SYLLABUS

Bachelor of Computer Applications

2nd SEMESTER

Session 2020 - 2021

<u>Mission of SCS&IT, DAVV</u>

To produce world-class professionals who have excellent analytical skills, communication skills, team building spirit and ability to work in cross cultural environment.

To produce international quality IT professionals, who can independently design, develop and implement computer applications.

Professionals who dedicate themselves to mankind, who are environment conscious, follow social norms and ethics.

School of Computer Science & IT,
Devi Ahilya Vishwa Vidyalaya, Indore
www.scs.dauniv.ac.in

Course Name: BCA 2ndSemester

Subject Code: IC-1905

Subject Name: English language and Composition

Aim of the Subject

To Improve English Language Proficiency

Objectives

To develop communicative competence and grammatical competence of the students.

Learning Outcomes

student should be able use the language effectively.
develop the language skills

Unit 1

literature
Where the Mind is Without Fear
2. A Hero
3. Tryst With Destiny
4. Indian Weavers
5. The Portrait of a Lady
6. The Solitary Reaper

Unit 2

Basic Language Skills:
Countable and Uncountable Nouns,
Verbs, types of verbs
Tenses,
determiners,
adjectives
Adverbs
prepositions
conjunctions

Unit 3

Basic Language Skills,
Vocabulary: Synonyms, Antonyms,
Word Formation, Prefixes, Suffixes,
Confusing Words, Misused Words,
Similar Words with Different Meanings

Unit 4

sentence , hierarchy of sentence, phrases, types of phrases, classification of sentence based on function and structure, parts of sentences

Unit 5

Composition and Paragraph Writing, types of paragraph, descriptive paragraph

Text Book(s)

Text Book: English Language and Literary Heritage of India, Foundation course (English Language) Published by Commission for Scientific and Technical Terminology and M P Hindi Granth Academy Edition first (2017)

Reference Material(s)

English usage- Michael swan, English grammar and composition Wren and martin

Course Name: BCA 2ndSemester
Subject Code: IC 1924
Subject Name: Hindi Language

Aim of the Subject

नाटक तर को विद्यार्थियों को सम्प्रेषण कौशल में दीक्षित करना

Objectives

साहित्य, भाषा और सांस्कृतिक चेतना से परिचित करवाना

Learning Outcomes

विद्यार्थी की अपने समाज, इतिहास, संस्कृति और प्रकृति आदि के प्रति एव

थ दृष्टि

विकसित होगी

Unit 1

(क) मानक हिंदी भाषा

(ख) अशुद्धियाँ और उनका संशोधन

Unit 2

(क) हिंदी का शब्द-भंडार

(ख) हिंदी की वाक्य-रचना और विराम चिन्ह

Unit 3

पत्र लेखन, सार-लेखन और पल्लवन

Unit 4

(क) भारत देश और उसके

निवासी (ख) भारतीय समाज

की संरचना (ग) सामाजिक म

तिशीलता

(घ) धर्म और दर्शन

Unit 5

(क) भारतीय संस्कृति का विश्व पर प्रभाव

(ख) मध्यप्रदेश का सांस्कृतिक वैभव

Text Book(s)

Reference Material(s)

Swayam Prabha 34 DTH Channel

Course Name: BCA 2ndSemester

Subject Code: CS-2020

Subject Name: Electronic Circuits

Aim of the Subject

This course aims to provide students with the basics of electronic Circuits, in particular, the fundamental laws of electric circuit analysis.

Objectives

To expose the students to the rudiments of electronic circuits, principals of working of

measuring equipments.

To expose the students to the various electronics components and devices with their

principle of operation and some applications

Learning Outcomes

1.To be able to understand basic electrical properties.

2. To be able to analyze electrical circuits.

3. Understand and analyze circuits with devices: operational amplifiers, diodes, bipolar

junction transistors and MOS

4 . Use complex impedances to determine the frequency response of circuits.

5 . Use operational amplifier models in circuits which employ negative feedback.

Unit 1

Introduction of the conductor, semiconductor and insulators. Overview of the semiconductors materials like intrinsic and extrinsic semiconductors. Drift current, diffusion current and mobility. Mechanism of current flow in semiconductors. Overview of the semiconductor diode and formation of depletion layer. Effect of temperature on barrier voltage, mechanism of current f low in PN junction diode. Voltage/ Current characteristics of PN junction diode. Temperature effect on V/I characteristics, ideal diode. Diode parameters like bulk resistance, static resistance and peak inverse voltage (PIV).

Unit 2

Half wave rectifier and its derivation. Finding the input ac power, efficiency, voltage regulation and ripple factor of half wave rectifier. Full wave rectifier classification. Overview of the Zener diode and understand V/I characteristics of Zener diode. Junction breakdown, avalanche breakdown, biasing, application of Zener diode as a voltage regulator, peak clipper and Zener diode as a meter protector. Schottky diode Properties of Schottky diode and its applications. Varicap or Varactor diode and its curve, construction of power diode. Tunnel diode and its V/I characteristics.

Unit 3

PNP, NPN Transistor. Transistor biasing fixed bias circuit, emitter stabilized bias and voltage

divider bias. Transistor behavior on the basis of output characteristics, load line analysis and operating point (Q point) and factors affecting it. DC voltage with voltage feedback ,some numerical based on it. Transistor as a switch, amplifier and emitter follower. Classification of amplifier, multistage amplifier construction and working of RC coupled amplifier. Frequency response of R- C amplifier and its advantages and disadvantages. Transformer coupled amplifier, frequency response and its advantages and disadvantages.

Unit 4

Transistor Configuration CB ,Characteristics of CB configuration ,Common emitter configuration ,Characteristics of CE configuration Common collector ,Characteristics of CC configuration ,Transistor behavior on the basis of output characteristics, load line analysis and operating point (Q point) and factors affecting it. Direct coupled amplifier and its advantages and disadvantages. Overview of Class A, Class B amplifier and their voltage-current graphs. Overview of Class AB, Class C amplifier and their voltage-current graphs. Push Pull operation: - Class A and Class B push pull amplifier its operation and efficiency. Quantity of power amplifier, collector or efficiency of amplifier.

Unit 5

Distortion, harmonic distortion and cross over distortion. Construction of FET and its biasing. Some characteristics regarding FET. Some definitions and regarding FET (shorted gate drain current, pinch of voltage). Some parameters regarding FET (AC drain resistance).Construction and working of Depletion type MOSFET. Construction and working of Enhancement type MOSFET. Characteristics curve.

Text Book(s)

1. Electronic Principle by Albert Paul Malvino, McGraw-Hill 7th Edition

Reference Material(s)

1. Electronic Devices and Circuits by Robert Boylstad Pearson Education
2. Malley, J. (1992). Basic Circuit Analysis, 2nd Edition. McGraw-Hill.

Course Name: BCA 2ndSemester
Subject Code: CS-1102
Subject Name: Mathematics-II

Aim of the Subject

The aim of this course is to provide mathematical background to the students so that they can be able to solve any problem related to computer science. This course will enable them to analyze and understand any problem mathematically.

Objectives

1. Know Fourier series, Laplace transforms, Differential equations, Linear and Non Linear differential equation and Vector calculus.
2. Understand their applications.
3. Solve related simple numerical problems which enable them to understand the subject.

Learning Outcomes

1. Student will understand the importance of mathematics and its application in computer science.
2. Enhance Mathematical Reasoning of students.
3. Problem solving ability of students.
4. Understand Fourier series and half range series .
5. . Know Laplace transforms & Inverse Laplace transforms of simple functions,their elementary properties, applications of Laplace transforms.
6. Study of differential equations.
7. . Study of Linear and Non-Linear Partial differential equation of first and second order with constant coefficients.
8. Understanding Vector calculus.

Unit 1

Fourier Series. Half Range Fourier Series, Laplace transforms & Inverse Laplace transforms of simple functions, their elementary properties, applications of Laplace in solution of ordinary differential Equations.

Unit 2

Second Order Differential Equation with Variables Coefficients (Only by method: One solution is known and Variation of Parameters).

Unit 3

Solution of Differential Equation by Series method, Legendre's and Bessel's equation and their elementary properties.

Unit 4

Linear and Non-Linear Partial differential equation of first and second order with constant coefficients, Separation of variable method.

Unit 5

Vector calculus, Vector Differentiation, Velocity and acceleration, Gradient, Divergence and Curl. Line and Surface integral, Stoke's and Gauss divergence theorem.

Text Book(s)

Engineering Mathematics " Dr. D C Agarwal" Fifth Edition, Published by Shree Sai Prakashan

Reference Material(s)

Higher Engineering Mathematics - by B.S. Grewal, Edition: 36, Khanna Publishers, 2001. ISBN: 8174091157, 9788174091154

Higher Engineering Mathematics – BV Ramana, Tata McGraw-Hill Education, 2006, ISBN: 007063419X, 9780070634190

Course Name: BCA 2ndSemester
Subject Code: CS-1202
Subject Name: Programming and Problem-Solving Using C - II

Aim of the Subject

Aim of this course is to understand and solve logical & mathematical problems through C language. Strengthen knowledge of a procedural programming language. Design and develop solutions to intermediate level problems using the C language. Further develop .

Objectives

- To understand various steps in Program development.
- To understand the basic concepts in C Programming Language.
- To learn how to write modular and readable C Programs.
- To develop skills to solve complex and logical problems.
- To enable students for software development using C programming.
- To develop the basic programming constructs in order to easily switch over to

any other language in future.

Learning Outcomes

- Introduce the concept of a program (i.e., a computer following a series of instructions).
- Introduce the concept of an algorithm (that is, a series of steps that can be carried out in a mechanical way) and a few specific examples of algorithms (for example, finding an average, sorting, searching).
- Introduce the concept of a variable holding a value, how a variable is

declared and how it can be changed.
. Introduce the concept of a loop – that is, a series of statements which is
- written once but executed repeatedly- and how to use it in a programming language.
- Be able to use a conditional statement to select a choice from two or more alternatives
- Be able to break a large problem into smaller parts, writing each part as a module or a function
- Be able to use an array to store multiple pieces of homogeneous data, and use a structure to store multiple pieces of heterogeneous data .
- Introduce the concept of Pointers Structures, Union and File handling

Unit 1

REVIEW FUNDAMENTALS OF C, Introduction of Arrays: Array initialization, Bound checking, Programs using 1D Array, Advantages and disadvantages of Arrays, Some exercise based on passing arrays to function, 2D and multidimensional array,

Matrices operation (Addition, Subtraction, Multiplication), Some exercises based on 2-D Array. Introduction of user defined functions along with examples, Functions with arguments without arguments along with the examples. Communication between functions (how one function calls the other functions). Exercise based on functions.

Unit 2

Introduction of Pointers: Pointers declaration, pointer arithmetic and operation, some programs based on pointers, Function Call by reference and Call by Value, Functions returning pointers, Pointers as parameter to function. APLLICATIONS OF POINTER, Uses and pitfalls, Dynamic Memory allocation (malloc() and calloc() functions), Exercise based on Dynamic Memory allocation. Array and Pointer Relationship, Pointer and Functions.

Unit 3

String Handling: Pointers and strings, standard library string functions, Array of pointers to
strings and its limitation, Introduction of Storage classes (register, static , auto and Extern) and their differences, Some exercises based on different storage classes.
Introduction of Structures: Structure declaration, program and application. Introduction of Union: Union declaration, program and application. Difference between Structure and Union. Some standard Functions like gets(), goto() , puts(), getchar() , putchar(), getche() etc.

Unit 4

Arguments to main: Introduction of argc and argv. Enumerations and bit fields and program
based on it. Introduction of bit wise operators along with examples. Concept of typedef and its programming. Concept of Pre-Processors: macro expansion, file inclusion, Conditional
compilation. Macros with argument and macro versus function. Concept of local and global
variables. Header files creation.

Unit 5

Introduction to file handling: Different operations on file like read, write and append. File Creation and programs based on file creation, reading and merging. File management and programs based on file management. Advanced pointer, other programming Techniques

Text Book(s)

1. Herbert Schildt, "C++ The Complete Reference", Osborne/McGraw-Hill

2. Let us C, Yashavant Kanetkar, BPB Publications.

3. Working with C, Yashavant Kanetkar, BPB Publications.

Reference Material(s)

Pointer in C- Yashwant Kanetkar-BPB Publication

Course Name: BCA 2ndSemester

Subject Code: CS-1501

Subject Name: Operating System Basics & PC Packages

Aim of the Subject

To make understanding of structure and functions of modern operating system and become proficiency in creating formatted documents.

Objectives

Course Objectives:

• To recognize the concepts and principles of operating systems.

• To provide comprehensive introduction to understand the underlying principles, techniques, approaches, various types and functions in operating systems.

• To describe of operating systems.

• To explain and execute various DOS and Unix operating commands.

• To be proficient in important Microsoft Office programs.

• To use Word, Excel and PowerPoint in a variety of professional, educational, and personal situations.

Learning Outcomes

Learning Objectives: Upon successful completion of this course, students are expected to have the ability to:

• Understand and describe the basic components of a computer operating system, and the interactions among the various components.

• Describe the general architecture of computer contrast and compare differing structures for operating systems.

• Conceptualize synchronization amongst various components of a typical operating system.

• Understand and simulate activities of various operating system components.

• Make files and understand the high-level structure of the Unix Operating.

• Correlate basic concepts of operating system with an existing operating system.

• Claim proficiency in Word, PowerPoint and MS-Excel.

Unit 1

Operating System:Evolution of an operating system, Define Operating System, Objectives andfunctions of an operating system, the operating system as a resource manager, types of an operating system. Differentiate DOS, Windows and Linux/Unix operating system.

Unit 2

Introduction to Windows XP: Windows XP features, Windows Desktop Setting, managingwindows explorer.Windows XP: Using Taskbar, Start Menu option, My computer, Recycle Bin, My Network Place, My Documents, Creating user Accounts in Win- XP.Windows Accessories: Calculator, Note Pad, Word Pad, Paint, Entertainment, Address Book.

Unit 3

Control Panel: Installation of Software, Addition of new hardware, installation of Modem, Sound card, Printers and Scanner, Date and time, taskbar and start menu.Windows Explorer: Creating a new folders and other explore facilities, changing the look and feel of windows (Desktop, Wallpaper, Screen saver etc.)

Unit 4

MS Word: Define word processor, types of word processor, creating document in MS word,formatting features of MS word, word standard toolbar ,text formatting, header and footer, auto text, document.MS Power Point: creating presentation using slide master, working with different view and menu, editing and formatting text, slide time management process, inserting data and pictures.

Unit 5

MSEXCEL: Saving and quitting worksheet, opening and moving in an worksheet, toolbar andmenus, working with formulas and cell referencing, Auto sum, Absolute and relative addressing, working with graph, function, pivot table, data sort, data filter.

Text Book(s)

1. .Microsoft Windows XP STEP BY SETP-PHI
2. Operating System –William Stallings –Pearson Education
3. Unix Operating System –Sumitabha Das –Tata McGraw Hill

Reference Material(s)

1. Introduction to computer –Nortal
2. Microsoft Office : Ron Mansdield BPB Publication

ASSIGNMENT QUESTIONS
SEMICONDUCTORS DIODES AND its APPLICATIONS.

1.Explain the quantitative theory of p-n junction.

2. With the help of the diode equation, explain the V-I characteristics of p-n junction

3. Explain the V-I characteristics with respect to the current equation

4. Draw and explain V-I characteristics of hot carrier diode

5. Write the current equation of a p-n junction and explain the V-I characteristics. What is the effect of temperature on cut-in voltage and reverse saturation current?

6. Differentiate between Zener breakdown and Avalanche breakdown

7. Draw and explain V-I characteristics of a varactor diode.

8. Draw the volt- ampere characteristics of a silicon diode marking the cut-in voltage. Briefly explain the V-I characteristics with respect to the diode current equation

9. Draw and explain the V-I characteristics of silicon and germanium diodes

10. Write the diode equation and explain the significance of the terms

11. Define ripple factor show from first principles R.F.of a H.W.R.is1.21

12. Draw and explain the working of bridge type F.W.R with necessary waveforms. Derive the expression for Idc and η

13. Design the Zener regulator for the following specifications Output voltage =5V Load current =20Ma Zener wattage =500mW Input voltage =125± 3V

14. Draw the bridge rectifier circuit and explain its operation with wave form 15. Explain the working of a full wave bridge rectifier with the help of circuit diagram and

Mathematics-II
List of Assignments

1. Find a series of sines and cosines of multiples of x which will represent f(x) in the interval $(-\pi, \pi)$ when
$$f(x) = \begin{cases} 0, & -\pi < x < 0 \\ \frac{\pi x}{4}, & 0 < x < \pi \end{cases}$$

   Hence show that $\frac{\pi^2}{8} = 1 + \frac{1}{3^2} + \frac{1}{5^2} + \frac{1}{7^2} + \cdots$

2. Prove that $L\{e^{at}\} = \frac{1}{p-a}$.

3. Find the Laplace transform of the function $e^{3t} \sin 2t$.

4. Evaluate: (i) $L^{-1}\{\frac{p+4}{p^2+8p+5}\}$ (ii) $L^{-1}\{\frac{p+4}{p^2+8p+5}\}$.

Solution of Second Order Differential Equation with variable coefficient
When one solution is known

1. Solve $(3-x)\frac{d^2y}{dx^2} - (9-4x)\frac{dy}{dx} + (6-3x)y = 0$, given that $y=e^x$ is one solution.

2. Solve $\frac{d^2y}{dx^2} - \cot x \frac{dy}{dx} - (1-\cot x)y = 0$, given that $y=e^x$ is one solution.

3. Solve $x\frac{d^2y}{dx^2} - 2(x+1)\frac{dy}{dx} + (x+2)y = 0$, given that $y=e^x$ is one solution.

4. Solve $x\frac{d^2y}{dx^2} + (x-2)\frac{dy}{dx} - 2y = 0$, given that $u = e^{-x}$ is one integral.

5. Solve $(x+2)\frac{d^2y}{dx^2} - (4x+9)\frac{dy}{dx} + (3x+7)y = 0$, given that $u = e^x$ is one integral.

6. Solve $(x+2)\frac{d^2y}{dx^2} - (2x+5)\frac{dy}{dx} + 2y = 0$, given that $u = e^{2x}$ is one integral.

7. Solve $x2\frac{d^2y}{dx^2} - (x^2+2x)\frac{dy}{dx} + (x+2)y = 0$, given that $u = x$ is one integral.

8. Solve $x^2\frac{d^2y}{dx^2} - 2x(1+x)\frac{dy}{dx} + 2(1+x)y = 0$, given that $u = x$ is one integral.

Method of Variation of Parameters

1. Solve $(D^2 + 1)y = x$.
2. Solve $(D^2+1)y = \text{cosec } x$.
3. Solve $(D^2 + 4)y = 4 \tan 2x$.
4. Solve $(D^2 + a2)y = \sec ax$.
5. Solve $(D^2 + 4)y = \sec 2x$.
6. Solve $(D^2 +1)y = \sec x$.

Partial differential equations of first order

1. Solve : $x(y^2 + z)p - y(x^2 + z)q = z(x^2 - y^2)$.
2. Solve : $x^2 p + y^2 q = nxy$.
3. Solve : $x^2 p + y^2 q = z^2$.
4. Solve : $p \tan x + q \tan y = \tan z$.
5. Solve: $z(p - q) = z^2 + (x + y)^2$.
6. Solve: $\dfrac{1}{a}(b-c)\, yzp + \dfrac{1}{b}(c-a)\, zxq = \dfrac{1}{c}(a-b)\, xy$.
7. Solve: $z(xp - yq) = y^2 - x^2$.

Partial differential equations with constant coefficients

1. $(D^2 - 2DD' + D'^2)z = 12xy$
2. $(D^2 + 3DD' + 2D'^2)z = x + y$
3. $(D^2 - DD' - 6D'^2)z = xy$
4. $r - 2s + t \sin(2x + 3y)$
5. $(D^2 - 2DD' + D'^2)z = e^{x+y}$
6. $4r - 4s + t = 16\log(x + 2y)$
7. $r - t = x - y$
8. $2r - s - 3t = 5\, e^{x-y}$
9. $(2D^2 - 5DD' + 2D'^2)z = 24(y - x)$
10. $(D^3 + D^2 D' - DD'^2 - D'^3)z = e^{2x+y} + \cos(x + y)$
11. $(D^3 - 2D^2 D' - DD'^2 + 2D'^2)z = e^{x+y}$

Vector Differentiation

1. If $r = a\cos t\, i + a\sin t\, j + t\, k$, find $\dfrac{dr}{dt}, \dfrac{d^2 r}{dt^2}, \left|\dfrac{d^3 r}{dt^3}\right|$.
2. A particle moves along the curve $r = 3t^2 i + (t^2 - 2t)\, j + t^2 k$. Find the velocity and acceleration at $t = 1$.
3. A particle moves along the curve whose parametric equations are $X = e^{-t}$, $y = 2\cos 3t$, $z = \sin 3t$. Find the velocity and acceleration at $t = 0$.
4. If $r = \sec t\, i + \tan t\, j$ be the position vector of a point at any time t , find velocity and acceleration at $t = \dfrac{\pi}{6}$.
5. If a, b are constant vectors, ω is a constant, and r is a vector function of the scalar variable t given by $r = a\cos \omega t + b\sin \omega t$. Show that $r \times \dfrac{dr}{dt} = \omega a \times b$.

Gradient

1. $\phi(x, y, z) = xy^2 z$ and $I = xz\, i - xy\, j + yz^2 k$, show that $\dfrac{\delta^3}{\delta x^2\, \delta z}(\phi I)$ at $(2, -1, 1)$ is $4i + 2j$.
2. If $a = xyz\, i + xz^2 j - y^3 k$ and $b = x^3 I - xyz\, j + x^2 z\, k$, then calculate the value of $\dfrac{\delta^2 a}{\delta y^2} \times \dfrac{\delta^2 b}{\delta x^2}$ at the point $(1, 1, 0)$.

3. If $r = (2xy^2 - x^4)\, i + (e^{x+y} - y\sin x)\, j + x^2\cos y\, k$, verify that $\dfrac{\delta^2 r}{\delta x \delta y} = \dfrac{\delta^2 r}{\delta y \delta x}$.

4. Find the gradient of following functions at $(1, -1, 2)$.

       (i) $x^3 - y^3 + xz^2$ (ii) $\sin xyz$ (iii)   x3 + y3 + 3xyz

5. If $r = xi + yj + zk$, show that

       gard $\log R = \dfrac{r}{R^2}$ OR $\nabla \log R = \dfrac{r}{R^2}$

6. Show that $(u \cdot \nabla)\, r = u$.

7. If $u = x + y + z$, $v = x^2 + y^2 + z^2$ and $w = yz + zx + xy$, prove that
   (grad u) $\cdot$ [(grad v) X (grad w)]=0.

8. If $r = xi + yj + zk$, find $r \cdot \nabla \phi$ for $\phi = x^3 + y^3 + z^3 - 3xyz$.

Divergence and Curl

1. Show that div $r = 2/r$.
2. Show that div $R^n r = (n + 3)\, R^n$.
3. If $F = xyz\, i + 3x^2 y\, j + (xz^2 - y^2 z)\, k$, find div F.
4. If $V = e^{xyz}\, (I + j + k)$, find curl V.
5. If $f = xy^2 i + 2x^2 yz\, j - 3yz^2 k$, find div f and curl f at the point $(1, -1, 1)$.
6. If $a = x^2 z\, I - 2y^3 z^2\, j + xy^2 z\, k$, then find div a and curl a at the point $(1, -1, 1)$.
7. Find div (curl A), where $A = x^2 y\, i + xz\, j + 2yz\, k$.
8. If a is a constant vector, then show that curl $(a\ X\ r) = 2a$.
9. div $(\phi A) = \phi$ div A $+$ (grad ϕ) $\cdot$ A.
10. Curl $(\phi A) = \phi$ curl A $+$ (grad ϕ) X A.
11. div $(A\ X\ B) = B \cdot$ curl A $-$ A $\cdot$ curl B.
12. Curl grad $\phi = 0$.
13. div (grad ϕ) $= \dfrac{\delta^2 \phi}{\delta x^2} + \dfrac{\delta^2 \phi}{\delta y^2} + \dfrac{\delta^2 \phi}{\delta z^2}$.

SYLLABUS

Bachelor of Computer Applications

4th SEMESTER

Session 2020 - 2021

School of Computer Science & IT,
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Course Name: BCA 4th Semester
Subject Code: IC-2927
Subject Name: Environmental Awareness

Aim of the Subject

To develop awareness towards environment in society.

Objectives

1.To discuss different aspect of environment.
2. Aforestation, pollution, chemical usage in agriculture ,sustainable use of resources.

Learning Outcomes

1.Students will be more sensitive towards environment and its conservation.
2.Aforestation :Tree Plantation.
3.Live in harmony with nature.

Unit 1

Environment meaning, structure and type of environment, components of environment, society
and resources. Man environment relationship: Approach to study man interaction with
environment(historical to present day)

Unit 2

Environmental degradation: Meaning of degradation, types of degradation, process of
degradation, cause of degradation, Religious and philosophical factors, deforestation, agricultural
development and degradation, population growth and degradation, urbanization and degradation,
modern technology and degradation.

Unit 3

Ecology: Definition of ecology and ecosystem. Types of ecosystem, components of ecosystem,
functions of ecosystem, productivity and stability of ecosystem.
Environmental disasters: Meaning and concepts, types of hazards and disaster, man induced and
natural hazards, global warming, ozone depletion, green house effect and other major
environmental problems.

Unit 4

Environmental pollution: Air, water, solid, noise pollution. Meaning, definition, sources, types,

adverse effects and methods of control.

Unit 5

Environmental planning and management: Concepts, aspects and approaches, resources

management, ecological management. Biosphere reserves, management of wild life.

Environmental regulation and rules, Vision of Environment by govt. of India, Environmental

policy, waste disposal rules and laws and legislation enacted by parliament for environmental

protection.

Text Book(s)

Environmental Awareness : Dr. Dhananjoy Verma, Published by : Madhya Pradesh Hindi Granth Academy.

Reference Material(s)

Course Name: BCA 4th Semester
Subject Code: CS-3210
Subject Name: JAVA Programming

Aim of the Subject

The aim of this course is to understand the various concepts of Object Oriented Programming (OOP) using Java.

Objectives

1. To understand basics of programming such as variables, conditional statements, iterative execution, arrays etc.
2. To understand object oriented programming concepts viz. classes, objects, constructors, Inheritance, Interfaces, Packages etc.

Learning Outcomes

After completion of the course students will learn the following concepts:
1. Will be able to identify classes, data members and member function for a specific problem.
2. Will be able to implement the concept of Inheritance and polymorphism
3. Will be able to implement Packages
4. Will be able to handle Exception, Multithreading, I/O basics and Applets

Unit 1

Features of java: Object-Oriented programming overview: Introduction of java Technology, Installing java, java program development, java source file, compilation, execution.

Data Types, Variables, Memory concepts, Naming conventions, primitive data type, declarations, variable name, numeric, literals, character literals, String, string literals, printing to console and taking input through console (scanner class).

Expressions: Assignment operator arithmetic operators, relational operators, logical operators, increment and decrement operators, conditional operator, operator precedence.

Unit 2

Statements: conditional: if, else if, switch statement. Break and Continue, type conversion and casting, command-line arguments.

Introduction to class, Objects, Methods and Instance Variable, primitive type vs reference type

Initializing objects with constructors, access modifiers, and encapsulation.

Final instance variable, this reference, garbage collection and finalize method, overloading methods.

Unit 3

Array declaring and creating array, passing array to methods, multidimensional array, variable length. Static method, static field and Math Class.

String Handling: String constructors, data and member functions, character extraction, string comparison, string buffer etc.

Inheritance: Inheritance basics, member access and inheritance, using super keyword, creating a multilevel hierarchy.

Polymorphism: Method overriding, dynamic method dispatch, final method and classes, abstract classes and methods, instances of operator, The object class.

Unit 4

Package: defining a package, understanding CLASSPATH, access protection, importing packages, creating own packages.

Interface: defining an interface, properties of interface, advantage of interface, achieving multiple inheritance through interfaces, variables in interfaces.

Exception Handling: Introduction, Keywords (try, catch, throw, throws), finally keyword, chained exception, user defined exception.

Unit 5

Multithreading: what are threads, the java thread model, thread priorities, thread life cycle, creating thread and executing thread.

Streams and Files: Introduction, files and streams, java stream class hierarchy. Executing file handling

Applets: Applet basics, applet architecture, applet life cycle method, applet HTML tag and attributes, executing applet in web browser and in the appletviewer.

Text Book(s)

1. The complete reference by Herbert Schildt, Tata McGraw-Hill
2. JAVA how to program by Deitel & Deitel, Pearson education

Reference Material(s)

1. Head Firs JAVA by KathySierra & Bert Bates.

Course Name: BCA 4th Semester
Subject Code: CS:3006
Subject Name: Microprocessor and Assembly Language Programming

Aim of the Subject

The aim of this course is to understand the various functions and architecture of microprocessor

Objectives

To learn about various terminologies related to microprocessor.
• To understand the various functional units of computer.
• To understand the architecture of 8085 Microprocessor
• To learn about the various units of ALU.
• To understand about various types of addressing modes.
• To learn the various instruction set of 8085 processor, so that they will be able to
do assembly language programming.
• To perform different operations on data using assembly language programming.
• To acquire the knowledge of Interfacing of I/O and Memory peripherals with
microprocessor.
• To Design few sample applications using assembly language programming

Learning Outcomes

1. Students will be familiar with functional units of CPU.
2. They will be aware about architecture of 8085 Microprocessor.
3. They will have knowledge of flowchart and assembly language programming.
4. They will have understanding about various types of instruction formats and addressing
modes.
5. They will be able to do different operations on data using assembly language
programming.
6. They will be familiar with the concept of Interfacing of I/O and Memory peripherals with
microprocessor.
7. They will be able to make sample applications using 8085 assembly language program

Unit 1

Basic Terminologies: Microprocessor, Centre Processing Unit (CPU), Minicomputer and
Microcontroller, Basic Architecture of Computer. System Bus: Data bus, address bus and control bus. Programming concepts: Machine Language, Assembly Language, and High-Level Language, Evolution of Microprocessors

Unit 2

Introduction of 8085 Microprocessor: Architecture of 8085 processor, Register Architecture: Accumulator, Temporally Register and Flag Register. Program Counter, Stack pointer and Instruction register.
Addressing Modes: Direct addressing mode and Register direct Addressing Mode. Register
Indirect Addressing Mode, Immediate Addressing Mode and Implicit or Implied Addressing
Mode. Overview of addressing modes of 8086 Microprocessor

Unit 3

Introduction to Assembly Language Programming: Various Instructions Classifications:
Instruction Format, Opcode, Operand and Hex code. Instruction Operation Status, Various
Instruction Sets: Data Transfer Group Instructions: Arithmetic Group Instructions, Logical
Group Instruction, Branch Group Instruction, Conditional and Unconditional branch instruction I/O and Machine control Instructions.

Unit 4

Solving Problems with Flowchart, Programming Techniques: BCD to binary conversion, Binary to BCD conversion, BCD addition and subtraction.
Machine cycle,T-State, control signal for opcode fetch cycle,Timing Diagram for opcode fetch cycle, Memory read and memory write cycle,I/O read,I/O write cycle. Counters and Timing Delays, Some Programs based on Counters and Time- Delays, Debugging Counters and Time-Delay Programs, Stack, Subroutine, Some Programs based on Subroutine .Advanced Subroutine Concepts,

Unit 5

Introduction to Various Peripheral devices: Basic Interfacing Concepts: Output Displays, Interfacing Input Keyboards (8212 device).Overview of Memory-Mapped I/O,

Overview of Interfacing Memory.8255 Peripheral Interfacing, Block Diagram of 8255,Pin

description of 8255 IC, Parallel ports of 8255 IC. Direct memory access(DMA)8257 IC Block diagram, Pin description and modes of operations. Interrupt System: Programmable interrupt controller(PIC) IC 8259 Block diagram, Pin description and modes of operation. Progammable Communication Interface. IC 8251(USART)

Text Book(s)

1. Microprocessor Architecture, Programming and Applications with 8085/8080 by Ramesh
S.Gaonkar, Edition5, illustrated, ISBN0130195707, 9780130195708

Reference Material(s)

1. Introduction to Microprocessor by D.A.Godse A.P.Godse, ISBN8184311265, 9788184311266
2. Microprocessor and Its applications by R Theagrajan,S Dhanapal Publisher-New Age
International, 2004, ISBN-8122410405, 9788122410402
3. Microprocessors and Microcom

Course Name: BCA 4th Semester
Subject Code: CS-2133
Subject Name: Statistics & Probability

Aim of the Subject

To make student aware about the basic concepts of statistical and probability methods for data analysis.

Objectives

1. Understanding the basic concept of of measure of Central tendency, dispersion , standard deviation, variance and coefficient of dispersion
2. Understanding the basic principles of probability including law of addition and multiplication of probability and conditional probability, Bayes Theorem
3. Define the binomial Poisson and continuous distribution and curve fitting
4. Understand the basic concept of correlation and regression
5. Learn the basic concepts of hypothesis testing

Learning Outcomes

1. Learn about simple methods of statistics
2. Familiar with measures of Central tendency and dispersion
3. Evaluate the probabilities and conditional probability
4. Calculate the number of samples needed to construct confidence levels on the mean and variance of a normal distribution
5. Use linear regression analysis to develop model of experimental data

Unit 1

Measures of central tendency: Arithmetic Mean, Median and Mode. Geometric mean, Harmonic Mean and Partition values. Measures of dispersion: Dispersion, Range, Quartile Deviation, Mean deviation, Standard Deviation, Variance and Coefficient of Dispersion.

Unit 2

Skewness, Kurtosis, Moments, Measure of skewness and kurtosis. Theory of probability: Introduction and definition of Probability, Event, Sample Space, Law of addition and multiplication of Probabilities and Conditional Probability. Independent and Dependent events, Bayes' theorem, Mathematical Expectations and Moment generating functions.

Unit 3

Theoretical Distribution: Discrete Distribution- Binomial Distribution and Poisson Distribution. Continuous Distribution –Rectangular and Normal distribution. Curve fitting: Curve fitting and Methods of Least square, fitting a Straight line and a Parabola.

Unit 4

Correlation and Regression: Correlation, Coefficient of Correlation, Rank Correlation, Lines of Regression. Multiple and Partial Correlation.

Unit 5

Testing of hypothesis: Null and Alternative hypothesis, two types of errors, level of significance and power of the test. Tests of significance: Chi-square distribution, test of popular variance and test of goodness of fit. t, F, Z distribution and tests based on them.

Text Book(s)

S.C.Gupta, V.K.Kapoor "Fundamentals of Mathematical Statistics". 10th Edition, Publisher: Sultan Chand, 2000

Reference Material(s)

1. D.N.Elhance.-'Fundamentals of Mathematical Statistics' Kitab Mahal, Allahabad
2. A.M.Goon, M.K.Gupta & B. Dasgupta (1980): An outline of Statistical theory, Vol. I, 6th revised edition, World Press.

Course Name: BCA 4th Semester

Subject Code: CS-3026

Subject Name: Database Programming using Visual Basic

Aim of the Subject

The aim of the course is to make students able to handle database with the help of Visual Basic as front end.

Objectives

- To make students familiar with basic concepts for database designing.
- Students must be able to design User Interfaces.
- To make students familiar with Event Handling.
- Student must be able to insert, manipulate and delete data from database.
- To make students familiar with Visual Basic Integrated Development Environment.
- Students must be able to develop minor project of database through VB.

Learning Outcomes

1. Understand key terms: Data, Information, Database Files, Table, Fields, Data Types, Primary Key, and Foreign Key.

2. Understand the Form designing issues in Visual Basic. Use of Different Components like text box, button, radio button, list box, drop-down list box and drop-down list box ,menu Items, Tool Strip control and use of Dialog Box..

3. Understand programming issues like Declare a variable, Change the value of a variable, Get input/Output with a dialog box, Create a constant, Evaluation of formulas, Combine text strings and Include a class library. Use of conditional expression, If… Then decision structure, Select Case decision structure, Loop Control Statements. Error handling and Error by try catch (Exception).

Unit 1

Introduction: Data, Information, Data v/ s Information, Database Management System,Advantages of DBMS approach over File System, Meta Data, Architecture of DBMS, Data independency. DBA(Roles & Responsibility), Data Models, Different Models of DBMS, Cardinality, Special Features of E-R Models

Unit 2

Key Concepts: Primary, Unique, Secondary, Candidate, Super, Foreign Key Relational Algebra, SQL. Exercise: Queries (Simple & Complex). MS- Access: Database Files, Table, Fields, Data Types. Creating and Manipulating Database.

Unit 3

Introduction of Visual Studio: IDE, Start Visual Studio, Open an existing project, Compile and run a program, Create a user interface. Design Issues: Use of text box, button, radio button, list box, drop-down list box and drop-down list box. Creation of menu Items, Tool Strip control, use of Dialog Box.

Unit 4

Programming Issues: Declare a variable, Change the value of a variable, Get input/output witha Textbox, Create a constant, formula, and Combine text strings. Write a conditional expression, Use an If...Then decision structure, Make two comparisons in a conditional expression, Use a Select Case decision structure. Loop Control Statements. Error handling, Error by try catch.

Unit 5

Database Programming : : Establish a connection to a database; Create a dataset, Create bound objects capable of displaying data from a dataset on a Windows form, Add navigation controls to a Windows form, Format database information on a form. Create a data grid view object on a form to display an entire database table, Preview data bound to a data grid view object. Connection with database. Data Access Components, Data Manipulation.

Text Book(s)

MF: Database Management by Fred R. McFadden.
SBS: Microsoft® Visual Basic® Step by Step By Michael Halvorson
WBV: Wrox Beginning Visual Basic

Reference Material(s)

1. Fundamentals of Database Systems, Shamkant B. Navathe
2.Database Management Systems,Alexis Leon and Mathews Leon, Leon Vikas, 2002
3.Database Management Systems, Raghu Ramakrishnan

SYLLABUS

Bachelor of Computer Applications

6th SEMESTER

Session 2020 - 2021

Mission of SCS&IT, DAVV

To produce world-class professionals who have excellent analytical skills, communication skills, team building spirit and ability to work in cross cultural environment.

To produce international quality IT professionals, who can independently design, develop and implement computer applications.

Professionals who dedicate themselves to mankind, who are environment conscious, follow social norms and ethics.

School of Computer Science & IT,
Devi Ahilya Vishwa Vidyalaya, Indore
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Course Name: BCA 6th Semester

Subject Code: CS-3605

Subject Name: Web Technology and Programming

Aim of the Subject

To develop an ability to design and implement static and dynamic website using scripting languages.

Objectives

• To understand the principles of creating an effective web page, including an in-depth consideration of web system architecture.

• To learn the language of the web: HTML, CSS, Java Script and PHP.

• To write well-structured, easily maintained, standards-compliant CSS code to present HTML pages in different ways.

• To develop skills in designing dynamic websites that meet specified needs and interests.

• To develop skills in analyzing the usability of a web site.

• To Design and deploy attractive web application using PHP and MQL Database connectivity.

• To apply different types of validations for all major browsers.

Learning Outcomes

Learning Outcomes

At the end of this course the successful student will be able to:

• Analyze a web page and identify its elements and attributes.

• Learn the language of the web: HTML, CSS, JavaScript, PHP, client server technology.

• Design well-structured, easily maintained, standards-compliant CSS code to present HTML layout.

• To design dynamic website by selecting HTML, CSS, and Java Script code from public repositories of open- source and free scripts that enhances the experience of site visitors.

• To Design and deploy attractive web application using PHP and MQL Database connectivity

• Apply different types of validations for all major browsers.

Unit 1

HTML & Forms: Introduction To HTML, WWW, W3C, web publishing, Common HTML, Tags Physical & Logical, Some basic tags like changing background color of page, text color etc., Text formatting tags, Ordered &Unordered Lists Tags, Inserting image, Links: text, image links, image mapping , Tables , Frames, Form: Introduction with text box, text area, buttons, List box, radio, checkbox etc

Unit 2

Internet Basics 1 Overview of Internet, history, web system architecture, Uniform Resource Locator, HTTP protocol basics, HTTP request & response, CSS: Introduction To Style sheet, types of style sheets- Inline, External, Embedded CSS, text formatting properties, CSS Border, margin properties, Positioning Use of classes in CSS, color properties, use of <div> &<span>

Unit 3

JavaScript:Introductionto script, types, Introduction of JavaScript, Java Script identifiers, operators, control & Looping structure, Intro of Array, Array with methods, Math, String, Date Objects with methods User defined & Predefined functions, DOM objects.

Unit 4

PHP: History of PHP, Requirements for PHP, PHP Fundamentals, Calculations and Operators, Control Structures, Built- in PHP Functions, User- Defined Functions, Arrays and Objects, File handling functions, miscellaneous functions, Opening a File, Reading Text from a File, Writing Text to a File, Closing a File, Locking Files.

Unit 5

Handling Session and Cookies: Concept of session, Starting session, Modifying session variables, Concept of cookies, Handling of cookies, GET and POST methods, Working MySQL with PHP, database connectivity, usages of My SQL commands in PHP.

Text Book(s)

1.Schafer, Steven M.Web standards programmer's reference: HTML, CSS, Java Script, Perl, Python, and PHP. John Wiley & Sons, 2007.
2.Batross, Ivan.Web Enabled Commercial Application Development Using HTML, DHTML, Javascript, Peril CGI. Bpb Publications, 200

Reference Material(s)

1. Sebesta, Robert W.Programming the world wide web. Pearson Addison Wesley, 2008.2.Glass, Michael K., et al.Beginning PHP, Apache, MySQL Web Development. John Wiley & Sons, 2004.3.Powell, Thomas A.HTML: the complete reference. McGraw-Hill Professional, 20

Course Name: BCA 6th Semester
Subject Code: IC – 3929
Subject Name: Entrepreneurship

Aim of the Subject

The Aim of this course is to inspire students and help them imbibe an entrepreneurial mind-set.

Objectives

- To familiarize the participants with the concept and overview of entrepreneurship with a view to enhance entrepreneurial talent.
- To impart knowledge on the basics of entrepreneurial skills and competencies to provide the participants with necessary inputs for creation of new ventures.
- To explore new vistas of entrepreneurship in 21st century environment to generate innovative business ideas.
- Familiarization with various uses of human resource for earning dignified means of living
- Understanding the concept and process of entrepreneurship - its contribution in and role in the growth and development of individual and the nation

Learning Outcomes

At the end of the course, the students will:
- Develop awareness about entrepreneurship and successful entrepreneurs.
- Develop an entrepreneurial mind-set by learning key skills such as design, personal selling, and communication.
- Understand the DNA of an entrepreneur and assess their strengths and weaknesses from an entrepreneurial perspective.

Unit 1

Unit I
Concepts of Entrepreneurship Development Evolution of the concept of Entrepreneur,
Entrepreneur Vs. Intrapreneur, Entrepreneur Vs. Entrepreneurship, Entrepreneur Vs. Manager,
Attributes and Characteristics of a successful Entrepreneur, Role of Entrepreneur in Indian
economy and developing economies with reference to Self- Employment Development,
Entrepreneurial Culture, Women Entrepreneurs.

Unit 2

Creating Entrepreneurial Venture, Business Planning Process, Environmental Analysis - Search and Scanning, Identifying problems and opportunities, Sources of Business Idea, idea generation - role of creativity & innovation and business research.

Unit 3

Technical, Financial, Marketing, Personnel and Management Feasibility, Estimating and

Financing funds requirement - Schemes offered by various commercial banks and financial

institutions, Venture Capital Funding.

Unit 4

Managerial roles and functions in a small business. Designing and redesigning, business

processes, location, layout, operations planning & control.

Unit 5

Role of Central Government and State Government in promoting Entrepreneurship - Introduction to various incentives, subsidies and grants. Role of following agencies in the Entrepreneurship Development - District Industries Centres (DIC), Small Industries Service Institute (SISI),

Entrepreneurship Development Institute of India (EDII), National Institute of Entrepreneurship & Small Business Development (NIESBUD), National Entrepreneurship Development Board (NEDB), MSME.

Text Book(s)

R.V. Badi- .V Badi, Entrepreneurship: Vrinda publications

Reference Material(s)

Reference Material(s) :
1. Udyamita (in Hindi) by Dr. MMP. Akhouri and S.P Mishra, pub. By National Institute for Entrepreneurship and Small Business Development (NIESBUD), NSIC-PATC Campus, Okhla
2. Everyday Entrepreneurs - The harbingers of Prosperity

Course Name: BCA 6th Semester
Subject Code: CS-3508
Subject Name: Introduction to Cloud Computing

Aim of the Subject

To provide students with the fundamentals of Cloud Computing and various cloud services.

Objectives

The objective of the course is to explore and understanding of following points-
1. Basic of Cloud Computing and its history.
2. Cloud Computing Platforms
3. Virtualization
4. virtualbox and AWS

Learning Outcomes

1. Explore the fundamental of cloud computing.
2. Compare the advantages and disadvantages of various cloud computing platforms.
3. Explore Virtualbox, Gsuite, AWS and hadoop
4. Understanding of Virtualization

Unit 1

Introduction to cloud computing, History, Importance of cloud computing in the current era, characteristics of cloud computing, what cloud computing really is and isn't, pros and cons of cloud computing, technologies in cloud computing.

Unit 2

Types of clouds, cloud infrastructure, cloud application architecture, working of cloud computing, trends in cloud computing, cloud service models, cloud deployment models, cloud computing and services pros and cons.

Unit 3

Cloud computing technology, cloud life cycle model, role of cloud modelling and architecture, cloud system architecture, virtualization, virtualization in cloud computing.

Unit 4

Data storage, data storage management in cloud computing, file system, cloud data stores, cloud storage characteristics. Introduction cloud security mechanism.

Unit 5

VirtualBox: Installation, features and characteristics, application of virtualbox, Google class room etc, case-study. Introduction to hadoop, AWS and Gsuite

Text Book(s)

Mastering Cloud Computing: Foundations and Applications Programming by Christian Vecchiola, Rajkumar Buyya, and S. Thamarai Selvi

Reference Material(s)

PPT will be given to students

Cloud Computing: A practical approach for learning and implementation, 1st edition, Pearson, A. Srinivasan, J. Suresh.

Course Name: BCA 6th Semester
Subject Code: CS-2502
Subject Name: Fundamentals of Operating Systems

Aim of the Subject

Develop general understanding of operating system and able to visualize the underlying working of operating system.

Objectives

A successful student will be able to understand the basic components of a computer operating system, and the interactions among the various components. The course will cover an introduction on the policies for scheduling, memory management, system calls, and file systems.

Learning Outcomes

Upon successful completion of this course, students are expected to have the ability to:
1. Describe and explain the fundamental components of a computer operating system.
2. Define, restate, discuss, and explain the policies for scheduling, memory management, system calls, and file systems.
3. Describe and extrapolate the interactions among the various components of computing systems.

Unit 1

Introduction: Typical application scenarios and role of OS in resource management, operational
view of a computer system. Evolution of operating systems, operating system concepts,
operating system services. Computer Systems: Multiprocessors, Distributed, Clustered, Real
time and Hand held systems

Unit 2

Introduction: Processor resource management: Explanation of processor as a resource, processor
utilization, multi-processing and time-sharing, response times.
Process Management: Process concepts, Operation on processes, Process state, process state
transitions

Unit 3

CPU Scheduling: process scheduling, short-term and long-term schedulers, Non pre-emptive
scheduling policies like FCFS, SJF etc. Gantt charts and parameters to compare performance,
context switching of process state information, Pre-emptive scheduling policies like Round
robin, Priority etc.

Unit 4

Introduction: Memory management: Motivation for memory management, Need of primary and
secondary memory management. Processes and management, fixed and variable partitions,
memory allocation policies, critique of various policies like first fit, best fit, worst fit, internal
and external fragmentation.

Unit 5

Introduction: Secondary memory management, file concepts, access methods, allocation
methods, free space management, disk structure, disk arm scheduling algorithm.

Text Book(s)

1. Operating Systems Concepts by Silbeschautz and Galvin.
2. Modern Operating System, Tanenbaum A.S., Prentice/Hall of India

Reference Material(s)

SYLLABUS

MBA (CM)

2nd SEMESTER

Session 2020 - 2021

School of Computer Science & IT,
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Course Name MBA (CM) 2nd Semester

Subject Code: IC-4917

Subject Name: Accounting and Financial Systems

Aim of the Subject

Development of understanding of basic concepts of Accounting

Objectives

The course is designed to make students:

1) Learn fundamental accounting concepts, elements of financial statements, and basic accounting vocabulary.

2) To give an in-depth knowledge of all business transactions and how they should be recorded, classified & interpreted to get a meaningful judgment of viability & profitability of the industry.

3) Learn the concepts of journal, ledger, final accounts, Inventory Management, Break Even Point.

4) To develop an understanding of financial statements and the principles and concepts underlying them

5) To lay foundation for developing the skills to interpret Financial Statements

6)) To enable students to work in the Financial Domains required in corporate sector to perform effectively as technical experts

Learning Outcomes

Students learn to prepare Balance Sheets and Operate on Tally Software

Unit 1

Introduction to book keeping: meaning, nature, development, objectives, merits and difference between book keeping and accountancy, Fundamentals of accounting: Accounting concepts and conventions. Brief introduction to GAAP and its importance.

Unit 2

Accounting structure: the process of accounting –journal, ledger, subsidiary books, Trial Balance based on double entry book keeping system

Unit 3

Financial Systems and related concepts: Form and preparation of Income statements , Statement of Financial Position, Method of Depreciation- SLM Method and WDV Method.

Unit 4

Break Even Analysis, Leverages: operating, financial and combined.

Unit 5

Inventory Management and Responsibility Accounting: Methods of Inventory Management and Material Issues, Responsibility Accounting- Meaning, Objectives and Importance, Accounting Package- Tally (operations).

Text Book(s)

1. Tulsian's Accountancy for Class XI
2. Financial Management by Khan & Jain

Reference Material(s)

1. Financial Accounting by T.S. Grewal.
2. NCERT Books on Accounting and Financial Management for Class XI and XII.

Course Name MBA (CM) 2nd Semester
Subject Code: CS-4405
Subject Name: Database Management System

Aim of the Subject

To develop the understanding of how data is structured into the memory and how efficiently it retrieves using a DBMS software.

Objectives

The objective of the course is to present an introduction to database management systems, with an emphasis on how to organize, maintain and retrieve - efficiently, and effectively - information from a DBMS.

Learning Outcomes

Upon successful completion of this course, students should be able to:
1. Describe the fundamental elements of relational database management systems
2. . Explain the basic concepts of relational data model, entity-relationship model, relational

database design, relational algebra and SQL.
3. Design ER-models to represent simple database application scenarios.
4. Improve the database design by normalization.
5. Familiar with basic database storage structures and access techniques: file and page

organizations, indexing methods including B tree.

Unit 1

Introduction and Relational Model: Advantages of DBMS approach, Various views of data, data
independence, schema & sub-schema, primary concept of data models, database languages,
transaction management, database administrator & user, data dictionary, database structure &
architectures. Relational Model: Domains, relation, kind of relation, Relational databases,
Various types of keys: candidate, primary, alternate & foreign keys, relational algebra with
fundamental and extended operations, modification of database.

Unit 2

ER Model and SQL: Basic concept, design issues, mapping constraint, keys, ER diagram,
weak& strong entity-sets, specialization & generalization, aggregation, inheritance, design of ER

schema, Reduction of ER Schema to tables. SQL: Basic structure of SQL, Set operation,
Aggregate functions, Null values, Nested Sub queries, derived relations, views, Modification of
database, join relation, Domain, relation & keys, DDL in SQL. Programming concepts of
PL/SQL, Stored procedure, Database connectivity with ODBC/JDBC 9. The concept of NoSQL,
Brief history of NoSQL, SQL verses NoSQL, CAP Theorem (Brewer's Theorem), No SQL
pros/ cons, Categories of No SQL database, Production deployment, Mongo Db, Key Features,
practical with MongoDb.

Unit 3

Functional Dependencies: Basic definitions, Trivial & non trivial dependencies, closure set of
dependencies & of attributes, Irreducible set of dependencies, FD diagram. Normalization:
Introduction to normalization, non loss decomposition, First, second and third normal forms,
dependency preservation, BCNF, multivalued dependencies and fourth normal form, join
dependencies and fifth normal form.

Unit 4

Transaction Management: Basic concept, ACID properties, transaction state, Implementation of
atomicity & durability, Concurrent execution, Basic idea of serializability. Concurrency &
Recovery: Basic idea of concurrency control, the basic idea of deadlock, Failure Classification,
storage structure-types, stable storage implementation, data access, recovery & Atomicity: log
based recovery, deferred database modification, immediate database modification, checkpoints.

Unit 5

Database Integrity, Storage Structure & File Organization: general idea, integrity rules, Domain
rules, Attributes rules, assertion, trigger, integrity & SQL. Storage Structure: overview of
physical storage media, magnetic disk: performance & optimization, RAID. File Organization:

File organization, Organization of records in files, the basic concept of Indexing, ordered indices:
B+ tree & B tree index files.

Text Book(s)

1. Database System concepts – Henry F. Korth , Tata McGraw Hill 6th Edition.

Reference Material(s)

Course Name MBA (CM) 2nd Semester
Subject Code: CS-4305
Subject Name: Software Engineering

Aim of the Subject

The course will help students to develop qualitative software product.

Objectives

1) Student will develop an understanding of Software Engineering principles.
2) Student will be able to deliver qualitative Software Products designed for different organizations.

Learning Outcomes

1) Student will understand process model, elements and characteristics of process model, process classification.
2) Student will understand project management essentials, project success and failures.
3) Student will develop understanding of SRS.
4) Student will understand Structured Design Methodology.
Student will develop good understanding of testing strategies, maintenance process models.

Unit 1

Introduction to Software Engineering & Software Processes: Software, Software Classifications and Characteristics, Emergency of Software Engineering, What is Software Engineering? Software Engineering Challenges, Software Processes: Process model, Elements and Characteristics of Process model, Process Classification, Phased Development Life Cycle, Software Development Processes: Waterfall model, Iterative Waterfall model, Prototyping model, Incremental model and Spiral model.

Unit 2

Project Management & Planning: Project management essentials, Project success and failures, Project Life Cycle, Project team structure and organization. Project planning activities, Metrics and Measurements, Project Size Estimation, Effort Estimation Techniques, Staffing and Personnel Planning, Project Scheduling and Miscellaneous Plans.

Unit 3

Requirement Engineering: Software Requirements, Requirement Engineering Process, Requirement Elicitation, Requirement Analysis (Structured Analysis, Object Oriented Analysis), Software Requirements Specification.

Unit 4

Software Design and Coding: Software Design Process, Characteristics of a Good Design, Design Principles, Modular Design, Software Architecture, Design Methodologies, Structured Design Methodology (SDM), Coding principles, Coding process, Code verification and documentations.

Unit 5

Software Testing, Quality and Maintenance: Testing Fundamentals, Test Planning, Black Box Testing, White Box Testing, Levels of Testing, Debugging Approaches, Quality Concept, Quality Factors, Verification and Validation, Quality Assurance Activities, Software Maintenance.

Text Book(s)

1) Software Engineering: Concepts & Practices- Ugrasen Suman, Cengage Learning publications.

Reference Material(s)

1)) Software Engineering Concepts – Richard Fairley, Tata Mc Graw-Hill International Edition.
2)) An Integrated Approach to Software Engineering- Pankaj Jalote, Narosa Publishing House.
3) Software Engineering-A practitioner's approach- R. S. Pressman, Tat

Course Name MBA (CM) 2nd Semester
Subject Code: CS-2301
Subject Name: Management Information System

Aim of the Subject

The aim of this course is to provide students with an understanding at how to use and manage information system in order to revitalize business processes, improve business decision making, and gain competitive advantage.

Objectives

Followings are the main objectives of a management information system:

• Data Storage - it is important to store information or processed data for future use.

• Data Retrieval - the data should be smoothly retrieved from storage devices whenever needed by different users.

• A system of efficient and effective planning - MIS controls functions of management to provide quick and timely information to the management. The process is very effective to make decisions.

• Graphical reports - give an idea about the performance of different resources employed in the organization.

• Controlling the organization - MIS helps control the organization to provide the latest information as well as historical data whenever required.

• Standard and budgeted performance - Through matching actual performance with standard and budgeted performance.

Learning Outcomes

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

1. Understand the concept of a computer-based information system including detailed knowledge of the system components and how they evolve and interact.

2. Distinguish and relate transaction processing systems, management information systems, decision support systems, expert systems, executive information systems and knowledge management systems. Be able to compare their components, major uses, benefits, and limitations.

3. Understand the use of the systems development life cycle and alternative analysis and design methods to solve business problems.

4. Understand the role of computer security, privacy, and ethics in today's business organizations.

Unit 1

The meaning and use MIS, System View of Business, Process of MIS, Development of MIS within the organization, Management Process, Information Needs, System Approach in Planning Organizing and Controlling MIS.

Unit 2

Planning, Implementation and Controlling of Management Information System.

Unit 3

Fundamentals of Data Processing, Computer Operation of Manual Information System, Components of Computer Systems, Flow Chart, Conversion of Manual to Computer Based Systems, Computer Systems Software, Application Software, Telecommunication Modem.

Unit 4

Managerial Decision Making, characteristics and components of Decision Support System.

Unit 5

System Design: System design consideration, input/output design, forms design, file organization and database, data management, file design, program design, control and security.

Text Book(s)

Kenneth C. Laudon & Jane P. Laudon, Essentials of Management Information Systems, Tenth Edition, Pearson Prentice-Hall, 2012.

Reference Material(s)

1.   .   Effy Oz & Andy Jones Management Information Systems, Cengage Learning EMEA, 2008.
2.   Terry Lucey, Management Information Systems, Ninth   Edition,   2005, Thompson

Course Name MBA (CM) 2nd Semester
Subject Code: IC 4915
Subject Name: Organization & management concepts

Aim of the Subject

to make students understand applicability of this subject

Objectives

1) ensure applicability 2)understanding organization & climate 3) adapting self

Learning Outcomes

to make oneself grow in regions & spheres of management with respect to application in IT

Unit 1

intro to management concepts

Unit 2

planning & organising

Unit 3

staffing

Unit 4

directing, motivation & leadership

Unit 5

controlling & communication

Text Book(s)

RD Agrawal, TATA Mc Graw Hill,

Reference Material(s)

ppts, pdf files

SYLLABUS

MBA (CM)

4th SEMESTER

Session 2020 - 2021

Mission of SCS&IT, DAVV

To produce world-class professionals who have excellent analytical skills, communication skills, team building spirit and ability to work in cross cultural environment.

To produce international quality IT professionals, who can independently design, develop and implement computer applications.

Professionals who dedicate themselves to mankind, who are environment conscious, follow social norms and ethics.

School of Computer Science & IT,
Devi Ahilya Vishwa Vidyalaya, Indore
www.scs.dauniv.ac.in

Course Name MBA (CM) 4th Semester
Subject Code: IC-3912
Subject Name: Professional and Social Issues in IT

Aim of the Subject

To inform students about various aspects of Ethics in IT.

Objectives

1. Students should know about the standards of professional practice, codes of conduct, aspects of computer law, public policy, corporate ethics- even certain topics in the sociology and psychology of computing.
2. Students should be able to become world class ethical professionals.

Learning Outcomes

1. What is ethics, and why is it important to act according to a code of ethics?
2. Why is business ethics becoming increasingly important?
3. What are organizations doing to improve their business ethics?
4. What is corporate social responsibility?
5. Why are organizations interested in fostering corporate social responsibility and good business ethics?
6. What approach can you take to ensure ethical decision making?
7. What trends have increased the risk of using information technology in an unethical manner?

Unit 1

Introduction to Course Specification : Course discussion, Importance of Ethics, Introduction to Ethics : What are Ethics, Ethics in the Business World, Ethics in Information Technology, Case Discussion.

Unit 2

Professional Ethics: Why Professional ethics? Characteristics of a Profession, Professional Ethics for Software Engineers. Professional Relationships: Employer-Employee, Client–Professional, Society- Professional, Professional- Professional, Collective Responsibility.

Unit 3

Ethics and the Internet - Ethics online: Characteristics of Internet: Global, Many-to-Many Scope, Anonymity, Reproducibility. Hacking and Hacker ethics, Netiquette, Policy Approaches.

Unit 4

Privacy: Understanding the "Computers and Privacy" issue – uses of information, Personal Privacy, Individual- Organization relationships. Privacy as a Social Good , Possible counter arguments, Global Perspective , Proposals for better Privacy Protection.

Unit 5

Philosophical Ethics: Philosophical Analysis, Descriptive and Normative claims, Ethical relativism, Utilitarianism. Act versus Rule, Deontological theories, Rights and social contract theories, virtue ethics.

Text Book(s)

1. Computer Ethics – Deorah G. Johnson –III Edition. Pearson Education
2. Ethics in Information Technology II Edition – George W Reynolds. Thomson Course Technology

Reference Material(s)

Electronic Materials, Web Sites etc.

Course Name MBA (CM) 4th Semester

Subject Code: CS-4410

Subject Name: CRM Using Salesforce/ServiceNow

Aim of the Subject

Salesforce is now the 7th most in-demand IT skill on job postings worldwide. Now is a great time to learn Salesforce and change your career to the cloud.

Objectives

1. 100 % Practical oriented training
2. Make student employable in salesforce

Learning Outcomes

Student must be able to clear salesforce administrator certification exam and interview

Unit 1

Introduction and Getting Started

Unit 2

Organization Setup (Global UI)

Unit 3

User Setup

Unit 4

Security and Access

Unit 5

Standard and Custom Objects

Text Book(s)

Salesforce Documentation

Reference Material(s)

MBA (CM) 4th SEM Session 2020 – 2021

Course Name MBA (CM) 4th Semester

<mark>**Subject Code**: CS-6313</mark>

<mark>**Subject Name:** Software Testing & Quality Assurance</mark>

Aim of the Subject

To enable students understand the inportance and concepts of testing in achieving quality software.

Objectives

1. To improve the quality of the software developed by the students.
2. To make students understand the tester's perspective of the software
3. To learn modern techniques of manual and automated testing
4. To acquire skills of creating, managing and tracking the testcases.
5. To define and comply with custom specific quality process in the company.
6. To acquire proficiency in tools for configuration management, test case management and automated testing.

Learning Outcomes

1. Proficiency in designing quality software.
2. Proficiency in testing skills
3. Knowledge of modern techniques of manual and automated testing
4. Proficiency in creating, managing and tracking the testcases.
5. Proficiency in tools for configuration management, test case management and automated testing.

Unit 1

<mark>Software Testing : Introduction and background, Big picture of software development process and testing component in every phase of the process.
Software testing terms and definitions: Black box & white box testing, static and dynamic testing, unit, integration, system, validation, acceptance, regression testing. Unit test Automation with JUnit.</mark>

Unit 2

<mark>Techniques of black box testing: Preparing tests-to-pass and tests-to-fail, equivalence partitioning, data and state testing.
White box testing: formal reviews of the code, programming standards and guidelines, preparing code review checklists, Data & Code coverage techniques.</mark>

Unit 3

<mark>Configuration and Compatibility testing: Isolating configuration bugs, identifying requirements of hardware, software and network, Identifying platform and</mark>

application versions, backward and forward compatibility, Data sharing compatibility.

Foreign Language testing: Translation issues, ASCII, EBCDIC, Hotkeys and shortcuts, extended characters, computation on characters, localization, compatibility and configurability issues.

Unit 4

Documentation testing: Types of documentation testing, preparing checklists before documentation testing, Security testing. Website testing: Web page fundamentals.

Automation Testing : Techniques and methods, Seminar on popular tools like Selenium, Hands on experience on these tools.

Test Planning: Test Phases, Resource, manpower requirements, test strategy, test schedule, bug reporting mechanisms, metrics and statistics.

Writing and tracking testcases, Introduction to automated bug tracking and testcase management systems .

Unit 5

Usability: Importance and Impact on SDLC, Generations of User Interfaces, The Usability Engineering Lifecycle, Usability Heuristics, Usability Testing, Usability Assessment Methods beyond Testing, Interface Standards, International User Interfaces.

CMM: Process, Need for Process Improvement & Standards, Assessment, Improvement and Compliance against Matured Processes, Software Quality tradeoffs, Introduction: CMM Level I to V, Case Studies.

Text Book(s)

Software testing and quality assurance by Ron Petton

Reference Material(s)

Software Testing and Quality Assurance: Theory and Practice: by Tripathy, Priyadarshi, Naik

Course Name MBA (CM) 4th Semester

Subject Code: CS-4422

Subject Name: ERP Applications

Aim of the Subject

To develop good understanding about different ERP applications.

Objectives

1) Student will have good knowledge about different ERP applications.

2) Student will understand Open-source ERP packages.

Learning Outcomes

1) Student will be acquainted with different ERP packages.

2) Student will understand usage of other SAP Business suite.

2) Student will be able to efficiently use Open-source ERP packages.

Unit 1

ERP quick tour: An Overview of ERP software solutions– small, medium and large enterprise vendor solutions, Functional modules. ERP implementation: Planning Evaluation and selection of ERP systems – Implementation life cycle – ERP implementation strategies, Methodology and Frame work, User Training, Data Migration.

Unit 2

SAP fundamentals: Introduction to SAP modules, SAP Architecture and GUI, SAP Clients, SAP NetWeaver, NetWeaver components, NetWeaver tools, NetWeaver applications, SAP logon, Adding a new application server, SAP GUI types, SAP system landscapes, Database basics for SAP, SAP Easy Access.

Unit 3

SAP navigation window: Navigating SAP through standard toolbar, Command field, Title bar, Application toolbar, Menu bar, SAP ABAP, ABAP workbench, Reporting, Data entry, General programming, SAP security levels.

Unit 4

SAP project basics: Running SAP project, Steps in pursuing SAP project, the SAP project lifecycle, organizing SAP project by tasks, organizing SAP project by roles. Personalizing SAP window through application toolbar, sample SAP business transactions, SAP transaction codes.

Unit 5

Open-source ERP packages – Exposure to Open-source ERP, Introduction to Orange HRM, Orange HRM modules, Exposure to admin module, PIM module, Leave module,

Time module, Benefits module, Recruitment module, ERP next, features and components.

Text Book(s)

1) Sams teach yourself SAP in 24 hours, 5th Edition, Missbach Anderson, Pearson Education.

Reference Material(s)

1.   ERP: Making It Happen: The Implementers' Guide to Success with Enterprise Resource Planning, Thomas F. Wallace and Michael H. Kremzar, WILEY.
2.   Enterprise Resource Planning –Alexis Leon -Tata McGraw Hill publication.
3.   Enterprise Resource Planning b

SYLLABUS

Master of Computer Applications

2nd SEMESTER

Session 2020 - 2021

Mission of SCS&IT, DAVV

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Professionals who dedicate themselves to mankind, who are environment conscious, follow social norms and ethics.

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www.scs.dauniv.ac.in

Course Name MCA 2nd Semester
Subject Code: CS-4305
Subject Name: Software Engineering

Aim of the Subject

Enable students to develop softwares using software develop life cycle

Objectives

1. Explain the importance of software engineering.
2. Understand the project planning and management in software development.
3. Practice function oriented and object oriented analysis and design.
4. Get insight into the testing and quality assurance approaches.
5. Learn the importance of software maintenance.

Learning Outcomes

1. Understand the application of software engineering approaches in software development.
2. Ability to plan and estimate projects.
3. Analyze and design software.
4. Produce quality software using testing and quality assurance mechanisms.
5. Understand the importance of software maintenance.

Unit 1

Introduction to Software Engineering and Software Processes: Software, Software Classifications and Characteristics, Software Crisis, What is Software Engineering? System Engineering Vs. Software Engineering, Software Engineering Challenges. Software Processes: Process model, Elements and Characteristics of Process model, Process Classification, Software Development Processes: SDLC, Waterfall model, Iterative Waterfall model, Prototyping model, Incremental model, Spiral model, RAD model, Agile Software Development: Principles, Practices & Methods; RUP process model, Component-Based Development model etc.

Unit 2

Project Management and Planning: Project management essentials, Project success and failures, Project Life Cycle, Project team structure and organization, Software Configuration Management, Risk Management. Project planning activities: Metrics and Measurements, Project Size Estimation, Effort Estimation Techniques, Staffing and Personnel Planning, Project Scheduling and Miscellaneous Plans.

Unit 3

Requirements Engineering: Software Requirements, Requirements Engineering Process, Requirements Elicitation. Requirements Analysis: Structured Analysis,

Object-oriented Analysis. Requirements Specification, Requirements Validation, and Requirements Management.

Unit 4

Software Design and Coding: Software Design Process, Characteristics of a Good Design, Design Principles, Modular Design (Coupling and Cohesion). Software Architecture. Design Methodologies: Function- oriented Design (Structured Design Methodology) and Object-oriented Design using UML, Logical Design. Coding principles, Coding process, Code verification and documentations.

Unit 5

Software Testing, Quality and Maintenance: Testing Fundamentals, Test Planning, Black- Box Testing, White- Box Testing, Levels of Testing, Usability Testing, Regression Testing, Program Slicing, Debugging Approaches. Quality Concept, Quality Factors, Verification and Validation, Quality Assurance Activities, Quality Standards: Capability Maturity Model (CMM), ISO 9000, Six Sigma. Best practices of Software Engineering. Software Reliability, Software Maintenance, Evolution, and Reengineering.

Text Book(s)

1.   Software Engineering: Concepts & Practices- Ugrasen Suman, Cengage Learning, 2nd Edition.
2.   Fundamentals of Software Engineering-Rajib Mall, PHI, New Delhi.
3.   Object Oriented Analysis and Design Using UML, Ugrasen Suman et al, Cengage Learning.

Reference Material(s)

1.   An Integrated Approach to Software Engineering- Pankaj Jalote, Narosa Publishing House.
2.   Software Engineering-A practitioner's approach- R. S. Pressman, Tata McGraw-Hill International Editions, New York.
3.   Object Oriented Analysis and Design with A

Course Name MCA 2nd Semester
Subject Code: CS-5617
Subject Name: Internet & Web Technology

Aim of the Subject

To give students a good understanding of basic concepts of object- oriented program design with the help of real world problem solving using JAVA. Enable students to develop web applications through web technology and database collaboration, especially through JSP and Servlet.

Objectives

To Briefly describe any course development objectives that are being implemented. (eg increased use of IT or web based reference material, changes in content as a result of new research in the field). As the technologies in Java are changing frequently so with the textbook, latest changes will also be incorporated in the course using web- based material. Students will also be given programming examples and exercises on every topic. The programming assignments will be checked every week in the computer-lab.

Learning Outcomes

1. Understand basic principles of object-oriented program design using Java.
2. . Understand the basic and some advanced issues related to writing classes and methods such as data, visibility, scope, method parameters, object references, and nested classes.
3. . Understand the basic ideas behind class hierarchies, polymorphism, and programming to interfaces.
4. Get exposure to exceptions and basic I/O streams.
5. Understanding the concept and configuration of servers and web technology basics and their challenges.
6. Understanding various concepts related to collaboration, database handling inside web application.
7. Develop solid Java programming skills and the ability to put in practice the acquired knowledge and understanding of the Java language, object- oriented design and web applications in relatively simple case studies

Unit 1

Introduction to Java: Features of Java, Object- oriented Programming Overview, Introduction of Java Technologies, JVM architecture and its components, Java Program structure, Tokens, Control Constructs, Memory concepts, Introduction to Class, Objects, Methods and Instance Variables,

Naming Conventions, Constructors, Method Overloading, Static Method, Static Field, Math Class, this reference, Garbage collection and finalize. String Handling: The String Constructors, String Operations, Character Exaction, String Comparison, String Buffer. Arrays: Creating an array, Enhanced for Statement, Passing Multidimensional Arrays, Variable-Length Argument l ists, Using Command- l ine Arguments. Wrapper Class: Introduction to wrapper classes. Inheritance: Relationship between Super classes and Subclasses, Using super, Constructor in Subclasses, The Object Class, Object Copying in Java. Polymorphism: Method Overriding, Upcasting, Dynamic Method Dispatch, final Field, Method and classes, Abstract classes and Methods.

Unit 2

Packages and Interfaces: Defining a Package, Understanding CLASSPATH, Access Protection, Importing packages, Creating own Packages. Defining an Interface, Properties of Interface, Advantages of Interface Achieving Multiple Inheritance through Interfaces, Variables in Interfaces, Exception Handling: Introduction, keywords, Types of Exceptions, Java Exception Hierarchy, f inally Block, Chained Exceptions, Declaring new Exception Types. Streams and Files: Introduction, Data Hierarchy, Files and Streams, Sequential- access Text Files, Object Serialization, Random- Access f i les, Java Stream Class Hierarchy. Applets: Applet Basics, Applet Architecture, Applet Life Cycle Methods, Applet HTML Tag and Attributes, Executing Applet in Web Browser and in Appletviewer.

Unit 3

Multithreading: Introduction, Java Thread Model, Thread priorities, Thread life cycle, Creating Thread, Thread Execution, Thread Synchronization, Inter-Thread Communication. Introduction To GUI: Introduction, Overview of swing Components, Introduction to Event Handling, Common GUI Event Type and Listener Interfaces, Adapter Classes, Layout Managers, Database connectivity through different databases.

Unit 4

Introduction to HTTP, web Server and application Servers, Installation of Application servers, Deployment Descriptors, The Generic Servlet, Lifecycle of Servlet. Servlet Packages, Classes, Interfaces and Methods, Handling Forms with Servlet. Session handling API, Servlet Collaboration, Attributes and various scopes of an Attribute

Unit 5

JSP Basics: JSP l i fecycle, Directives, scripting elements, standard actions, implicit objects, Session handling in JSP, Separating Business Logic and Presentation Logic, Building and using Java Bean. MVC Architecture, Database operations handling in Web applications.

Text Book(s)

1.   .   M.
Hall, L. Brown, "Core Servlets and Java Server Pages", 2nd   edition,
Pearson
Education
2.   .   Java   2:   The   Complete   Referenceby   Herbert
        Schildt,   Tata   McGraw- Hill,   8th Edition, 2011.

Reference Material(s)

1. C. Bauer, G. King, "Hibernate in Action", Manning Press
2. B. Basham, K. Sierra, B. Bates, "Head First Servlet and JSP", 2nd   Edition,
O'Reilly
Media.
3. . The Java Programming Language, Ken Arnold , James Gosling , David Holmes,

Course Name MCA 2nd Semester
Subject Code: CS-4405
Subject Name: Database Management System

Aim of the Subject

The student should learn database design and information retrieval concepts and apply these concepts in complex projects involving large database.

Objectives

- To present necessary concepts for database designing.
- Design conceptual, logical database model and physical model.
- Evaluate set of query using SQL and algebra.
- Concepts of RDBMS, and learn Object oriented modelling.
- To introduce transaction management and concurrency.
- To introduce storage structure and file management.
- To introduce query optimization and query processing.
- To introduce data mining and data warehousing.

Develop any multi-phased project as a part of a team

Learning Outcomes

1. Introduction provides the general overview of the nature and purpose of database systems. We explain how the concept of the database systems. We explain how the concept of database system has developed, what the common features of the database system are, what the database system does for the user, and how a database system interfaces with operating systems.

2. Database design provides the overview of the database-design process, with major emphasis on the database design using the entity relationship data model. Entity relationship data model provides a high level view of the issues in database design.

3. . Relation database introduces the relational model of data, covering basic concepts as well as the relational algebra. A brief introduction to integrity constraints and focus on the most influential of the user- oriented relational languages: SQL.

4. . SQL provide how to interface between a programming language and the database supporting SQL.

5. Introduction to the theory of relational database design. The theory of functional dependencies and normalization is covered, with emphasis on the motivation and intuitive understanding of each normal form. An overview of relational design and relies on an intuitive understanding of logical implication of functional dependencies. This allows the concept of normalization to be introduced prior to full coverage of functional dependency theory.

6.   Transaction management focuses on the fundamentals of a transaction-processing system, including transaction atomicity, consistency, isolation, and durability as well as the notion of serializability. Focuses on concurrency control and presents several techniques for ensuring serializability, including locking, timestamping, and optimistic techniques.

7.   .   Data storage and querying deals with disk, file, and file-system structure. A variety of data access techniques including hashing and B+ tree indices. Query-evaluation algorithms and query optimization provides an understanding of the internals of the storages and retrieval components of a database.

Unit 1

Introduction and Relational Model: Advantages of DBMS approach, various views of data, data independence, schema & sub-schema, primary concept of data models, database languages, transaction management, database administrator &user, data dictionary, database structure & architectures. Relational Model: Domains, relation, kind of relation, Relational databases, Various types of keys: candidate, primary, alternate & foreign keys, relational algebra with fundamental and extended operations, modification of database.

Unit 2

ER Model and SQL: Basic concept, design issues, mapping constraint, keys, ER diagram, weak& strong entity-sets, specialization & generalization, aggregation, inheritance, design of ER schema, Reduction of ER Schema to tables. SQL: Basic structure of SQL, Set operation, Aggregate functions, Null values, Nested Sub queries, derived relations, views, Modification of database, join relation, Domain, relation & keys, DDL in SQL. Programming concepts of PL/ SQL, Stored procedure, Database connectivity with ODBC/ JDBC 9. The concept of No SQL, Brief history of No SQL, SQL verses No SQL, CAP Theorem (Brewer's Theorem), No SQL pros/cons, Categories of NoSQL database, Production deployment, Mongo Db, Key Features, practical with MongoDb.

Unit 3

Functional Dependencies: Basic definitions, Trivial & non trivial dependencies, closure set of dependencies & of attributes, Irreducible set of dependencies, FD diagram. Normalization: Introduction to normalization, non loss decomposition, First, second and third normal forms, dependency preservation, BCNF, multivalued dependencies and fourth normal form, join dependencies and fifth normal form.

Unit 4

Transaction Management: Basic concept, ACID properties, transaction state, Implementation of atomicity & durability, Concurrent execution, Basic idea of serializability. Concurrency & Recovery: Basic idea of concurrency control, the basic

idea of deadlock, Failure Classification, storage structure-types, stable storage implementation, data access, recovery & Atomicity: log based recovery, deferred database modification, immediate database modification, checkpoints.

Unit 5

Database Integrity, Storage Structure & File Organization: general idea, integrity rules, Domain rules, Attributes rules, assertion, trigger, integrity & SQL. Storage Structure: overview of physical storage media, magnetic disk: performance & optimization, RAID. File Organization: File organization, Organization of records in files, the basic concept of Indexing, ordered indices: B+ tree & B tree index files.

Text Book(s)

1. Database System concepts –Henry F. Korth , Tata McGraw Hill 6th Edition.

Reference Material(s)

1. "Fundamentals of Database Systems", Elmasri R, Navathe S, Addison Wesley 4th Ed.
2. An introduction to database system-Bipin C. Desai
3. An introduction to Database System -C.J Date
4. SQL, PL/SQL The programming language of Oracle-Ivan Bayross

Course Name MCA 2nd Semester
Subject Code: CS-5216
Subject Name: Design and Analysis of Algorithms

Aim of the Subject

The aim is to teach the basic concepts of algorithms.

Objectives

The objective of the course is to teach techniques for effective problem solving in computing. The use of different paradigms of problem solving will be used to illustrate clever and efficient ways to solve a given problem. In each case emphasis will be placed on rigorously proving correctness of the algorithm. In addition, the analysis of the algorithm will be used to show the efficiency of the algorithm over the naïve techniques.

Learning Outcomes

1. Argue the correctness of algorithms using inductive proofs and invariants.
2. Analyze worst-case running times of algorithms using asymptotic analysis.
3. Describe the divide-and-conquer paradigm and explain when an algorithmic design situation calls for it. Recite algorithms that employ this paradigm. Synthesize divide-and-conquer algorithms. Derive and solve recurrences describing the performance of divide-and-conquer algorithms.
4. Describe the dynamic-programming paradigm and explain when an algorithmic design situation calls for it. Recite algorithms that employ this paradigm. Synthesize dynamic-programming algorithms, and analyze them.
5. Describe the greedy paradigm and explain when an algorithmic design situation calls for it. Recite algorithms that employ this paradigm. Synthesize greedy algorithms, and analyze them.
6. . Explain the major graph algorithms and their analyses. Employ graphs to model engineering problems, when appropriate. Synthesize new graph algorithms and algorithms that employ graph computations as key components, and analyze them.

Unit 1

Recall of asymptotic notation, big-oh, theta, big-omega, and introduce little-oh and little-omega. Worst case and average case complexity

Unit 2

Divide and Conquer: Integer multiplication revisited with an efficient algorithm that motivates and leads into recurrences. Solving recurrences using recurrence trees, repeated substitution, statement of master theorem. Brief recall of merge sort and its recurrence. Median in worst case linear time.

Unit 3

Application of Graph Traversal Techniques: Recall representation of graphs, BFS (as a method for SSSP on unweighted graphs), DFS, connected components, topological sorting of DAGs, biconnected components, and strongly connected components in directed graphs Greedy Algorithms: Greedy choice, optimal substructure property, minimum spanning trees -- Prims and Kruskals, Dijkstra's shortest path using arrays and heaps, fractional knapsack, and Huffman coding (use of priority queue).

Unit 4

Dynamic Programming: Integral knapsack (contrasted with the fractional variant), longest increasing subsequence, Edit distance, matrix chain multiplication, and independent sets in trees. (The instructor may choose a subset that fits within the time frame.)

Unit 5

NP- completeness: reduction amongst problems, classes NP, P, NP- complete, and polynomial time reductions

Text Book(s)

[1] Introduction to Algorithms, by Cormen, Leiserson, Rivest, and Stein, MIT Press, Third Edition, 2009. [CLRS]

Reference Material(s)

[1] Algorithms, by Dasgupta, Papadimitrou and Vazirani, McGraw- Hill Education, 2006.
[2] Computer Algorithms, by Horowitz, Sahni, and Rajasekaran, Silicon Press, 2007.

Course Name MCA 2nd Semester
Subject Code: CS-5613
Subject Name: Computer Networks

Aim of the Subject

Understand the fundamental concepts and basic principles of computer networks.

Objectives

1. . Develop a knowledge of the function of basic concepts of computer network systems.
2. Understanding basic design principles in network protocols and Internet protocols.
3. Gain an understanding of the principles of operation of a wide variety of network
technologies.
4. . Develop an appreciation of how network services are developed and a knowledge of their
uses.

Learning Outcomes

1. Familiarity with network terminologies, reference model, applications of network, design
issues and computer network working.
2. Knowledge of Data link layer design issues, Framing, Error correction and Detection
techniques.
3. Meaning of flow control and its methods.
4. Problems associated with broadcast network and multiple access control protocols.
5. Knowledge of LANs.
6. . Design issues related to Network layer like routing, addressing and their protocols.
7. Introductory knowledge of Transport layer protocols like TCP and UDP.
8. Idea about client server architecture and working of DNS, HTTP and E Mail.
9. Security issues in computer network and Introduction to Cryptographic algorithms and
Digital Signature.

Unit 1

Introduction: Overview, Goal and Applications of Computer Networks; Network Classification - LAN, MAN, WAN, Internetworks and topologies; Network Software - Protocol hierarchies, Design issues for the layers, Connection Oriented and Connection less services, Service primitives, Relationship between Services and Protocols; Switching Techniques – Circuit Switching and Packet Switching;

Reference models – OSI and TCP/ IP, comparison and critique of OSI and TCP/ IP reference models.
Physical layer: Guided Transmission Media- Magnetic Media, Twisted Pairs, Coaxial Cable, Power Lines, Fiber Optics; Wireless Transmission- Electromagnetic Spectrum, Radio Transmission, Microwave Transmission; digital modulation and multiplexing; The public switched telephone network - Structure of telephone network; The mobile telephone system - Generations of mobile phones.

Unit 2

Data Link Layer: Design issues – Services, Framing, Error Control and Flow Control; Error Detection Techniques - Parity Check and Cyclic Redundancy Check (CRC); Error Correction Technique - Hamming code; Elementary Data Link Protocols - Unrestricted Simplex Protocol, Simplex Stop- and- Wait Protocol; Sliding Window Protocols - One-Bit Sliding Window Protocol, protocol using Go Back N and Selective Repeat; Data link layer in the Internet - PPP.

Unit 3

Medium Access Sublayer: Channel Allocation problem; Multiple access protocols- Pure Aloha, Slotted Aloha, CSMA Protocols, CSMA/ CD, Collision-Free Protocols, wireless LAN protocols; IEEE MAC Sublayer protocols - Ethernet, Fast Ethernet, Gigabit Ethernet, wireless LANs and broadband wireless, Bluetooth; High speed LANs – Fast Ethernet, FDDI; Wireless LANs; Data Link Layer Switching – Bridges and Switches, their difference with Repeaters, Hubs, Routers and Gateways.

Unit 4

Network Layer: Design issues - Store-and-forward packet switching, services, implementation of connectionless and connection- oriented service, VC and datagram networks; Routing algorithms - Optimality Principle, Shortest Path Routing, Flooding, Distance Vector Routing, Link State Routing, Hierarchical Routing, Broadcast Routing, Multicast Routing, routing in Mobile hosts, routing in Ad Hoc networks; Congestion Control algorithms - General principle of Congestion control, leaky bucket algorithm, Token Bucket Algorithm; Internetworking - network difference, network connection, tunneling; The Network Layer in the Internet - Internet Protocol, Internet addressing and Internet Control protocols, ARP, DHCP and Mobile IP, Internet routing protocols - RIP, OSPF, BGP.

Unit 5

Transport Layer: Transport Services; Elements of transport protocols - Addressing, Connection establishment, Connection release, Error control and Flow control, Multiplexing; The Internet Transport Protocols - UDP and TCP, The TCP Service Model, The TCP Protocol.

Application layer: DNS, E-mail Protocols (SMTP, POP 3, IMAP, MIME), WWW and HTTP, FTP, TELNET; Network Security - Cryptography, Symmetric Key Algorithms, Public key Algorithms and Digital Signatures.

Text Book(s)

1. Andrew S. Tanenbaum and David J. Wetherall, Computer Networks, 5 th Edition,

Reference Material(s)

1. . Pearson- Prentice Hall, 2011 . 1 . Behrouz A. Frouzan, Data Communications and Networking, McGraw-Hill Education, 5th Edition, 2013.
2. William Stallings, Data and Computer Communications, Pearson- Prentice Hall, 8 th Edition, 2007.
3. James F. Kurore & K

CS-5216 Design and Analysis of Algorithms
Assignments

Q1) Given an array of numbers, replace each number with the product of all the numbers in the array except the number itself *without* using division.

Q2) Given an array of integers which is circularly sorted, how do you find a given integer?

Q3) Efficiently implement 2 stacks in a single array.

Q4) Find the number of rotations in a circularly sorted array.

Q5) Find the maximum product of two integers in an array.

Q6) Move all zeros present in an array to the end.

Q7) Given a limited range array of size n and containing elements between 1 and n+1 with one element missing, find the missing number without using any extra space.

Q8) Given an integer array, rearrange it such that it contains positive and negative numbers at alternate positions. If the array contains more positive or negative elements, move them to the end of the array.

Q9) Given a positive integer n, print all combinations of numbers between 1 and n having sum n.

Q10) Left rotate an array.

Q11) Implement an algorithm to determine if a string has all unique characters.

Q12) Write an algorithm such that if an element in an MXN matrix is 0 its entire row and column are set to 0.

Q13) Describe how you can use a single array to implement three stacks.

Q14) Implement a function to check if a binary tree is balanced.

Q15) Implement a function to check if a binary tree is a binary search tree.

Q16) Write a program to swap odd and even bits of an integer.

Q17) Write functions to implement multiply, subtract and divide operations for integers. Use only the add operator.

Q18) Write a function to find the middle node of a singly-linked list.

Q19) Write a function to compare whether two binary trees are identical. Identical trees have the same key value at each position and the same structure.

Q20) Write a program to convert a binary search tree into a linked list.

Q21) Write a program to convert a binary search tree into a linked list.

Q22) Implement an algorithm to reverse a linked list.

Q23) Reverse the words in a sentence—i.e., "My name is Chris" becomes "Chris is name My." Optimize for time and space.

Q24) Write a function reverse(s) that reverses the character string s.

Q25) Write a function rightrot(x,n) that returns the value of the integer x rotated to the right by n positions.

Q26) Determine whether a binary tree is a subtree of another binary tree.

Q27) Check if a binary tree is symmetric or not.

Q28) Convert a binary tree to its mirror.

Q29) Construct a binary tree from inorder and postorder traversals.

Q30) Produce a list of words contained in a document.

SYLLABUS

Master of Computer Applications

4th SEMESTER

Session 2020 - 2021

School of Computer Science & IT,
Devi Ahilya Vishwa Vidyalaya, Indore
www.scs.dauniv.ac.in

Course Name MCA 4th Semester
Subject Code: CS-5617
Subject Name: Internet & Web Technology

Aim of the Subject

To acquire the conceptual knowledge to students about web technology and enable students to develop web applications through JSP, Servlet, MVC with association of Database handling, JS, AJAX.

Objectives

To briefly describe any course development objectives that are being implemented (eg increased use of IT or web based reference material, changes in content as a result of new research in the field). As the technologies in Java are changing frequently so with the textbook, latest changes will also be incorporated in the course using web- based material. Students will also be given programming examples and exercises on every topic. Programming assignments will be checked every week in the computer-lab.

Learning Outcomes

• Understand basic principles of web technology using socket, datagram, Servlet and JSP.
• Understanding the concept and configuration of servers and their challenges.
• Understanding various concepts related to collaboration, database handling inside web application.
• Learn and develop web application through JS, AJAX.

Unit 1

Introduction to HTTP, web Server and application Servers, Installation of Application servers, Config files, Web.xml. Java Servlet, Servlet Development Process, Deployment Descriptors, The Generic Servlet, Lifecycle of Servlet. Servlet Packages, Classes, Interfaces and Methods, Handling Forms with Servlet.

Unit 2

Various methods of Session Handling, various elements of Deployment Descriptor. Java Database Connectivity: various steps in process of connection to the Database, various types of JDBC Drivers.

Unit 3

JSP Basics: JSP lifecycle, Directives, scripting elements, standard actions, implicit objects, Session handling in JSP, Types of error and exception handling.

Unit 4

Connection of JSP and Servlet with different database viz. Oracle, MS-SQL Server, MySQL. java.sql Package. Querying a database, adding records, deleting records and modifying records. Types of Statement.

Unit 5

Separating Business Logic and Presentation Logic, Building and using JavaBean. MVC Architecture, JS, AJAX

Text Book(s)

1. M. Hall, L. Brown, "Core Servlets and Java Server Pages", 2nd edition, Pearson

Reference Material(s)

1. K. Mukhar, "Beginning Java EE 5: From Novice to Professional", Wrox Press.
2. G. Franciscus, "Struts Recipes", Manning Press
3. C. Bauer, G. King, "Hibernate in Action", Manning Press
4. B. Basham, K. Sierra, B. Bates, "Head First Servlet and JSP", 2nd

Course Name MCA 4th Semester
Subject Code: IC-3912
Subject Name: Professional and Social Issues in IT

Aim of the Subject

To inform students about various aspects of Ethics in IT.

Objectives

1. Students should know about the standards of professional practice, codes of conduct, aspects of computer law, public policy, corporate ethics-even certain topics in the sociology and psychology of computing.
2. Students should be able to become world class ethical professionals.

Learning Outcomes

1. What is ethics, and why is it important to act according to a code of ethics?
2. Why is business ethics becoming increasingly important?
3. What are organizations doing to improve their business ethics?
4. What is corporate social responsibility?
5. Why are organizations interested in fostering corporate social responsibility and good business ethics?
6. What approach can you take to ensure ethical decision making?
7. What trends have increased the risk of using information technology in an unethical manner?

Unit 1

Introduction to Course Specification : Course discussion, Importance of Ethics, Introduction to Ethics : What are Ethics, Ethics in the Business World, Ethics in Information Technology, Case Discussion.

Unit 2

Professional Ethics: Why Professional ethics? Characteristics of a Profession, Professional Ethics for Software Engineers. Professional Relationships: Employer-Employee, Client–Professional, Society- Professional, Professional-Professional, Collective Responsibility.

Unit 3

Ethics and the Internet - Ethics online: Characteristics of Internet: Global, Many-to-Many Scope, Anonymity, Reproducibility. Hacking and Hacker ethics, Netiquette, Policy Approaches.

Unit 4

Privacy: Understanding the " Computers and Privacy" issue – uses of information, Personal Privacy, Individual-Organization relationships. Privacy as a Social Good , Possible counter arguments, Global Perspective , Proposals for better Privacy Protection.

Unit 5

Philosophical Ethics: Philosophical Analysis, Descriptive and Normative claims, Ethical relativism, Utilitarianism. Act versus Rule, Deontological theories, Rights and social contract theories, virtue ethics.

Text Book(s)

1. Computer Ethics – Deorah G. Johnson –III Edition. Pearson Education
2. . Ethics in Information Technology I I Edition – George W Reynolds. Thomson Course Technology

Reference Material(s)

Electronic Materials, Web Sites etc.

Course Name MCA 4th Semester
Subject Code: CS-6518
Subject Name: Cloud Computing

Aim of the Subject

To provide students with the fundamentals and essentials of Cloud Computing, thus creating a sound foundation while enabling students to start using and adopting Cloud Computing services and tools in their real-life scenarios.

Objectives

1. Provide graduate students with the comprehensive and in-depth knowledge of Cloud Computing concepts, technologies, architecture and applications by introducing and researching state-of-the-art in Cloud Computing fundamental issues, technologies, applications and implementations.
2. Expose the students to frontier areas of Cloud Computing and information systems, while providing sufficient foundations to enable further study and research.

Learning Outcomes

1. The fundamental ideas behind Cloud Computing, the evolution of the paradigm, its applicability; benefits, as well as current and future challenges.
2. The basic ideas and principles in data center design; cloud management techniques and cloud software deployment considerations.
3. . Different CPU, memory and I/O virtualization techniques that serve in offering software, computation and storage services on the cloud.
4. Cloud storage technologies and relevant distributed file systems.

Unit 1

Introduction to cloud computing, History, Importance of cloud computing in the current era, characteristics of cloud computing, what cloud computing really is and isn't, pros and cons of cloud computing, technologies in cloud computing, migrating into cloud.

Unit 2

Types of clouds, cloud infrastructure, cloud application architecture, working of cloud computing, trends in cloud computing, cloud service models, cloud deployment models, cloud computing and services pros and cons.

Unit 3

Cloud computing technology, cloud life cycle model, role of cloud modelling and architecture, cloud system architecture, virtualization, types of virtualization, importance and limitations of various types of virtualization, virtualization in cloud computing.

Unit 4

Data storage, introduction to enterprise data storage, data storage management, file system, cloud data stores, cloud storage characteristics, applications utilizing cloud storage.

Unit 5

Introduction to web services, cloud service deployment tools, management/ administrative services, risk management in cloud computing, introduction to apache Hadoop.

Text Book(s)

1. Cloud Computing: A practical approach for learning and implementation, 1 st edition, Pearson, A. Srinivasan, J. Suresh.

Reference Material(s)

Online Tutorial and Websites (as and when required)

Course Name MCA 4th Semester
Subject Code: CS-5701
Subject Name: Artificial Intelligence

Aim of the Subject

To introduce the basic principles, techniques, and applications of Artificial Intelligence.

Objectives

1.Gain a historical perspective of AI and its foundations.
2. . Become familiar with basic principles of AI toward problem solving, inference, perception,
knowledge representation, and learning.
3. Investigate applications of AI techniques in intelligent agents.
4. Explore the current scope, potential, limitations, and implications of intelligent systems.

Learning Outcomes

1) Demonstrate fundamental understanding of the history of artificial intelligence (AI) and its foundations.
2) Apply basic principles of AI in solutions that require problem solving, inference, perception, knowledge representation, search algorithms, and learning.
3) Demonstrate awareness and a fundamental understanding of various applications of AI
techniques in intelligent agents, expert systems, artificial neural networks.
4) Demonstrate an ability to share in discussions of AI, its current scope and limitations, and societal implications.

Unit 1

Introduction: Intelligence v/s Artificial Intelligence, Knowledge and related issues, Applications of AI. Knowledge Management: Representation, organization, manipulation,
acquisitions and maintenance of knowledge. Role of intelligent behavior.

Unit 2

Knowledge Representation Techniques: Symbolic Approaches, Representation of knowledge
using prepositional logic (PL), First Order Predicate Logic (FOPL), Conversion to clausal form, Inference Rules, The Resolution principle, non-deductive inference methods, associative networks, frames, Conceptual dependencies and Scripts.

Unit 3

Introduction to LISP and PROLOG: Basic programming in LISP / PROLOG.

Problem solving in AI: Introduction, Problem characteristics, state space representation,
Classical AI problems: The Eight Puzzle, Traveling Salesman Problem.

Unit 4

Search and Control Strategies: Uninformed and Informed search techniques.
Uninformed Search: Breadth-First Search & Depth First Search;
Heuristic Search Techniques: Hill Climbing, Best first search, A* algorithm, Problem reduction, and/or graph, AO* algorithm, Constraint Satisfaction, Means-end Analysis.

Unit 5

Neural Network Computing: Introduction, basics of ANN, terminology and models of neuron,
topology and basic learning laws. Activation and synaptic dynamics, learning methods, stability and convergence in ANN, Functional units of an ANN for pattern recognition.
Expert Systems: Characteristics and elements of an expert system, Building an expert system using LISP/ PROLOG.

Text Book(s)

1. Elaine Rich, Kevin Knight, Shivshankar B. Nair, Artificial Intelligence,3rd Edition,
,
Tata Mc-Graw Hill Publishing Company Ltd.,2009.
2. Dan W. Patterson, Introduction to Artificial Intelligence and Expert Systems, 1st edition,
Prentice Hall, 1990.

Reference Material(s)

1. Dan W. Patterson, Artificial Neural Networks, 1st edition, Prentice Hall 1998.
2. S.J. Russell & P. Norvig, Artificial Intelligence: A Modern Approach, Prentice Hall, 2nd
edition, 2002.
3. N. J. Nilsson, Artificial Intelligence: A New Synthesis, Morgan

Course Name MCA 4th Semester
Subject Code: CS-5413
Subject Name: Data Mining and Warehousing

Aim of the Subject

To clear the concepts, applications and research challenges of data mining and data warehousing.

Objectives

1.To present an overview of data warehousing process.
2. To make students understand tools and techniques of On Line Analytical Processing (OLAP)
3. Learn to create data warehouse data models, data warehouse design, storage and implementation techniques.
4. Identify and learn useful algorithms to discover useful knowledge out of tremendous data volumes. Also to determine in what application areas can data mining be applied.
5. To present an overview of Big Data Analytics techniques.

Learning Outcomes

A student completing course unit 1 should:
1) Have an understanding of the foundations, the design, the maintenance, the evolution, and the use of data warehouses
2) To understand data warehouse architecture.
3) To understand the step by step process of data warehouse development including data extraction, cleaning, loading and refreshing.
4) To understand various issues related to improvement in performance of data warehouse.
A student completing course unit 2 should:
1) Practice SQL & PL/ SQL required in data warehouse environment.
2) To master the basic range of techniques for creating, controlling, and navigating dimensional business databases, by being able to use a tool for dimensional modeling and analysis.
3) Understand multidimensional data model, OLAP, OLAP operations and work on OLAP queries
A student completing course unit 3 should:
1) Understand the fundamentals of data mining Data Mining Functionalities.
2) Have an understanding of the data mining process, its motivation, applicability, advantages and pitfalls.
3) Understand how to move from Data Warehousing to Data Mining,
4) Understand Issues and challenges in Data Mining.
5) Understand Data Mining Query Languages and Data Mining applications

A student completing course unit 4 should:
1) Understand different data mining techniques.
2) Understand various algorithms to find association rules.
3) Have an understanding of the principles, methods, techniques, and tools that underpin successful data mining applications.
4) Understand different clustering techniques.
5) Understand data mining through Decision Trees, Neural networks and Genetic Algorithm.
A student completing course unit 5 should:
1) Understand what is Web Mining, Web content mining, Web Structure mining and to know the concept of Text mining.
2) Understand the concept of Temporal Data Mining, Spatial Data Mining.
3) Be able to understand the methods and techniques of Big Data Analytics.

Unit 1

Introduction: Data Warehouse, Evolution, Definition, Very large database, Application, Multidimensional Data Model, OLTP vs Data Warehouse, Warehouse Schema, Data Warehouse Architecture,
Data Warehouse Server, Data Warehouse Implementation, Metadata, Data Warehouse Backend Process: Data Extraction, Data Cleaning, Data Transformation, Data Reduction, Data loading and refreshing. ETL and Data warehouse, Metadata

Unit 2

Structuring/Modeling Issues, Derived Data, Schema Design, Dimension Tables, Fact Table, Star Schema, Snowflake schema, Fact Constellation, De-normalization, Data Partitioning, Data Warehouse and Data Marts.OLAP, Strengths of OLAP, OLTP vs OLAP, Multi-dimensional Data, Slicing and Dicing, Roll-up and Drill Down, OLAP queries, Successful Warehouse, Data Warehouse Pitfalls, DW and OLAP Research Issues, Tools. SQL Extensions, PLSQL.

Unit 3

Fundamentals of data mining, Data Mining definitions, KDD vs Data Mining, Data Mining Functionalities, Issues and challenges in Data Mining. Data Mining Primitives, Descriptive and Predictive Data mining, Data Mining applications-Case studies. Association rules: Methods to discover association rules. Various algorithms to discover association rules like A Priori Algorithm. Partition, Pincer search, Dynamic Itemset Counting Algorithm etc

Unit 4

Cluster Analysis Introduction : Types of Data in Cluster Analysis, A Categorization of Major Clustering Methods, Partitioning Algorithms, Hierarchical and Categorical clustering, Decision Trees, Neural networks, Genetic Algorithm, SVM, Regression

Unit 5

Web Mining , Web content mining, Web Structure mining, Text mining, Temporal Data Mining, Spatial Data Mining, Introduction to Big Data Analytics

Text Book(s)

1. Data Mining Techniques – ARUN K PUJARI, Second Edition, University Press,2001
2. Data Mining-Introductory and Advanced Topics-Margaret H. Dunham,
2. Data Mining – Concepts and Techniques - JIAWEI HAN & MICHELINE KAMBER Harcourt India.
3. Building

Reference Material(s)

Essential References
1. Data Warehousing in the Real World – SAM ANAHORY & DENNIS MURRAY. Pearson Edn Asia.
2. Data Warehousing Fundamentals – PAULRAJ PONNAIAH WILEY STUDENT EDITION
3. Data Mining Introductory and advanced topics –MARGARET H DUNHAM, P

CS-5413 Data Mining & Data Warehousing

ASSIGNMENTS and LAB Manual :

1. Search a voluminous data file and understand it.(hint: you may get free data from internet)

2. Replace all tabs with commas from file or vice versa.

3. Normalize the data: for each value, set the minimum value to 0 and the maximum to 100.

4. Transform the data file (text, excel etc) into database.

5. Create a subject oriented data warehouse.

6. Analysis of existing data (semantical correctness, completeness)

7. Use of free ETL tool.

8. Use of data mining algorithms.

9. Describe an application area where data mining algorithms can be applied. Description should contain application scenario, scale of the problem, existing approach, data mining algorithm that can be used and the benefits of using the algorithms, Prepare data mining models.

Note: Extra assignments may be provided in classroom.

PROJECT (Any One for one team): Data mining application using any freeware data mining tool. Deliverables:

a. Project proposal: A one-page description of what you plan to do for your project, due Nov. 1st. Please include: i. Who is in your group ii. Project title iii. Brief description of the problem you'll solve or the question you'll investigate iv. What data you'll use and where you'll get it v. Which algorithms/techniques you plan to use

b. Final project write up This is a comprehensive description of your project. You should include the following:

1. Project idea

2. Details of data

3. ETL and Data mining implementation

4. Key results and metrics of your system c. Final presentation: In the last week of class , each team will present their project to the rest of the class. The presentation should not be more than 15 minutes.

SYLLABUS

MSc (CS/ IT)

2nd SEMESTER

Session 2020 - 2021

Mission of SCS&IT, DAVV

To produce world-class professionals who have excellent analytical skills, communication skills, team building spirit and ability to work in cross cultural environment.

To produce international quality IT professionals, who can independently design, develop and implement computer applications.

Professionals who dedicate themselves to mankind, who are environment conscious, follow social norms and ethics.

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Course Name MSc (CS/IT) 2nd Semester
Subject Code: CS-4209
Subject Name: Data Structures using C++

Aim of the Subject

To develop proficiency in the specification, representation, and implementation of Data Structures and apply the concepts for better program design.

Objectives

1. To understand object oriented programming
2. To understand abstract data types
3. To implement various data structures and related algorithms used in computer science.
4. Profiling of the algorithms used in specific data structures.
5. To understand the complexity of a algorithm.
6. Study of Searching and sorting algorithms.

Learning Outcomes

1. Outline basic object-oriented design concepts. i.e., Inheritance, Polymorphism, Dynamic
Method Binding etc.
2. Understand and implement the various data structures such as Lists, Stacks, Queues.
3. Understand and implement various hierarchical data structures: Binary search trees,
Graphs etc.
4. Analyses sorting and searching algorithms, and explain their relationship to data
structures.
5. Analyses time and space complexity of algorithms.
6. Choose and implement appropriate data structures to solve an application problem.

Unit 1

Introduction to C++ & Introduction to Data Structures:
C++ Basics, Introduction to Classes and Objects, Constructors, Destructors
Definition of Data Structures and Abstract Data Types (ADT). Classification of Data Structures,
Static and Dynamic implementations. Operations on Data Structures, Examples and real life
applications, Data Structures: Arrays, Address calculation in a single and multi dimensional
array. Sparse matrices.

Unit 2

Stacks, Queues and Lists:

Definition, Array based implementation of Stacks, Linked List based implementation of Stacks,

Examples: Infix, Postfix, Prefix representation, Applications: Mathematical expression

evaluation, Linear Queue: Definition, Applications, Array based implementation of Queue,

Linked List based implementation of Queue, Circular Queue, Double ended Queue (Dequeue),

Priority queues, Singly linked Lists, Doubly linked List, Circular implementation of Singly

linked list and Doubly linked List.

Unit 3

Trees & Graphs:

Definition of Tree and Binary Tree, Properties of Binary Tree, Types of Binary Tree, Tree

Traversal - Preorder, Postorder, Inorder Traversal, Binary Search Tree and its Implementation,

Threaded Tree, AVL Tree, Balanced multi way search trees- B-Tree, B+ Tree, Applications.

Definition of Undirected and Directed Graphs and applications, representation of Graphs:

Adjacency List, Adjacency Matrix, Linked List representation of graphs, Array based implementation of Graphs, Shortest path Algorithm, Graph Traversal: Breadth First Search

Traversal, Depth First Search Traversal, Connectivity of Graphs; Connected components of

graphs, Weighted Graphs and Applications.

Unit 4

Running time & Searching Algorithms:

Time Complexity, Big – Oh - notation, Running Times, Best Case, Worst Case, Average Case,

Factors depends on running time, Introduction to Recursion, Divide and Conquer Algorithm,

Evaluating time Complexity.

Sequential Search, Binary Search, non –recursive Algorithms, recursive Algorithms, Indexed

Sequential Search. Hashing: Definition, Hash function, Collision Resolution Techniques,

Hashing Applications.

Unit 5

Sorting Algorithms:

Introduction, Sorting by Exchange, Selection Sort, Insertion Sort, Bubble Sort, Selection Sort,

Shell Sort, Merge sort, Merging of Sorted Arrays, Quick Sort Algorithm, Analysis of Quick sort,

Picking a Pivot, A partitioning strategy, Heap sort, Heap Construction, Heap sort, bottom – up, Top – down Heap sort approach, Radix sort.

Text Book(s)

1. Data Structures using C and C++ by A. M. Tenenbaum, Langsam, Moshe J. Augentem,

PHI Pub, 6th Edition.

2. How to Program C++ by Paul Deitel , Harvey Deitel, Prentice Hall; 8 edition.

Reference Material(s)

1. . Theory & Problems of Data Structures by Jr. Symour Lipschetz, Schaum's outlineby

TMH 2006,Special Indian Edition.

2. . Data Structures and Algorithms by A.V. Aho, J.E. Hopcroft and T.D. Ullman, Original

edition, Addison-Wesley, 1999, Low Priced Editi

Course Name MSc (CS/IT) 2nd Semester
Subject Code: CS-4405
Subject Name: Database Management System

Aim of the Subject

To develop the understanding of how data is structured into the memory and how efficiently it retrieves using a DBMS software.

Objectives

The objective of the course is to present an introduction to database management systems, with an emphasis on how to organize, maintain and retrieve - efficiently, and effectively - information from a DBMS.

Learning Outcomes

Upon successful completion of this course, students should be able to:
1. Describe the fundamental elements of relational database management systems
2. . Explain the basic concepts of relational data model, entity-relationship model, relational
database design, relational algebra and SQL.
3. Design ER-models to represent simple database application scenarios.
4. Improve the database design by normalization.
5. Familiar with basic database storage structures and access techniques: file and page
organizations, indexing methods including B tree.

Unit 1

Introduction and Relational Model: Advantages of DBMS approach, Various views of data, data
independence, schema & sub-schema, primary concept of data models, database languages,
transaction management, database administrator & user, data dictionary, database structure &
architectures. Relational Model: Domains, relation, kind of relation, Relational databases,
Various types of keys: candidate, primary, alternate & foreign keys, relational algebra with
fundamental and extended operations, modification of database.

Unit 2

ER Model and SQL: Basic concept, design issues, mapping constraint, keys, ER diagram,
weak& strong entity-sets, specialization & generalization, aggregation, inheritance, design of ER

schema, Reduction of ER Schema to tables. SQL: Basic structure of SQL, Set operation,

Aggregate functions, Null values, Nested Sub queries, derived relations, views, Modification of

database, join relation, Domain, relation & keys, DDL in SQL. Programming concepts of

PL/SQL, Stored procedure, Database connectivity with ODBC/JDBC 9. The concept of NoSQL,

Brief history of NoSQL, SQL verses NoSQL, CAP Theorem (Brewer's Theorem), No SQL pros/ cons, Categories of No SQL database, Production deployment, Mongo Db, Key Features,

practical with MongoDb.

Unit 3

Functional Dependencies: Basic definitions, Trivial & non trivial dependencies, closure set of

dependencies & of attributes, Irreducible set of dependencies, FD diagram. Normalization:

Introduction to normalization, non loss decomposition, First, second and third normal forms,

dependency preservation, BCNF, multivalued dependencies and fourth normal form, join

dependencies and fifth normal form.

Unit 4

Transaction Management: Basic concept, ACID properties, transaction state, Implementation of

atomicity & durability, Concurrent execution, Basic idea of serializability. Concurrency &

Recovery: Basic idea of concurrency control, the basic idea of deadlock, Failure Classification,

storage structure-types, stable storage implementation, data access, recovery & Atomicity: log

based recovery, deferred database modification, immediate database modification, checkpoints.

Unit 5

Database Integrity, Storage Structure & File Organization: general idea, integrity rules, Domain

rules, Attributes rules, assertion, trigger, integrity & SQL. Storage Structure: overview of

physical storage media, magnetic disk: performance & optimization, RAID. File Organization:

File organization, Organization of records in files, the basic concept of Indexing, ordered indices:
B+ tree & B tree index files.

Text Book(s)

1. Database System concepts – Henry F. Korth , Tata McGraw Hill 6th Edition.

Reference Material(s)

Course Name MSc (CS/IT) 2nd Semester

Subject Code: CS-4305

Subject Name: Software Engineering

Aim of the Subject

Enable students to develop softwares using software develop life cycle

Objectives

1. Explain the importance of software engineering.
2. Understand the project planning and management in software development.
3. Practice function oriented and object oriented analysis and design.
4. Get insight into the testing and quality assurance approaches.
5. Learn the importance of software maintenance.

Learning Outcomes

1. Understand the application of software engineering approaches in software development.
2. Ability to plan and estimate projects.
3. Analyze and design software.
4. Produce quality software using testing and quality assurance mechanisms.
5. Understand the importance of software maintenance.

Unit 1

Introduction to Software Engineering and Software Processes: Software, Software Classifications and Characteristics, Software Crisis, What is Software Engineering? System Engineering Vs. Software Engineering, Software Engineering Challenges. Software Processes: Process model, Elements and Characteristics of Process model, Process Classification, Software Development Processes: SDLC, Waterfall model, Iterative Waterfall model, Prototyping model, Incremental model, Spiral model, RAD model, Agile Software Development: Principles, Practices & Methods; RUP process model, Component-Based Development model etc.

Unit 2

Project Management and Planning: Project management essentials, Project success and failures, Project Life Cycle, Project team structure and organization, Software Configuration Management, Risk Management. Project planning activities: Metrics and Measurements, Project Size Estimation, Effort Estimation Techniques, Staffing and Personnel Planning, Project Scheduling and Miscellaneous Plans.

Unit 3

Requirements Engineering: Software Requirements, Requirements Engineering Process, Requirements Elicitation. Requirements Analysis: Structured Analysis,

Object-oriented Analysis. Requirements Specification, Requirements Validation, and Requirements Management.

Unit 4

Software Design and Coding: Software Design Process, Characteristics of a Good Design, Design Principles, Modular Design (Coupling and Cohesion). Software Architecture. Design Methodologies: Function- oriented Design (Structured Design Methodology) and Object-oriented Design using UML, Logical Design. Coding principles, Coding process, Code verification and documentations.

Unit 5

Software Testing, Quality and Maintenance: Testing Fundamentals, Test Planning, Black- Box Testing, White- Box Testing, Levels of Testing, Usability Testing, Regression Testing, Program Slicing, Debugging Approaches. Quality Concept, Quality Factors, Verification and Validation, Quality Assurance Activities, Quality Standards: Capability Maturity Model (CMM), ISO 9000, Six Sigma. Best practices of Software Engineering. Software Reliability, Software Maintenance, Evolution, and Reengineering.

Text Book(s)

1.   Software Engineering: Concepts & Practices- Ugrasen Suman, Cengage Learning, 2nd Edition.
2.   Fundamentals of Software Engineering-Rajib Mall, PHI, New Delhi.
3.   Object Oriented Analysis and Design Using UML, Ugrasen Suman et al, Cengage Learning.

Reference Material(s)

1.   An Integrated Approach to Software Engineering- Pankaj Jalote, Narosa Publishing House.
2.   Software Engineering-A practitioner's approach- R. S. Pressman, Tata McGraw-Hill International Editions, New York.
3.   Object Oriented Analysis and Design with A

Course Name MSc (CS/IT) 2nd Semester
Subject Code: Cs-4008
Subject Name: Computer Architecture

Aim of the Subject

To provide an understanding the functioning of the modern computer architecture, including mechanism of parallelism, pipelining and multiprocessor architecture through assembly language programming.

Objectives

To understand the various functional units of CPU.

1 To learn about various measuring trends and laws.

1 To understand the architecture of 8088 microprocessor.

1 To learn the instruction set of 8088 processor, so that they will be able to do assembly

language programming.

1 To learn about computer arithmetic and various units of ALU.

1 To understand about various types of instruction formats and addressing modes.

1 To understand about various types of processor organization and to learn about RISC and

CISC features.

Learning Outcomes

1. Students will be familiar with various measuring tools and functional units of CPU.
2. They will be aware about architecture of 8088 microprocessor.
3. They will have knowledge of assembly language programming.
4. They will be aware about computer arithmetic.
5. They will have understanding about various types of instruction formats and addressing

modes.

6. . They will have knowledge of various types of processor organization and about RISC and

CISC features.

Unit 1

Technological trends, measuring performance: MIPS, CPI/IPC, Benchmark suite, Geometric and Arithmetic means, Speed up, Amdahl's law. External Devices, I/O Modules, Programmed I/O, Interrupt driven I/O, Direct memory access. Functional units and components in computer organization: The memory unit, the input and output subsystem, the bus structures, design of ALU.

Unit 2

Processing unit design: Processor micro architecture –I, fundamentals concepts for data path implementation. Processor micro architecture-II, data path implementation. Concepts of instruction formats and instruction set, instruction set types, types of operands and operations. Generation of memory address and addressing modes.

Unit 3

STACKS and QUEUS, GPR based organization and stack based organizations. Encoding of
machine instructions features of RISC and CISC processors.
Instruction pipelining: Instruction pipelining hazards, data dependency hazards and control
hazards, overcoming hazards. Parallel processing and pipelining, pipelining in RISC and CISC processors.

Unit 4

Super scalar processors: in order and out of order execution, instruction level parallelism,
introduction to VLIW processors, vector processors.
Cache Memory: Data caches, instruction caches and unified caches, cache implementations, fully associative and direct mapped caches, write back versus write through caches.

Unit 5

Multiprocessor Architectures: Introduction, architectures, Performance characteristics.
Multicore architectures: single chip Multiprocessors, Flynn classification, Interconnections
Structures, Interprocessors arbitration, Interprocessors Communication, Memory Organizations
in Multiprocessors, Shared Memory Multiprocessors System.
Synchronization: Memory Organization, Contention and Arbitration, Cache coherence

Text Book(s)

1. Computer Architecture: Sachem's outlines by Dr. Rajkamal.
2. Computer Architecture and organization By William Stalling, Seventh edition

Reference Material(s)

1. Computer Architecture & Parallel Processing, Hwang & Briggs, McGraw Hill
2. Computer Architecture and Organization by D. A. Patterson

3. Computer Architecture: pipelined and parallel Processor Design by Michael J. Flynn,
   Jones & Bartlett Learning 19

Course Name MSc (CS/IT) 2nd Semester

Subject Code: IC-4915

Subject Name: Organization and Management Concepts

Aim of the Subject

To make students understand the concepts of Management.

Objectives

1. To provide students the introduction to the basics of management and the language of business.

2. To provide a basis of understanding with reference to working of Business Organizations through the process of Management.

3. To inculcate the managerial skills and to teach students how it can be executed in a variety of circumstances.

Learning Outcomes

At the end of the course, students should be able to:

1. Identify the key management processes and the relevance of management in organizations.

2. Understand the management skills required in organizations and how these might be applied.

3. Evaluate their own managerial skills.

Unit 1

INTRODUCTION TO MANAGEMENT-

Definition of Management, Management Functions, Role of Managers, Principles of Management, Management Thought- Classical School, Systems Theory School

Unit 2

PLANNING-

Nature and purpose of planning - types of planning, planning process, Decision making

Unit 3

ORGANISING AND STAFFING-

Formal and Informal Organization, Basis of Departmentation, Span of Management, Line and Staff Conflicts, Definition of Staffing, Selection Process, Performance Appraisal, Career Strategy

Unit 4

MOTIVATION AND LEADERSHIP-

Motivation, Theories- Maslow's Need Hierarchy Theory, McGregor's Theory X and Theory Y, Herzberg's two factor theory, Leadership, Managerial grid

Unit 5

CONTROLLING-

The basic control process, Control as feedback system, Real time control

Text Book(s)

[1]. R.D Agrawal, Organization & Management.1/E PHI 1997.

[2]. Tripathy PC And Reddy PN, Principles of Management, Tata McGraw-Hill, 5th Edition,

2012.

[3]. Harold Koontz Heinz Weihrich- Essentials of Management- Tata McGraw Hill Publishing Company Ltd.

Reference Material(s)

Data Structures using C++
Lab Assignment

1. Write a C++ Program to construct a Class stack of integers and to perform the following operations on it:
   a. Push
   b. Pop
   c. Display
   The program should print appropriate messages for stack overflow, stack underflow, and stack empty.

2. Write a C++ Program to simulate the working of a queue of integers using an array. Provide the following operations:
   a. Insert
   b. Delete
   c. Display

3. Write a C++ Program to simulate the working of a Circular queue and Deque of integers using an array. Provide the following operations:
   a. Insert
   b. Delete
   c. Display

4. Write a C++ Program to construct a singly linked list and to perform the following operations on it:
   a) The insertion operation
      i.   At the front of a list
      ii. At the back of the list
      iii. At any position in the list
   b) The deletion operation
      i.   At the front of a list
      ii. At the back of the list
      iii. At any position in the list
   c) Displaying all the nodes in the list

5. Write a C++ Program to construct a stack of integers using singly linked list and to perform the following operations:
   a. Push
   b. Pop
   c. Display
   The program should print appropriate messages for stack overflow and stack empty.

6. Write a C++ program to construct a queue of integers using singly linked list and to perform the following operations:
   a. Insert
   b. Delete
   c. Display

7. Write a C++ Program to construct a doubly linked list and to perform the following operations on it:

a) The insertion operation
   i. At the front of a list
   ii. At the back of the list
   iii. At any position in the list

b) The deletion operation
   i. At the front of a list
   ii. At the back of the list
   iii. At any position in the list
c) Displaying all the nodes in the list

8. Write a C++ Program to construct a Circular (Singly & Doubly) linked list and to perform the following operations on it:
   a) The insertion operation
      i. At the front of a list
      ii. At the back of the list
      iii. At any position in the list

   b) The deletion operation
      i. At the front of a list
      ii. At the back of the list
      iii. At any position in the list

   c) Displaying all the nodes in the list

9. Write a program to create and display a polynomial.

10. Write a program to print the middle element of a given linked list (There is an odd number of elements in list).

11. Write a program to Count the number of nodes of a given linked.

12. Write a program to Sort the element of linked list.

13. Write a program to Search a particular data in a singly linked list.

14. Write a C++ Program:
    a. To construct a binary search tree of integers.
    b. To traverse the tree using all the methods i.e., inorder, preorder and postorder.
    c. To display the elements in the tree.

15. Implement various searching algorithms.
16. Implement various sorting algorithms.

SYLLABUS

MSc (CS / IT)

4th SEMESTER

Session 2020 - 2021

Mission of SCS&IT, DAVV

To produce world-class professionals who have excellent analytical skills, communication skills, team building spirit and ability to work in cross cultural environment.

To produce international quality IT professionals, who can independently design, develop and implement computer applications.

Professionals who dedicate themselves to mankind, who are environment conscious, follow social norms and ethics.

School of Computer Science & IT,
Devi Ahilya Vishwa Vidyalaya, Indore

www.scs.dauniv.ac.in

Course Name MSc (CS/IT) 4th Semester
Subject Code: CS-5512
Subject Name: Compiler Design

Aim of the Subject

The aim of this course is to provide students with the knowledge and abilities to design and implement compilers.

Objectives

1. To introduce the major concept areas of language translation and compiler design.
2. . To develop an awareness of the function and complexity of modern compilers.
3. To provide practical, hands-on experience in compiler design, writing and modification.
4. The symbol table management, syntax-Directed definition and translations along
with the code optimization and generation and error handling have to be covered
to complete the aim.

Learning Outcomes

Upon successful completion of this course, the student will be able to
1. Basic knowledge of compilation steps; ability to apply automata theory and
knowledge on formal languages.
2. Ability to design and implement scanner modules in compilers.
3. Ability to identify and select suitable parsing strategies for a compiler for various
cases. Knowledge in alternative methods (top-down or bottom-up, etc).
4. Knowledge and ability to devise, select, and use modern techniques and tools
needed to design and implement compilers.

Unit 1

Introduction to compiling & Lexical Analysis: Introduction of Compiler, Major data Structure in compiler, BOOT Strapping & Porting, Compiler structure: analysis-synthesis
model of compilation, various phases of a compiler, Lexical analysis: Input buffering,
Specification & Recognition of Tokens, LEX.

Unit 2

Syntax Analysis &Syntax Directed Translation: Syntax analysis: CFGs, Top-down

parsing, Brute force approach, recursive descent parsing, transformation on the grammars, predictive parsing, bottom-up parsing, operator precedence parsing, LR parsers (SLR, LALR, LR), Parser generation. Syntax directed definitions: Construction of

Syntax trees, bottom-up evaluation of S-attributed definition, L-attribute definition, Topdown

translation, Bottom-Up evaluation of inherited attributes. Recursive Evaluation, Analysis of Syntax directed definition.

Unit 3

Type Checking & Run Time Environment: Type checking: type system, specification of simple type checker, equivalence of expression, types, type conversion, overloading of

functions and operations, polymorphic functions. Run time Environment: storage organization, Storage allocation strategies, parameter passing, dynamic storage allocation, Symbol table.

Unit 4

Code Optimization: Introduction to Code optimization: sources of optimization of basic

blocks, loops in flow graphs, dead code elimination, loop optimization, Introduction to

global data flow analysis, Code Improving transformations, Data flow analysis of structure flow graph Symbolic debugging of optimized code.

Unit 5

Code Generation: Intermediate code generation: Declarations, Assignment statements,

Boolean expressions, Case statements, Back patching, Procedure calls Code Generation:

Issues in the design of code generator, Basic block and flow graphs, register allocation

and assignment, DAG representation of basic blocks, peephole optimization, generating

code from DAG.

Text Book(s)

A. V. Aho, R. Sethi, and J. D. Ullman. Compilers: Principles, Techniques and Tools, Pearson Education

Reference Material(s)

1. Raghavan, Compiler Design, TMH Pub.
2. Louden. Compiler Construction: Principles and Practice, Cengage Learning
3. A. C. Holub. Compiler Design in C , Prentice-Hall Inc., 1993.

4. Mak, writing compiler & Interpreters, Willey Pub.

Course Name MSc (CS/IT) 4th Semester
Subject Code: CS-5617
Subject Name: Internet & Web Technology

Aim of the Subject

To make students learn the fundamental concepts of coding and to develop problem-solving skills.

Objectives

1.To develop programming skills and to perform them practically .
2.To identify java language components and how they work together in application.

Learning Outcomes

Description of knowledge to be acquired:

1.A student completing course unit 1 should :
(i).Have understanding of fundamentals of HTTP and servlets.
(ii).Have understanding methods and to perform them practically.

2.A student completing course unit 2 should :
(i).Have understanding of session handling in servlet and to perform them practically .
(ii).Have understanding and knowledge of java database connectivity and steps involved in it and its practical implementation.

3.A student completing course unit 3 should :
(i).Have knowledge and understanding of basics of Jsp.

4.A student completing course unit 4 should :
(i).Have understanding of connection of Jsp and servlet with different database like oracle, ms-sql server, mysql and performing operations.

5.A student completing course unit 5 should :
(i).Have knowledge and understanding of using java beans, session handling in jsp.
(ii).Have knowledge of MVC Architecture.

Unit 1

Introduction to HTTP, web Server and application Servers, Installation of Application servers,
Config f i les, Web. xml. Java Servlet, Servlet Development Process, Deployment Descriptors, The Generic Servlet, Lifecycle of Servlet. Servlet Packages, Classes, Interfaces and Methods, Handling Forms with Servlet.

Unit 2

Various methods of Session Handling, various elements of Deployment Descriptor. Java
Database Connectivity: various steps in process of connection to the Database, various types of JDBC Drivers.

Unit 3

JSP Basics: JSP lifecycle, Directives, scripting elements, standard actions, implicit objects.

Unit 4

Connection of JSP and Servlet with different database viz. Oracle, MS-SQL Server, MySQL.
java.sql Package. Querying a database, adding records, deleting records and modifying records. Types of Statement.

Unit 5

Separating Business Logic and Presentation Logic, Building and using JavaBean. Session
handling in JSP, types of error and exception handling. MVC Architecture, introduction to Web Services.

Text Book(s)

1. K. Mukhar, "Beginning Java EE 5: From Novice to Professional", Wrox Press.

Reference Material(s)

1. M. Hall, L. Brown, "Core Servlets and Java Server Pages", 2nd edition, Pearson Education
2. G. Franciscus, "Struts Recipes", Manning Press
3. C. Bauer, G. King, "Hibernate in Action", Manning Press
4. B. Basham, K. Sierra, B. Bates, "Head First Servlet

Course Name MSc (CS/IT) 4th Semester

Subject Code: CS-5216

Subject Name: Design and Analysis of Algorithms

Aim of the Subject

The aim is to teach the basic concepts of algorithms.

Objectives

The objective of the course is to teach techniques for effective problem solving in computing. The use of different paradigms of problem solving will be used to illustrate clever and efficient ways to solve a given problem. In each case emphasis will be placed on rigorously proving correctness of the algorithm. In addition, the analysis of the algorithm will be used to show the efficiency of the algorithm over the naïve techniques.

Learning Outcomes

1. Argue the correctness of algorithms using inductive proofs and invariants.

2. Analyze worst-case running times of algorithms using asymptotic analysis.

3. Describe the divide-and-conquer paradigm and explain when an algorithmic design situation calls for it. Recite algorithms that employ this paradigm. Synthesize divide-and-conquer algorithms. Derive and solve recurrences describing the performance of divide-and-conquer algorithms.

4. Describe the dynamic-programming paradigm and explain when an algorithmic design situation calls for it. Recite algorithms that employ this paradigm. Synthesize dynamic-programming algorithms, and analyze them.

5. Describe the greedy paradigm and explain when an algorithmic design situation calls for it. Recite algorithms that employ this paradigm. Synthesize greedy algorithms, and analyze them.

6. . Explain the major graph algorithms and their analyses. Employ graphs to model engineering problems, when appropriate. Synthesize new graph algorithms and algorithms that employ graph computations as key components, and analyze them.

Unit 1

Recall of asymptotic notation, big-oh, theta, big-omega, and introduce little-oh and little-omega. Worst case and average case complexity

Unit 2

Divide and Conquer: Integer multiplication revisited with an efficient algorithm that motivates and leads into recurrences. Solving recurrences using recurrence trees, repeated substitution, statement of master theorem. Brief recall of merge sort and its recurrence. Median in worst case linear time.

Unit 3

Application of Graph Traversal Techniques: Recall representation of graphs, BFS (as a method for SSSP on unweighted graphs), DFS, connected components, topological sorting of DAGs, biconnected components, and strongly connected components in directed graphs Greedy Algorithms: Greedy choice, optimal substructure property, minimum spanning trees -- Prims and Kruskals, Dijkstra's shortest path using arrays and heaps, fractional knapsack, and Huffman coding (use of priority queue).

Unit 4

Dynamic Programming: Integral knapsack (contrasted with the fractional variant), longest increasing subsequence, Edit distance, matrix chain multiplication, and independent sets in trees. (The instructor may choose a subset that fits within the time frame.)

Unit 5

NP- completeness: reduction amongst problems, classes NP, P, NP- complete, and polynomial time reductions

Text Book(s)

[1] Introduction to Algorithms, by Cormen, Leiserson, Rivest, and Stein, MIT Press, Third Edition, 2009. [CLRS]

Reference Material(s)

Reference Material(s)
[1] Algorithms, by Dasgupta, Papadimitrou and Vazirani, McGraw- Hill Education, 2006.
[2] Computer Algorithms, by Horowitz, Sahni, and Rajasekaran, Silicon Press, 2007.

Course Name MSc (CS/IT) 4th Semester
Subject Code: IC-3912
Subject Name: Professional and Social Issues in IT

Aim of the Subject

To inform students about various aspects of Ethics in IT.

Objectives

1. Students should know about the standards of professional practice, codes of conduct, aspects of computer law, public policy, corporate ethics-even certain topics in the sociology and psychology of computing.
2. Students should be able to become world class ethical professionals.

Learning Outcomes

1. What is ethics, and why is it important to act according to a code of ethics?
2. Why is business ethics becoming increasingly important?
3. What are organizations doing to improve their business ethics?
4. What is corporate social responsibility?
5. Why are organizations interested in fostering corporate social responsibility and good business ethics?
6. What approach can you take to ensure ethical decision making?
7. What trends have increased the risk of using information technology in an unethical manner?

Unit 1

Introduction to Course Specification : Course discussion, Importance of Ethics, Introduction to Ethics : What are Ethics, Ethics in the Business World, Ethics in Information Technology, Case Discussion.

Unit 2

Professional Ethics: Why Professional ethics? Characteristics of a Profession, Professional Ethics for Software Engineers. Professional Relationships: Employer-Employee, Client–Professional, Society- Professional, Professional-Professional, Collective Responsibility.

Unit 3

Ethics and the Internet - Ethics online: Characteristics of Internet: Global, Many-to-Many Scope, Anonymity, Reproducibility. Hacking and Hacker ethics, Netiquette, Policy Approaches.

Unit 4

Privacy: Understanding the "Computers and Privacy" issue – uses of information, Personal Privacy, Individual-Organization relationships. Privacy as a Social Good , Possible counter arguments, Global Perspective , Proposals for better Privacy Protection.

Unit 5

Philosophical Ethics: Philosophical Analysis, Descriptive and Normative claims, Ethical relativism, Utilitarianism. Act versus Rule, Deontological theories, Rights and social contract theories, virtue ethics.

Text Book(s)

1. Computer Ethics – Deorah G. Johnson –III Edition. Pearson Education
2. . Ethics in Information Technology I I Edition – George W Reynolds. Thomson Course Technology

Reference Material(s)

Electronic Materials, Web Sites etc.

Course Name MSc (CS/IT) 4th Semester

Subject Code: CS-4517

Subject Name: Linux/UNIX Administration

Aim of the Subject

To provide knowledge of UNIX operating system including multi-user concepts, terminal emulation, use of system editor, basic UNIX commands, and writing script files.

Objectives

1. To familiarize students with the concepts, design, and structure of the UNIX operating

system.

2. To teach students the use of basic UNIX Utilities

3. To teach students the principles of UNIX shell programming.

Learning Outcomes

1. It will provide student understanding of various Unix OS and usage.

2. Basic commands.

3. Understanding with file systems.

4. Learns working in editors.

5. Concepts of shell programming and system call will be developed.

6. Understanding of communication facilities used in UNIX.

7. Practicing administrative commands

Unit 1

Background: Evolution of Unix OS. Unix implementations. Features of Unix operating system. Linux operating system: Development of Linux. Applications of Linux operating system. Basic UNIX environment: Basic commands, directory management, pipes, tee, I/O redirection and other utilities.

Unit 2

Advanced commands: File system and process management commands, Shell, Pattern matching, navigating the File Systems. Unix editor: VI editor, Creating new files. Text addition, deletion and changes. Dealing with sentences and paragraphs. Searching. Cut, paste and copy. Running C/C++ programs.

Unit 3

Shell programming: Features of shell. Shell variables. Control statements. Advance shell

programming: Command line arguments. Interactive shell scripts. Debugging of shell scripts. Communication facilities in Unix.

Unit 4

Structure of Unix operating system: Structure of unix kernel, Unix system calls. Unix system:
File system calls, Process management calls. Advance Filter: Awk: Number processing, Interface with shell, functions.

Unit 5

Unix system administration: Adding and removing users. User accounting. Adding and removing hardware. Performing backups and restore. Disk space management. Unix system
administration: Configuring the kernel. Network management in Unix. Performance analysis.
Unix Desktop

Text Book(s)

Unix Concepts And Application by Sumitabha Das

Reference Material(s)

UNIX AND LINUX SYSTEM ADMINISTRATION HANDBOOK
PPT and lectures note (pdf format)

Q1) Given an array of numbers, replace each number with the product of all the numbers in the array except the number itself *without* using division.

Q2) Given an array of integers which is circularly sorted, how do you find a given integer?

Q3) Efficiently implement 2 stacks in a single array.

Q4) Find the number of rotations in a circularly sorted array.

Q5) Find the maximum product of two integers in an array.

Q6) Move all zeros present in an array to the end.

Q7) Given a limited range array of size n and containing elements between 1 and n+1 with one element missing, find the missing number without using any extra space.

Q8) Given an integer array, rearrange it such that it contains positive and negative numbers at alternate positions. If the array contains more positive or negative elements, move them to the end of the array.

Q9) Given a positive integer n, print all combinations of numbers between 1 and n having sum n.

Q10) Left rotate an array.

Q11) Implement an algorithm to determine if a string has all unique characters.

Q12) Write an algorithm such that if an element in an MXN matrix is 0 its entire row and column are set to 0.

Q13) Describe how you can use a single array to implement three stacks.

Q14) Implement a function to check if a binary tree is balanced.

Q15) Implement a function to check if a binary tree is a binary search tree.

Q16) Write a program to swap odd and even bits of an integer.

Q17)Write functions to implement multiply, subtract and divide operations for integers. Use only the add operator.

Q18) Write a function to find the middle node of a singly-linked list.

Q19) Write a function to compare whether two binary trees are identical. Identical trees have the same key value at each position and the same structure.

Q20) Write a program to convert a binary search tree into a linked list.

Q21) Write a program to convert a binary search tree into a linked list.

Q22) Implement an algorithm to reverse a linked list.

Q23) Reverse the words in a sentence—i.e., "My name is Chris" becomes "Chris is name My." Optimize for time and space.

Q24) Write a function reverse(s) that reverses the character string s.

Q25) Write a function rightrot(x,n) that returns the value of the integer x rotated to the right by n positions.

Q26) Determine whether a binary tree is a subtree of another binary tree.

Q27) Check if a binary tree is symmetric or not.

Q28) Convert a binary tree to its mirror.

Q29) Construct a binary tree from inorder and postorder traversals.

Q30) Produce a list of words contained in a document.

School of Computer Science & IT ,DAVV, Indore

Internet &Web Technology

M.Sc(CS/IT) -IV

Lab Assignment :01

Note :

Study the uploaded PDF and PPT that we had discussed earlier in class ,based on this study and prepare assignment in word file .

Q1. Write a servlet program by implementing Servlet interface.

Q2. Write a servlet program by inheriting GenericServlet class.

Q3. Write a servlet program by inheriting HttpServlet class.

School of Computer Science & IT ,DAVV, Indore

Internet &Web Technology

M.Sc(CS/IT) -IV

Lab Assignment :02

Note :

Study the uploaded PDF and PPT that we had discussed earlier in class ,based on this study and prepare assignment in word file with output of programs performed practically .

Q1. Write a program for each of the Methods of Session handling in servlet given below :

    (i)   Cookies.
    (ii)   Hidden form field.
    (iii)   Url rewriting.
    (iv)   Http session interface.

    NOTE: while performing it practically it should contain all files(html page,servlet page,web.xml page) of the project in every method of session handling as shown in lab session.

Internet &Web Technology

M.Sc(CS/IT) -IV

Lab Assignment :03

Note :

Study the uploaded PDF and PPT that we had discussed earlier in class ,based on this study and prepare assignment in word file with output of programs performed practically.

Q1. Write a program of Servlet Filter for displaying information that filter is invoked automatically after the post processing of the request using servlet and describing it in deployment description file.

> **(while performing it practically it should contain all files(html page,servlet page, Filter page,web.xml page) of the project.)**

Note :

Study the uploaded PDF and PPT that we had discussed earlier in class ,based on this study and prepare assignment in word file .

Q1. Write a program for process of connection to the database.

Q2. Write a JDBC program for which allows you to Add the record in the table.

Q3. Write a JDBC program for Selecting the specified record in the table.

Q4. Write a JDBC program for Deleting the specified record in the table.

Q5. Write a JDBC program for Updating the specified record in the table.

SYLLABUS

MTech (CS)

2nd SEMESTER

Session 2020 - 2021

School of Computer Science & IT,
Devi Ahilya Vishwa Vidyalaya, Indore

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Course Name MTech (CS) 2nd Semester
Subject Code: CS-6711
Subject Name: Soft Computing

Aim of the Subject

The aim of the course is to give students a good understanding of introduction to the basic principles, techniques, and applications of Soft Computing.

Objectives

1. Learn Soft Computing techniques and their applications.
2. Learn and understand Fuzzy logic and its applications.
3. Analyze Genetic Algorithms and their applications.
4. Gain an understanding of Neural Network theory and its applications.
5. Apply different Soft Computing techniques to solve problems.

Learning Outcomes

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

1. Understand Fuzzy logic and its applications.
2. Solve single-objective optimization problems using Genetic Algorithms.
3. . Solve multi- objective optimization problems using Evolutionary algorithms (MOEAs).
4. Understand Artificial Neural Networks and its applications.
5. Apply different Soft Computing techniques to solve problems.

Unit 1

Introduction to Soft Computing: Soft Computing concepts, Differences between Soft Computing and Hard Computing, Soft Computing constituents. Fuzzy logic: Definition, Applications. Genetic Algorithms: Definition, Applications, Neural Networks: Definition, Applications, Hybrid Systems: Definition, Types.

Unit 2

Fuzzy Sets and Fuzzy Logic: Introduction to Classical Sets and Fuzzy Sets. Classical set and Fuzzy sets – Operations and Properties. Fuzzy Relations – Equivalence and Tolerance, Membership Functions, Fuzzification, Membership Value Assignment. Fuzzy to Crisp Conversion, Defuzzification, Fuzzy Arithmetic, Fuzzy Logic and Approximate Reasoning, Rule Based Systems and Rough Sets.

Unit 3

Elementary Search techniques: Uninformed Search Techniques-Breadth First Search, Depth First Search, Depth first Iterative Deepening, Bidirectional Search. Heuristic Search Techniques - Best First Search, Hill Climbing Search, A*, AO*, Means-ends Analysis, Constraint Satisfaction. Advanced search using Genetic Algorithm (GA) - Introduction to Genetic Algorithms (GA), Representation, Operators in GA, Fitness function, population, Multi-objective GA, Applications of GA.

Unit 4

Artificial Neural Networks: Basics of Neural Networks, Biological Neural Networks, McCulloch Pitt model, Supervised Learning algorithms: Perceptron (Single Layer, Multi- layer), Linear separability, Delta learning rule, Back Propagation algorithm, Un-Supervised Learning algorithms: Hebbian Learning.

Unit 5

Hybrid Systems: Integration of Neural Networks, Fuzzy Logic and Genetic Algorithms, GA Based Back propagation Networks, Fuzzy Back Propagation Networks, Fuzzy Associative Memories, ANFIS: Adaptive Neuro- Fuzzy Inference Systems.

Text Book(s)

1 . Samir Roy, Udit Chakraborty, Soft Computing: Neuro- Fuzzy and Genetic Algorithms, Pearson India,2013.

Reference Material(s)

1.   S.N. Deepa, S.N. Sivanandam, Principles of Soft Computing (Second Edition), Wiley India Pvt. Ltd.,2011.

Course Name MTech (CS) 2nd Semester
Subject Code: CS-6630
Subject Name: Internet of Things

Aim of the Subject

To impart knowledge with a solid theoretical foundation, and strong practical skills in the fields of computer technology, communications networks and IT, that are required to develop a wide range of IoT applications.

Objectives

- To cover all concepts of IoT
- To explore various applications of IoT
- To provide understanding of technologies involved in IoT
- To acquaint with Data Modelling and Security requirements in IoT environment
- To experiment on mutiple sensors using Microcontroller/Microprocessor

Learning Outcomes

Upon completing the course, students will be able to:
- Understand IoT concept
- Gain knowledge of IoT Applications and Examples
- Understand Technologies involved in IoT
- Get insight of Data Modelling in IoT
- Learn Security models in IoT
- Explore and learn about IoT with the help of preparing projects designed with the Arduino

Unit 1

Introduction to IoT: Definition, Characteristics, Conceptual framework, Architectural view.
Technology involved - Server-end technology, Hardware and Software components, Development tools & Open source framework, APIs & Device interfacing components, Platforms & Integration tools, Sources of Io T, Advantages and Disadvantages of IoT.
Machine-to-Machine Communication: Definition, M2M Vs. IoT, M2M architecture.

Unit 2

Design principles for connected devices: Communication Technologies – Near-field communication, RFID, Bluetooth, Zigbee (ZigBee IP/ZigBee SE 2.0), Wi-Fi, GPRS/GSM cellular Networks-Mobile Internet.

Design principles for web connectivity: Constrained Application Protocol (Co AP), MQTT, XMPP.

Data formats: JSON, XML, TLV, MIME.

Connectivity Models: Request/Response, Publish/ Subscribe, Pull/ Push Data, Message cache, Message queue.

Gateway Protocols for Web Connectivity: HTTP, SOAP, REST, RESTful HTTP and WebSockets.

Unit 3

Data Acquiring: Data generation, Data Acquisition, Data validation, Data categorization for storage, Data Store – definition, Key/ value store, Document store, tabular store (Column Family & Big Table), Object store, Graph Stores-Graph Databases

Data Organizing: Definition, DBMS-ACID rules, Distributed database, CAP theorem , Query processing, SQL, NoSQL, ETL, MPP, in-memory databases , columnar database.

Unit 4

Data Processing: Definition, Online tractions and processing (OLTP), Stream processing, Real-Time processing, Event Stream processing, Business process, Business Intelligence, Distributed Business Process, Enterprise Systems, Service Oriented Architecture(SOA).

Data Analytics: Definition, Analytics phases- Descriptive, Predictive, Prescriptive), Online analytical processing (OLAP), Statistical tools for data analysis -descriptive and inferential statistics, random analysis, sampling concept, Sampling distribution techniques, statistical inference, regression analysis.

Machine Learning basics: Supervise and un-supervised techniques,

Big Data analytics - Big data definition, Characteristics, Big data Classifications on the basis of: sources, format, stores, analysis, type, users, rate.

Big data Analytics: Architecture, Hadoop components, Berkley Data Analytics Stack (BDAS) Architecture.

Knowledge Management: Definition, Knowledge Management Reference Architecture.

Unit 5

Cloud Storage models and communication APIs for Io T, Io T Privacy, Security and Vulnerabilities Issues and Solutions, Prototyping and designing the software for Io T applications, Interoperability in IoT.

Introduction to Arduino Programming: Integration of Sensors and Actuators with Arduino.

IoT Case Studies: Agriculture, Healthcare, SCM, Connected Cars, Smart city, Smart Home.

Text Book(s)

1. . Adrian McEwen, Hakim Cassimally, "Designing the Internet of Thing", Wiley
2. Rajkamal, "Internet of Things: Architecture and Design Principles", McGraw Hill Education, 2017.

Reference Material(s)

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. Dr. Ovidiu Vermesa

Course Name MTech (CS) 2nd Semester
Subject Code: CS-6517
Subject Name: Advanced Compiler Design

Aim of the Subject

To learn basic principles and advanced techniques of compiler design, and implement them at each phase of a compiler.

Objectives

- To explore exiting tools for lexical and syntax analysis.
- To understand various paring techniques and implement them.
- To review code optimization strategies and use them at code generation.

Learning Outcomes

At this level, the students will be able to understand techniques used at Lexical, Syntactic, Semantic, Intermediate code generation and Code optimization level and their implementation using suitable algorithms and existing programming tools as well. And hence, they will have the insight of overall working and performance of the compilers.

Unit 1

Compiler, Translator, Interpreter, Assembler definition, Types of compiler, Phases of compiler, one pass and multi pass compilers. Analysis of source program. Review of Finite automata, lexical analyzer, Input, buffering, Recognition of tokens, LEX: A lexical analyzer generator, Error handling.

Unit 2

Introduction to parsing. Bottom up and Top down parsing techniques- Shift reduce, Operator precedence, Recursive descent and predictive parsers. LL grammars and parsers, error handling in LL parser. LR parsers,Construction of SLR, .CanonicalLR and LALR parsing tables.

Unit 3

Syntax directed definitions and translation: Construction of syntax trees, L~attributed definitions, Intermediate code forms using postfix notation and three address code. Representing TAC using triples and quadruples, Translation of assignment statement. Boolean expression and control structures etc.

Unit 4

Definition of basic block control f low graphs, DAG representation of basic block. Advantages of DAG, Sources of optimization, Loop optimization, Idea about global data flow analysis, Loop invariant computation, Peephole optimization.

Unit 5

Issues in design of code generator, A simple code generator, Code generation from DAG. Code Optimization.

Text Book(s)

1. . Alfred V. Aho, Ravi Sethi, Jeffrey D. Ullman (2007), Compilers Principles, Techniques and Tools, 2nd edition, Pearson Education, New Delhi, India.
2. . Engineering a Compiler, Keith D. Cooper, Linda Torczon (2012), Second Edition, Elsevier.

Reference Material(s)

1. . Alfred V. Aho, Jeffrey D. Ullman (2001), Principles of compiler design, Indian student edition, Pearson Education, New Delhi, India.
2. Kenneth C. Louden (1997), Compiler Construction– Principles and Practice, 1st edition, PWS Publishing.
3. Andrew

Course Name MTech (CS) 2nd Semester
Subject Code: CS 6418
Subject Name: Advanced Database Management System

Aim of the Subject

The aim of the course is to make students able to handle large database system (corporate database) and to be able to manipulate it efficiently.

Objectives

The course objectives are to:
● To build strong foundation of query languages through relational algebra, calculus & QBE
● Design conceptual, logical database model and physical model.
● Develop SQL proficiency on simple & advanced features
● Learn database design techniques through normalization
● Learn advanced database functions like concurrency, transaction processing, recovery in multi user environment
● Acquire necessary skills for NoSQL based database application development
● Exposure to graph, spatial, and temporal databases

Learning Outcomes

The course objectives are to:
● To build strong foundation of query languages through relational algebra, calculus & QBE
● Design conceptual, logical database model and physical model.
● Develop SQL proficiency on simple & advanced features
● Learn database design techniques through normalization
● Learn advanced database functions like concurrency, transaction processing, recovery in multi user environment
● Acquire necessary skills for NoSQL based database application development
● Exposure to graph, spatial, and temporal databases

Unit 1

Introduction: Advantages of DBMS approach, Various views of data, data independence, schema & sub-schema, primary concept of data models, database languages, transaction management, database administrator &user, data dictionary, database architectures.
ER model: Basic concept, design issues, mapping constraint, keys, ER diagram, weak & strong entity-sets, specialization & generalization, aggregation, inheritance, design of ER schema, Reduction of ER Schema to tables. Domains, relation, kind of

relation, Relational databases, Various types of keys: candidate, primary, alternate & foreign keys.

Unit 2

Relational Algebra and SQL: The structure, relational algebra with extended operations, modification of database, Idea of relational calculus, basic structure of SQL, Set operation, Aggregate functions, Null values, Nested Sub queries, derived relations, views, Modification of database, join relation, Domain, relation & keys, DDL in SQL.
Overview of Graph & Spatial Databases

Unit 3

Functional dependencies & Normalization: basic definitions, Trivial & non trivial dependencies, closure set of dependencies & of attributes, Irreducible set of dependencies, introduction to normalization, non loss decomposition, FD diagram, First, second and third normal forms, dependency preservation, BCNF, multivalue dependencies and fourth normal form, join dependencies and fifth normal form.
Database Integrity: general idea, integrity rules, Domain rules, Attributes rules, assertion, triggers, integrity & SQL.

Unit 4

Transaction, Concurrency & Recovery: basic concept, ACID properties, transaction state, Implementation of atomicity & durability, Concurrent execution, Basic idea of serializability, Basic idea of concurrency control, basic idea of deadlock, Failure Classification, storage structure-types, stable storage implementation, data access, recovery & Atomicity: log based recovery, deferred database modification, immediate

Unit 5

Query processing, optimisation & NOSQL

Text Book(s)

DBMS By Sudarshan & Korth

Reference Material(s)

Internet material & e books for advanced topics

Course Name MTech (CS) 2nd Semester
Subject Code: CS-6712
Subject Name: Data Science

Aim of the Subject

This course aims to provide sound foundation to fundamental concepts of Data Science and its application and prepare students for advanced research and real time problem solving in Data Science.

Objectives

1. Ability to understand, analyze and design solutions with professional competency for the real-world problems.
2. Ability to develop software solutions for the requirements, based on critical analysis and research.

Learning Outcomes

1. Understand the fundamental concepts of data analytics.
2. Evaluate the data analysis techniques for applications handling large data.
3 . Demonstrate the various machine learning algorithms used in data analytics process.

Unit 1

Introduction: What is Data Science?, The Data Science Process, Different Types of Data:
Quantitative, Categorical. Graphical Summaries of Data: Pie Chart, Bar Graph, Pareto Chart, Histogram. Measuring the Center of Quantitative Data: Mean, Median, Mode. Measuring the Variability of Quantitative Data: Range, Standard Deviation, and Variance.

Unit 2

Overview of R, R data types :Vectors, Matrices, Factors, Lists, Data Frames, reading and writing data, Control structures, functions, scoping rules, dates and times

Unit 3

Introduction to Data Cleansing, Missing and Repeated Values, Feature Engineering, Outliers and Errors, Finding Outliers, Cleaning Data with R.

Unit 4

Machine Learning : Definition and overview, Regression, Simple Linear Regression, Multiple Regression, Assessing Performance, Ridge Regression, Feature Selection & Lasso, Nearest Neighbors & Kernel Regression

Unit 5

Machine Learning : Classification, Linear Classifiers & Logistic Regression, Learning Linear Classifiers, Overfitting & Regularization in Logistic Regression, Decision Trees, Handling Missing Data, Boosting.

Text Book(s)

[1] Allan G. Bluman, Elementary Statistics: A Step By Step Approach,10th Edition,McGraw-Hill, 2017.

[2] Paul Teetor, R Cookbook, First Edition, O,ReillyMedia, 2011.

[3] Tom Mitchell, Machine Learning, First Edition, McGraw Hill. 1997

Reference Material(s)

MOOCS of Coursera

Course Name MTech (CS) 2nd Semester
Subject Code: CS 6518
Subject Name: Cloud Computing

Aim of the Subject

to introduce concepts related to the analysis, design and implementation of computation and storage clouds.

Objectives

comprehensive and in-depth knowledge of Cloud Computing concepts, technologies, architecture and applications by introducing and researching state-of-the-art in Cloud Computing fundamental issues, technologies, applications and implementations

Learning Outcomes

1. Explain the core concepts of the cloud computing paradigm: how and why this paradigm shift came about, the characteristics, advantages and challenges brought about by the various models and services in cloud computing.
2. Apply the fundamental concepts in datacenters to understand the tradeoffs in power, efficiency and cost.
3. Identify resource management fundamentals, i.e. resource abstraction, sharing and sandboxing and outline their role in managing infrastructure in cloud computing.
4. Analyze various cloud programming models and apply them to solve problems on the cloud.

Unit 1

OVERVIEW OF COMPUTING PARADIGM AND INTRODUCTION TO CLOUD COMPUTING: Recent trends in computing, evolution of cloud computing, Cloud computing (NIST model), properties, characteristics and disadvantages, role of open standards. Service models (XAAS), Deployment models

Unit 2

INFRASTRUCTURE AS A SERVICE: Introduction, Hypervisors, Resource virtualization, examples.

Unit 3

PLATFORM AS A SERVICE and Software-as-a Service :Introduction, Cloud Platform and Management, examples.Introduction to SaaS, , Web services, Web OS, examples

Unit 4

SERVICE MANAGEMENT IN CLOUD COMPUTING: Service Level Agreements (SLAs), Billing & Accounting, Comparing scaling hardware, economics of scaling, managing data

Unit 5

CASE STUDY ON OPEN SOURCE AND COMMERCIAL CLOUDS: CLoudSIm, HDFS and MapReduce, Amazon, Microsoft Azure etc.

Text Book(s)

1. Barrie Sosinsky: "Cloud Computing Bible", Wiley-India, 2010
2. . Rajkumar Buyya, James Broberg, Andrzej M. Goscinski: "Cloud Computing:Principles and Paradigms", Wiley, 2011

Reference Material(s)

1. Nikos Antonopoulos, Lee Gillam: "Cloud Computing: Principles, Systems and Applications", Springer, 2012
2. Ronald L. Krutz, Russell Dean Vines: "Cloud Security: A Comprehensive Guide to Secure Cloud Computing", Wiley-India, 2010
3. Tim Mather, Subra Ku

Course Name MTech (CS) 2nd Semester
Subject Code: CS-6623
Subject Name: Mobile and Wireless Systems

Aim of the Subject

To introduce the theory, architecture, protocols, techniques and applications in wireless and mobile networks.

Objectives

1. To familiarize students with wireless and mobile terminology.
2. To focus on several areas of wireless and mobile technologies including; Wireless LAN, Cellular Network, Ad-hoc Network and Satellite Communication.
3. To explain architecture and infrastructure for wireless and mobile systems.
4. To familiarize students how mobile phone systems work.
5. To make student understand the influence of mobility, security or IP
networks.
6. To make student understand the design decisions of higher layer communication protocols and applications.
7. To expose students to emerging wireless technologies and their potential impact

Learning Outcomes

1 Acquaintance with communication systems & their applications.
2. Understanding of Wireless transmission techniques, infrastructure and devices.
3. Understanding of GSM Architecture, its working and concepts of cellular systems.
4. Understanding of Modulation Techniques, Multiplexing techniques, CDMA
4 . Knowledge of channel allocation and co- channel Interference in cellular networks.
5. Application and uses of protocol and developing wireless LAN infrastructure.
6. Understanding of Mobile Ad-hoc network and Sensor networks, issues in efficient routing in MANET.
7. Developing concepts on Characteristics, classification of routing algorithms in MANET, Mobile operating System and applications.
8. Administration & management of mobile systems, security issues.

Unit 1

Overview of the emerging field of mobile computing: Historical perspectives (mainly from the perspective of radio), Land mobile vs. Satellite vs. In-building

communications systems, RF vs. IR, Mobile applications, Limitations.

Mobile Radio Propagation: Introduction, Propagation mechanism, Path loss, Slow Fading, Fast Fading, Delay Spread, Inter-symbol Interference, Co-channel Interference.

Cellular Concept: Characteristic of Cellular Systems, Cell area, Capacity of a cell, frequency reuse, Reducing Co-channel Interference, Cell Splitting, Cell Sectoring.

Unit 2

Mobile communication: Fiber or wire based transmission, Wireless Transmission:

Frequencies, Antennas and Signal Propagation, Modulation Techniques, Multiplexing techniques, Coding techniques.

Channel Allocation: Fixed Channel Allocation, Dynamic channel Allocation, Hybrid Channel Allocation, Allocation in Specialized System Structure.

Mobile Communication Systems: Cellular System Infrastructure, Registration, Handoff in cellular Systems, Roaming support, Mobile IP, Multicasting, Generation of Mobile Systems, Existing Wireless Systems, Case Study on GSM and CDMA.

Unit 3

Satellite Systems: Types of Satellite Systems, Characteristic of Satellite Systems,

Satellite System Infrastructure, Call Setup, Global Positioning System, limitations and beneficiaries of GPS.

Unit 4

Ad Hoc and Sensor Networks: Characteristic of MANETs, Applications, Need of

Routing, Routing Classification, Wireless Sensor Networks.

Unit 5

Wireless LANs and PANs: IEEE802.11, HIPERLAN, Bluetooth. Case Study on Wireless LAN infrastructure, Wireless security.

Text Book(s)

1. Jochen Schiller, Mobile Communications, John Willy & Sons, Ltd.
2. D. P. Agrawal and Qing-An zeng, Introduction to Wireless and Mobile Systems, Thomson publication.

Reference Material(s)

1. P. Nicopotidis, Wireless Networks, Addision –Wesley publication.
2. Raj Kamal, Mobile Computing, Oxford University press, 2007.
3. U. Hansmann, L. Merk, M.S. Nicklons and T. Stober, Principles of Mobile Computing, Springer, 2003.
4. R.

School of Computer Science & IT

Devi Ahilya University, Indore

Short answer review questions

MTech II Sem - Advanced Database management Systems

by Dr Sanjay Tanwani, Prof & Head,

What is database?

What is difference between database & DBMS?

What are DB applications?

What is a file?

What are the problems with conventional file systems?

What is a text file? How it differentiates from binary file?

What is data redundancy & inconsistency?

What is data isolation? How multiple formats are isolated from programs?

What are integrity constraints?

Differentiate between data verification & validation.

What is a transaction?

What are ACID properties of a transaction?

Why it is important to ensure atomicity? How it is implemented?

What is durability of a transaction? How it is ensured?

What is isolation property is not maintained in a transaction?

What is concurrency? Why it is needed?

Why we need control over concurrency?

What are the ways to control concurrency?

What is serializability? How serializable schedules are prepared?

How time stamp based protocol ensures serializability of transactions?

What are locks? Differentiate between shared & exclusive locks?

What are deadlocks in a lock based protocol?

How the deadlocks are detected, prevented and eliminated in a lock based concurrency control system?

Define security? How databases are secured?

What are illegal login attempts? How they are detected?

What are system logs?

Differentiate between authorization & authentication.

What are different authentication techniques?

What are authorizations? How authorizations are made in a database?

What is DDL? How assertions & constraints are defined in DDL?

What is DCL? How authorization is done using DCL?

What is query processing? What are its steps?

How select operator is implemented in relational algebra?

How join is implemented between two tables?

What is query optimization?

What is role and responsibilities of DBA?

What is XML? How XML is stored in a database?

Define relation and its attribute.

Define null. How it is represented?

What is key? Differentiate between super, candidate & primary key.

What is foreign key? What is its purpose?

What are pure languages?

How pure languages build the foundations of commercial query languages?

Define levels of abstraction.

Differentiate between logical & physical level with an example.

Differentiate between logical & view level with an example.

What is schema? Differentiate between logical & physical schema.

Define schema instance, physical data independence.

What is data model? Is relational data model better than network or hierarchical model

What is an ER model?

What is object based ER model?

What is DML? Differentiate between procedural & nonprocedural aspects of SQL.

What is SQL? Is it procedural or nonprocedural?

What are six basic operators of relational algebra?

What are unary operators of relational algebra?

What is difference between Cartesian product & division in relational algebra?

When is project operation useful?

What is an arity of a relation?

Define rename operator. How it is used?

What is equivalent of rename in SQL? Explain with an example.

What is natural join? How it is different from other joins?

Differentiate between left & right outer join.

What is an assignment? How it differs from rename operation?

What are aggregate functions in relational algebra? Why use of aggregate functions is not permitted in where condition clauses?

What is generalized projection?

What is null value? How aggregate functions handle null values?

What are main features of SQL?

What are domain types in SQL?

How integrity constraints are defined in create table?

How can we add new attributes in an existing table?

Differentiate between distinct and all in context of SQL.

How the keyword like is used in string matching in SQL?

What % and underscore(_) represent in string matching?

Explain string operations like concatenation, string length, extract substring from a string in SQL.

How order by clause is used in SQL?

How to arrange data items in ascending or descending order in SQL?

What keyword is used to retain duplicated in union, intersect & except operations in SQL?

How group wise aggregate functions are performed in SQL?

Differentiate between where and having clause of SQL.

Differentiate between all, some and any construct of SQL.

How to test for empty relations?

Explain exists with an example.

What are views? When are they useful?

What is difference between date timestamp data type?

How can you create user defined data type in SQL?

How large objects are stored? What are data types to support LOBs?

What are assertions? How are they applied in SQL?

How authorization is specified in SQL?

Define embedded & dynamic SQL

Differentiate between ODBC & JDBC.

What is prepared statement?

Name all meta data features of JDBC.

What is a resultset?

What are stored procedures & triggers in SQL?

What is database modeling?

What artifact is used for modeling databases?

Define various symbols used in ER Model.

What is a weak entity set? What is role of discriminator in weak entity set?

What are extended ER features?

What is attribute inheritence?

Differentiate between specialisation & generlization

What is completeness constraint?

What is aggregation in EER Diagram?

How total participation of entity in a relation ship set is represented?

How identifying relationship set for weak entity is represented?

What is normalization? What are its goals?

What are features of a good DB design?

What is 1NF, 2NF & 3NF?

Why atomicity of attributes is important?

What is functional & multi-valued dependency?

What is difference between lossy & lossless decomposition?

What is BCNF?

Differentiate between 4NF & BCNF.

Explain storage structure of hard disk in terms of block, sector, track, and cylinder.

Define seek, latency & access time of a hard disk.

Define checksum and remapping of bad sectors in hard disk.

Define sequential file organisation?

What is fragmentation in files? Why it needs to be removed?

Define RAID 0, 1 & 5.

Define hot swapping

What are database buffers? Why they are needed?

What are buffer replacement strategies?

Differentiate between fixed-length record and variable length record file formats implemented with a linked structure.

How files are stored in hard disk in sequential file organization?

Differentiate between sparse & dense indices.

Define multi level index.

What are B+ tree index files? How they are used for creating indices?

Define clustered index.

Differentiate between indexing and hashing.

Define hash, hash function, collision & its resolution.

How bucket overflow is handled in hashing?

What is query cost? How it is computed?

How selections with compound conditions are evaluated?

Differentiate between index-nested loop & hash join.

How duplicates are eliminated in the result given by a query?

Define evaluation plan.

How will you propose the order of evaluation in a join of three tables?

What are the states of a transaction? Explain using state transition diagram.

What are levels of consistency in SQL-92?

What are SQL keywords for transaction definition begin end or revert, if failure?

What is a timestamp?

How a time stamp based protocol ensures serializability?

Explain read & write algorithm of a shared data item in case of time stamp based protocol.

What are two phases of 2Pl locking protocols?

What is the meaning of granularity of data items?

Explain basic principle of validation based protocol.

Explain protocol based on multi version schemes.

In context of recovery, describe various types of failures.

Explain log based recovery to ensure atomicity.

Differentiate between shadow-paging and log-based recovery.

differentiate between deferred and immediate database modification for log-based recovery.

What are checkpoints in recovery process?

Assignments

1. Write a R program to take input from the user (name and age) and display the values. Also print the version of R installation.

2. Write a R program to get the details of the objects in memory.

3. Write a R program to create a sequence of numbers from 20 to 50 and find the mean of numbers from 20 to 60 and sum of numbers from 51 to 91.

4. Write a R program to create a vector which contains 10 random integer values between -50 and +50.

5. Write a R program to get the first 10 Fibonacci numbers.

6. Load the built in warpbreaks data set . Find out, in a single command, which columns of warpbreaks are either numeric or integer.

7. a Load the state datasets.
b. Convert the state.x77 dataset to a dataframe.
c. Rename the Life Exp variable to Life.Exp, and HS Grad to HS.Grad

8. Suppose we wanted to enter all the variables in a first-order linear regression model with Life Expectancy as the dependent variable. Fit this model.

9. Suppose we wanted to remove the Income, Illiteracy, and Area variables from the model in Exercise 2. Use the update function to fit this model.

10. Let's assume that we have settled on a model that has HS.Grad and Murder as predictors. Fit this model.

11. Write a R program to create a Data Frames which contain details of 5 employees and display summary of the data.

12. Write a R program to create the system's idea of the current date with and without time.

13. How do you prepare data for analysis in R?

14. How do I find missing data in R?

15. How do I exclude missing data in R?

16. How do I remove rows with 0 in R?

17. Create a list of 80% of the rows in the original dataset to use for training.

18. Select 20% of the data for validation.

19. Use the remaining 80% of data to train and test the models.

20. Find the dimensions of the "iris" dataset.

21. Find the type of each attribute in your dataset.

22. Take a look at the first 5 rows of your dataset.

23. Display the summary of the "iris" dataset.

24. What happens to missing values in a histogram? What happens to missing values in a bar chart? Why is there a difference?

CS-6711 Soft Computing

List of Assignments:

Fuzzy Sets and Fuzzy Logic
1. Write a program in to perform Union, Intersection and Complement operations.
2. Write a program in to implement De-Morgan's Law.
3. Write a program in to plot various membership functions.
4. Design a Fuzzy Inference System using Fuzzy toolbox to model tip value that is given after a dinner which can be-not good, satisfying, good and delightful and service which is poor, average or good and the tip value will range from Rs. 10 to 100.
5. Design a fuzzy controller for a train approaching or leaving a station. The inputs are the distance from the station and speed of the train. The op is amount of brake power used. Use four descriptors each for input and output and design using Mamdani's fuzzy model. Derive a set of rules for control action and defuzzification. The design should be supported by figures. Prove that if the train is at a short distance with great speed the brake power required would be very high and vice versa.

Genetic Algorithm (GA)

6. Write a program in to implement Genetic Algorithm Life Cycle.
7. Write a program in to solve 0-1-knapsack-problem by using Genetic-Algorithm.

Artificial Neural Networks

8. Write a program to generate ANDNOT function using McCulloch-Pitts neural net.
9. Write a program to generate XOR function using McCulloch-Pitts neural net.
10. Write a program to implement Hebb's Rule.

Hybrid Systems
11. Soft Computing has enormous applications areas such as medical diagnosis, computer vision, hand written character recondition, pattern recognition, machine intelligence, weather forecasting, network optimization, VLSI design, etc. Discuss and list out design principles of any application to solve any real-life problem.

References:
1. S.N. Deepa, S.N. Sivanandam, Principles of Soft Computing (Second Edition), Wiley India Pvt. Ltd., 2011.
2. Samir Roy, Udit Chakraborty, Soft Computing: Neuro-Fuzzy and Genetic Algorithms, Pearson India, 2013.

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PRACTICAL ASSIGNMENTS

- Explore exiting tools for lexical analysis such as LEX, Flex, jFlex.

- Design & develop character manipulator and scanner for building up tokens, given a piece of source code in any high level language of interest.

- Implement Operator Precedence Parsing algorithm with a set of well-defined operators and precedence relation table.

- Construct SLR(1) parser using algorithm for generating canonical collection of items, given a sample source comprised of at least 2-3 statements of source language.

- Develop CLR(1) and LALR(1) parsers for the above.

- Write a program for translation of some constructs of any source language into their equivalent 3-address code.

- Write a program for analyzing various strategies used for optimizing space and time complexity.

SYLLABUS

MTech (CS) Executive

2nd SEMESTER

Session 2020 - 2021

Mission of SCS&IT, DAVV

To produce world-class professionals who have excellent analytical skills, communication skills, team building spirit and ability to work in cross cultural environment.

To produce international quality IT professionals, who can independently design, develop and implement computer applications.

Professionals who dedicate themselves to mankind, who are environment conscious, follow social norms and ethics.

School of Computer Science & IT, Devi Ahilya Vishwa Vidyalaya, Indore

Course Name MTech Exec (CS) 2nd Semester

Subject Code: CS-6712

Subject Name: Data Science

Aim of the Subject

This course aims to provide sound foundation to fundamental concepts of Data Science and its application and prepare students for advanced research and real time problem solving in Data Science.

Objectives

1. Ability to understand, analyze and design solutions with professional competency for the real-world problems.
2. Ability to develop software solutions for the requirements, based on critical analysis and research.

Learning Outcomes

1. Understand the fundamental concepts of data analytics.
2. Evaluate the data analysis techniques for applications handling large data.
3. Demonstrate the various machine learning algorithms used in data analytics process.

Unit 1

Introduction: What is Data Science?, The Data Science Process, Different Types of Data:
Quantitative, Categorical. Graphical Summaries of Data: Pie Chart, Bar Graph, Pareto Chart, Histogram. Measuring the Center of Quantitative Data: Mean, Median, Mode. Measuring the Variability of Quantitative Data: Range, Standard Deviation, and Variance.

Unit 2

Overview of R, R data types :Vectors, Matrices, Factors, Lists, Data Frames, reading and writing data, Control structures, functions, scoping rules, dates and times

Unit 3

Introduction to Data Cleansing, Missing and Repeated Values, Feature Engineering, Outliers and Errors, Finding Outliers, Cleaning Data with R.

Unit 4

Machine Learning : Definition and overview, Regression, Simple Linear Regression, Multiple Regression, Assessing Performance, Ridge Regression, Feature Selection & Lasso, Nearest Neighbors & Kernel Regression

MTech (CS) Executive 2ⁿᵈ SEM Session 2020 - 2021

Unit 5

Text Book(s)

[1] Allan G. Bluman, Elementary Statistics: A Step By Step Approach,10th Edition, McGraw-Hill, 2017.

[2] Paul Teetor, R Cookbook, First Edition, O,ReillyMedia, 2011.

[3] Tom Mitchell, Machine Learning, First Edition, McGraw Hill. 1997

Reference Material(s)

MOOCS of Coursera

Course Name MTech Executive CS 2nd Semester

<mark>**Subject Code**: CS-6223</mark>

<mark>**Subject Name:** Python Programming</mark>

Aim of the Subject

To provide students with a rigorous theoretical as well as practical grounding for programming in Python programming language.

Objectives

- Fundamental understanding of programming in Python.
- To create a variety of scripts.
- To understand built-in and external module and standard libraries of Python 3.
- To realize the ease of programming in Python.
- To focus on best practices such as Python featured programming, data preprocessing, and working with datasets.

Learning Outcomes

Upon successfully completing this course, students will be able to

- Identify/characterize/define a problem
- Design a program to solve the problem
- Create executable code
- Read most Python code
- Working with datasets

Unit 1

Introduction to Python Programming Language: Why and for What Python? Built-in Data Types, Variables, Strings and String methods, Numbers, Basic Input, Output and String formatting, Python literals, Operators: Arithmetic, Comparison, Assignment, Logical, Bitwise, Membership, and Identity, Comments, First Python program, Styling Python code.

Unit 2

List: Basic List operations, Indexing, Slicing, and Matrixes, organizing a list, Working with list and a part of a list, Tuple, Conditional Execution, Boolean Expressions, Conditional Statements with Lists, List Comprehension Expression, While and For Loop, Iterations, Documentation Interlude.

Unit 3

Working with Dictionaries, Functions: How functions communicate with their environment? Returning a result from function, Introduction to Scopes, Arguments, and Comprehensions and Generators.

Unit 4

Introduction to Modules and Packages, some useful Modules, Object- Oriented Programming Concepts: Classes and Objects/Instances, Working with Files, Exception Handling: Anatomy of Exception, Some useful Exceptions.

Unit 5

Python Libraries, Introduction to Scipy, Numpy, MatPlotLib, Scikit- Learn and Pandas, Data Preprocessing, Manipulation, and Visualization, Produce Python code to statistically analyze a Dataset.

Text Book(s)

1. Think Python First Edition, by Allen B. Downey
2. Learning Python Fifth Edition, By Mark Lutz

Reference Material(s)

SYLLABUS

MTech (NM & IS)

2nd SEMESTER

Session 2020 - 2021

School of Computer Science & IT, Devi Ahilya Vishwa Vidyalaya, Indore

www.scs.dauniv.ac.in

Course Name MTech (NM & IS) 2nd Semester
Subject Code: CS-6628
Subject Name: Legal Aspects of Information Security

Aim of the Subject

The main aim of this course is to provide students with a background, foundation, and insight into the many dimensions of Legal Aspects of Information Security.

Objectives

1. Explain the role of culture as it applies to ethics in information security.
2. Understand key provisions of information security and privacy laws.
3. Recognize different types of intellectual property laws.
4. . Describe the functions of and relationships among laws, regulations, and professional
     organizations in information security.
5. Differentiate between laws and ethics.
6. Identify major national laws that affect the practice of information security.

Learning Outcomes

Upon successful completion of this course, the student will be able to
1.   Understand the basic concepts of ethics.
2.   Know the contribution of ethics in security and privacy of Information System.
3.   .   Be aware of the technology used in the security of IS and regulations related to its
     implementation.
4.   Describe the different methods of applying laws and regulations.

Unit 1

Computer Ethics Introduction: Introduction to Social and Ethical behavior, Computer Ethics, Morality and the Law. Ethics and Ethical Analysis: Reasoning and Decision Making, Ethics and the Professions: Professionalism and Ethical Responsibilities.

Unit 2

Privacy: Definition, Types of Privacy, Ethical and Legal Framework for Information, Workplace Privacy, Corporate Information Security and Privacy Regulation.

Unit 3

Intellectual Property Rights in Cyberspace: Definitions, Foundations of Intellectual Property-Copyrights, Patents, Trademarks, Trade Secrets.

Unit 4

Computer Crimes: General Criminal Law Concepts, Common Criminal Laws Used in Cyberspace-The Computer Fraud and Abuse, Computer Trespass or Intrusion, Theft of Information, Interception of Communications, Spam and Phishing, Hacking, Identity Theft and Credit Card Fraud etc.

Unit 5

Information Technology Law: Evolution of the IT Act, Genesis and Necessity, Salient features of the IT Act, 2000 , various authorities under IT Act and their powers: Penalties & Offences, amendments.

Text Book(s)

1.   Kizza, Joseph Migga, " Ethical and Social Issues in the Information Age", Springer
       London Dordrecht Heidelberg, New York, 2010, Fourth edition.
2.   Grama, Joanna Lyn, "Legal and Privacy Issues in Information Security", Jones & Bartlett

Reference Material(s)

1. . Baase, Sara, " A Gift of Fire: Social, Legal, and Ethical Issues for Computing Technology",
    Prentice-Hall, USA, 2013, Fourth edition.
2. The Information Technology Act, 2000; Bare Act – Professional Book Publishers, New Delhi.

Course Name MTech (NM & IS) 2nd Semester
Subject Code: CS-5618
Subject Name: Network Security

Aim of the Subject

To create security professionals who will be handling the real-life challenges and Problems the industry is facing today in connection with Networks.

Objectives

1.Understand the basic concepts of networks, networking devices and various attacks Possible on networking devices and data.
2. Students will be exposed to various tools for secure communications, threat
management and analytics.
3. Practice with an expertise in academics to design and implement security solutions.
4. Understand principles of web security and to guarantee a secure network by monitoring
and analyzing the nature of attacks through cyber/computer forensics software/tools.
5. Develop cyber security strategies and policies.

Learning Outcomes

1. Analyze and evaluate the cyber security needs of an organization.
2. Determine and analyze software vulnerabilities and security solutions to reduce the
risk of exploitation.
3. Measure the performance and troubleshoot cyber security systems.
4. Implement cyber security solutions and use of cyber security, information assurance,
and cyber/computer forensics software/tools.
5. Comprehend and execute risk management processes, risk treatment methods, and key
risk and performance indicators
6.Design operational and strategic cyber security strategies and policies.

Unit 1

Obstacles to Security
Security is inconvenient, Computer Are Powerful and complex, Computer User Are Unsophisticated, Computer Created without a Thought to Security, Current Trend is to

Share, Not Project Data Accessible from Anywhere security Isn't, Hardware and Software. The Bad Guys Are Very Sophisticated, Management Sees Security as a Drain
on the Bottom Line.

Ten Steps to Building a Secure Organization

Evaluate the Risks and Threats, Beware of Common Misconceptions, Provide Security Training for IT Staff-Now and Forever, Think Employees: Develop a Culture of Security Identify and Utilize Built-In Security Features of the Operating System and Applications, Monitor System, Hire a Third Party to audit Security, Don't Forget the Basics, Patch.

Unit 2

Internet Security

Internet Protocol Architecture: Communications Architecture Basics, An Internet Threat Model: The Dolev-Yoa Adversary Model Layer Threats, Defending Against Attacks on the Internet: Layer Session Defences, Session Stratup Defences

Botnet Problem

Botnet Overview, Origin of Botnets, Botnet Topologies and Protocols, Typical Bot Life, Cycle, The Botnet Business Model, Botnet Defence, Detecting and Removing Individual Bots, Detecting C&C Traffic, Detecting and Neutralizing C&C Channels,\Locating and identifying the Botmaster Botmaster Traceback: Traceback Challenges, Traceback Beyond the internet

Unit 3

Content Filtering

The Problem with Content Filtering, Categories, Issues and Problems with Content Filtering, Bypass and circumvention, Client – Based Proxies, Open Proxies, HTTP web-Based Proxies(Public and private),Secure Public Web-Based Proxies, Process Killing

Remote Pc Control Applications, Overblocking and Underblocking, Blacklist and Whitelist Determination, Casual Surfing Mistake, Getting the List Updated, Time-of-Day Policy Changing ,Override Authorization Methods, Hide Content in "Noise" or use Steganography, Detect Spyware and malware in the HTTP Payload, Scalability and Usability , Performance Issue, Technology and Techniques for Content-Filtering control ,Internet gateway-based Products Unified Threat Appliances

Virtual Private Network,

IPsec,,L2TP,L2TPv3,L2F,PPTP VPN,MPLS,MPVPN,SSH,SSL-VPN,TLS

Authentication Methods

Hashing, HMAC, MD5, SHA-1, Symmetric Encryption, Asymmetric Cryptography

Edge Devices, Password,

Unit 4

Instant-Massaging Security

The Evolution of Networking Technology, Game Theory and Instant Messaging, Your workforce, Generational Gaps, Transactions, The Nature of the Threat

Malicious Threat , Vulnerabilities, Man-in-the-Middle Attacks, Phishing and Social Engineering, Knowledge Is the Commodity, Data and Traffic Analysis, Unintentional Threats, Regulatory Concerns, Common IM Applications Consumer Instant Messaging, Enterprise Instant Messaging, Backdoor: Instant Messaging via Other Means(HTML), Mobile Dimension, Defensive Strategies: Asset Management, Built-in Security, Content Filtering, Classic Security, Compliance, Data Loss Prevention, Logging, Archival, Processes, Instant-Messaging Activation and Provisioning, Application Review, People, Revise ,Audit

Risk Management: The concept of risk, Expressing and Measuring Risk

The Risk Management Methology: Context Establishment, Risk Assement, Risk Treatment, Risk Communication, Risk Monitoring and Review, Integrating Risk Management into the System Development Life Cycle, Critique of Risk Management as a Methology, Risk Management Methods

Risk Management Laws and Regulations, Risk Management standards

Unit 5

Vulnerability Assessment

Why Vulnerability assessment, Penetration Testing Versus Vulnerability Assessment,

Vulnerability Assessment Goal, Mapping the Network, Selecting the Right Scanner Central Scans versus local Scans, Defence in Depth Strategy, Network Scanning Countermeasures, Vulnerability Disclosure Date, Find Security Hole before They Become Problem, Proactive Security versus Reactive Security, Vulnerability Causes, Conclusion.

Firewall, IDS/IPS, Honeypot

Text Book(s)

. 1.Charlie Kaufman, Radia Perlman, Mike Speciner, "Network Security", Prentice Hall,

2nd edition, 2002, ISBN-10: 0130460192, ISBN-13: 978-0130460196.

2. Charles Pfleeger," Security in Computing", Prentice Hall, 4 th Edition, 2006, ISBN-10:

0132390779,

Reference Material(s)

1. Ulysess Black, "Internet Security Protocols: Protecting IP Traffic", Prentice Hall PTR;

1st edition, 2000, ISBN-10: 0130142492, ISBN-13: 978-0130142498.

2. Amir Ranjbar 2007, CCNP ONT Official Exam Certification Guide, Cisco Press [ISBN: 978-1-58720-

Course Name MTech (NM & IS) 2nd Semester
Subject Code: CS-6623
Subject Name: Mobile and Wireless Systems

Aim of the Subject

To introduce the theory, architecture, protocols, techniques and applications in wireless and mobile networks.

Objectives

1. To familiarize students with wireless and mobile terminology.
2. To focus on several areas of wireless and mobile technologies including; Wireless LAN, Cellular Network, Ad-hoc Network and Satellite Communication.
3. To explain architecture and infrastructure for wireless and mobile systems.
4. To familiarize students how mobile phone systems work.
5. To make student understand the influence of mobility, security or IP

networks.
6. To make student understand the design decisions of higher layer communication protocols and applications.
7. To expose students to emerging wireless technologies and their potential impact

Learning Outcomes

1 Acquaintance with communication systems & their applications.
2. Understanding of Wireless transmission techniques, infrastructure and devices.
3. Understanding of GSM Architecture, its working and concepts of cellular systems.
4. Understanding of Modulation Techniques, Multiplexing techniques, CDMA
4. Knowledge of channel allocation and co- channel Interference in cellular networks.
5. Application and uses of protocol and developing wireless LAN infrastructure.
6. Understanding of Mobile Ad-hoc network and Sensor networks, issues in efficient routing in MANET.
7. Developing concepts on Characteristics, classification of routing algorithms in MANET, Mobile operating System and applications.
8. Administration & management of mobile systems, security issues.

Unit 1

Overview of the emerging field of mobile computing: Historical perspectives (mainly from the perspective of radio), Land mobile vs. Satellite vs. In-building

communications systems, RF vs. IR, Mobile applications, Limitations.

Mobile Radio Propagation: Introduction, Propagation mechanism, Path loss, Slow Fading, Fast Fading, Delay Spread, Inter-symbol Interference, Co-channel Interference.

Cellular Concept: Characteristic of Cellular Systems, Cell area, Capacity of a cell, frequency reuse, Reducing Co-channel Interference, Cell Splitting, Cell Sectoring.

Unit 2

Mobile communication: Fiber or wire based transmission, Wireless Transmission:

Frequencies, Antennas and Signal Propagation, Modulation Techniques, Multiplexing techniques, Coding techniques.

Channel Allocation: Fixed Channel Allocation, Dynamic channel Allocation, Hybrid Channel Allocation, Allocation in Specialized System Structure.

Mobile Communication Systems: Cellular System Infrastructure, Registration, Handoff in cellular Systems, Roaming support, Mobile IP, Multicasting, Generation of Mobile Systems, Existing Wireless Systems, Case Study on GSM and CDMA.

Unit 3

Satellite Systems: Types of Satellite Systems, Characteristic of Satellite Systems,

Satellite System Infrastructure, Call Setup, Global Positioning System, limitations and beneficiaries of GPS.

Unit 4

Ad Hoc and Sensor Networks: Characteristic of MANETs, Applications, Need of

Routing, Routing Classification, Wireless Sensor Networks.

Unit 5

Wireless LANs and PANs: IEEE802.11, HIPERLAN, Bluetooth. Case Study on Wireless LAN infrastructure, Wireless security.

Text Book(s)

1. Jochen Schiller, Mobile Communications, John Willy & Sons, Ltd.
2. D. P. Agrawal and Qing-An zeng, Introduction to Wireless and Mobile Systems, Thomson publication.

Reference Material(s)

1. P. Nicopotidis, Wireless Networks, Addision –Wesley publication.
2. Raj Kamal, Mobile Computing, Oxford University press, 2007.
3. U. Hansmann, L. Merk, M.S. Nicklons and T. Stober, Principles of Mobile Computing, Springer, 2003.
4. R.

Course Name MTech (NM & IS) 2nd Semester
Subject Code: CS-6630
Subject Name: Internet of Things

Aim of the Subject

To impart knowledge with a solid theoretical foundation, and strong practical skills in the fields of computer technology, communications networks and IT, that are required to develop a wide range of IoT applications.

Objectives

- To cover all concepts of IoT
- To explore various applications of IoT
- To provide understanding of technologies involved in IoT
- To acquaint with Data Modelling and Security requirements in IoT environment
- To experiment on mutiple sensors using Microcontroller/Microprocessor

Learning Outcomes

Upon completing the course, students will be able to:
- Understand IoT concept
- Gain knowledge of IoT Applications and Examples
- Understand Technologies involved in IoT
- Get insight of Data Modelling in IoT
- Learn Security models in IoT
- Explore and learn about IoT with the help of preparing projects designed with the Arduino

Unit 1

Introduction to IoT: Definition, Characteristics, Conceptual framework, Architectural view.
Technology involved - Server-end technology, Hardware and Software components, Development tools & Open source framework, APIs & Device interfacing components, Platforms & Integration tools, Sources of Io T, Advantages and Disadvantages of IoT.
Machine-to-Machine Communication: Definition, M2M Vs. IoT, M2M architecture.

Unit 2

Design principles for connected devices: Communication Technologies – Near-field communication, RFID, Bluetooth, Zigbee (ZigBee IP/ZigBee SE 2.0), Wi-Fi, GPRS/GSM cellular Networks-Mobile Internet.

Design principles for web connectivity: Constrained Application Protocol (Co AP), MQTT, XMPP.

Data formats: JSON, XML, TLV, MIME.

Connectivity Models: Request/Response, Publish/ Subscribe, Pull/ Push Data, Message cache, Message queue.

Gateway Protocols for Web Connectivity: HTTP, SOAP, REST, RESTful HTTP and WebSockets.

Unit 3

Data Acquiring: Data generation, Data Acquisition, Data validation, Data categorization for storage, Data Store – definition, Key/ value store, Document store, tabular store (Column Family & Big Table), Object store, Graph Stores-Graph Databases

Data Organizing: Definition, DBMS- ACID rules, Distributed database, CAP theorem , Query processing, SQL, NoSQL, ETL, MPP, in-memory databases , columnar database.

Unit 4

Data Processing: Definition, Online tractions and processing (OLTP), Stream processing, Real-Time processing, Event Stream processing, Business process, Business Intelligence, Distributed Business Process, Enterprise Systems, Service Oriented Architecture(SOA).

Data Analytics: Definition, Analytics phases- Descriptive, Predictive, Prescriptive), Online analytical processing (OLAP), Statistical tools for data analysis -descriptive and inferential statistics, random analysis, sampling concept, Sampling distribution techniques, statistical inference, regression analysis.

Machine Learning basics: Supervise and un-supervised techniques,

Big Data analytics - Big data definition, Characteristics, Big data Classifications on the basis of: sources, format, stores, analysis, type, users, rate.

Big data Analytics: Architecture, Hadoop components, Berkley Data Analytics Stack (BDAS) Architecture.

Knowledge Management: Definition, Knowledge Management Reference Architecture.

Unit 5

Cloud Storage models and communication APIs for Io T, Io T Privacy, Security and Vulnerabilities Issues and Solutions, Prototyping and designing the software for Io T applications, Interoperability in IoT.

Introduction to Arduino Programming: Integration of Sensors and Actuators with Arduino.

IoT Case Studies: Agriculture, Healthcare, SCM, Connected Cars, Smart city, Smart Home.

Text Book(s)

1. . Adrian McEwen, Hakim Cassimally, "Designing the Internet of Thing", Wiley
2. Rajkamal, "Internet of Things: Architecture and Design Principles", McGraw Hill Education, 2017.

Reference Material(s)

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. Dr. Ovidiu Vermesa

Course Name MTech (NM & IS) 2nd Semester
Subject Code: CS 6518
Subject Name: Cloud Computing

Aim of the Subject

to introduce concepts related to the analysis, design and implementation of computation and storage clouds.

Objectives

comprehensive and in-depth knowledge of Cloud Computing concepts, technologies, architecture and applications by introducing and researching state-of-the-art in Cloud Computing fundamental issues, technologies, applications and implementations

Learning Outcomes

1. Explain the core concepts of the cloud computing paradigm: how and why this paradigm shift came about, the characteristics, advantages and challenges brought about by the various models and services in cloud computing.
2. Apply the fundamental concepts in datacenters to understand the tradeoffs in power, efficiency and cost.
3. Identify resource management fundamentals, i.e. resource abstraction, sharing and sandboxing and outline their role in managing infrastructure in cloud computing.
4. Analyze various cloud programming models and apply them to solve problems on the cloud.

Unit 1

OVERVIEW OF COMPUTING PARADIGM AND INTRODUCTION TO CLOUD COMPUTING: Recent trends in computing, evolution of cloud computing, Cloud computing (NIST model), properties, characteristics and disadvantages, role of open standards. Service models (XAAS), Deployment models

Unit 2

INFRASTRUCTURE AS A SERVICE: Introduction, Hypervisors, Resource virtualization, examples.

Unit 3

PLATFORM AS A SERVICE and Software-as-a Service :Introduction, Cloud Platform and Management, examples.Introduction to SaaS, , Web services, Web OS, examples

Unit 4

SERVICE MANAGEMENT IN CLOUD COMPUTING: Service Level Agreements (SLAs), Billing & Accounting, Comparing scaling hardware, economics of scaling, managing data

Unit 5

CASE STUDY ON OPEN SOURCE AND COMMERCIAL CLOUDS: CLoudSIm, HDFS and MapReduce, Amazon, Microsoft Azure etc.

Text Book(s)

1. Barrie Sosinsky: "Cloud Computing Bible", Wiley-India, 2010
2. . Rajkumar Buyya, James Broberg, Andrzej M. Goscinski: "Cloud Computing:Principles and Paradigms", Wiley, 2011

Reference Material(s)

1. Nikos Antonopoulos, Lee Gillam: "Cloud Computing: Principles, Systems and Applications", Springer, 2012
2. Ronald L. Krutz, Russell Dean Vines: "Cloud Security: A Comprehensive Guide to Secure Cloud Computing", Wiley-India, 2010
3. Tim Mather, Subra Ku