DEVI AHILYA VISHWAVIDYALAYA, INDORE

School of Computer Science and IT

1.1.1
Syllabus of all programs

Student Kit

PGDCA

2017-18

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

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DEVI AHILYA VISWAVIDYALAYA
Takshashila Campus, Khandwa Road, Indore – 452017
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School of Computer Science & IT, DAVV, Indore
Scheme for PGDCA. : 2017-18

PGDCA I

Sub. Code	Subject	L	T	P	C	Internal	Practical/Project	End Sem	Total
CS -1001	Fundamentals of Computer and Information Technology	3	1	0	4	40	-	60	100
CS-4223	Programming and Problem Solving Using Java	3	1	2	5	30	20	50	100
CS-1501	Operating System Basics & PC Packages	2	1	4	5	30	20	50	100
IC-3913	Financial Accounting	2	1	0	3	40	-	60	100
CS-3424	E-Governance	2	1	0	3	40	-	60	100
CS-4809A	Comprehensive Viva				4				
Total					**24**				

PGDCA II

Sub. Code	Subject	L	T	P	C	Internal	Practical/Project	End Sem	Total
CS-2402	Introduction to Database Management System - I	3	1	2	5	30	20	50	100
CS-4517	IT Infrastructure Management	3	1	0	4	40	-	60	100
CS-2602	Internet and E-Commerce	3	1	2	5	30	20	60	100
CS-5805A	Major Project				6				
CS-5809A	Comprehensive Viva				4				
Total					**24**				

PGDCA – I

CS-1001 Fundamentals of Computers & Information Technology

Unit 1

Know the Computer -, Introduction, What does computer stand for?, Strengths of computers, Limitations of computers, Fundamental uses of computers, Development of computers, Types of Computers, Generations of Computers.

Personal Computer - Introduction, Personal computer, Uses of personal computers, Components of personal computers, Evolution of PCs, Developments of processors, Architecture of Pentium IV, Configuration of PC

Unit 2

Number System - Introduction, Digital and Analog Operations, Binary Data, Binary Number System, Decimal Number System, Octal Number System, Hexadecimal Number System, Fractional Conversion, Coding System

Data Representation and Binary Arithmetic - Introduction, Bits, Nibbles, Bytes and Words, Data Representation, Coding system, Binary Arithmetic, Binary Addition, Binary Subtraction, Binary Multiplication, Binary Division, Character Representation, Checking the Result of Binary Arithmetic

Boolean Algebra and Logic Gates - Introduction, Boolean Algebra, Binary Valued Quantities, And Operator, OR Operator, NOT Operator, Basic Postulates of Boolean Algebra, Theorems of Boolean Algebra, De Morgan's Theorems, Reducing Boolean Expression by their Simplifications, Proving the Equations of Boolean Expressions By Truth Table, Principle of Duality, Standard Forms, Basic Logic Gates, Use of Logic Gates in Circuits, Karnaugh Maps

Unit3

Input Devices, Output Devices, Central Processing Unit, Storage Devices**, Basics of Software-** Introduction, What Does Software Stand For ?, Needs of software, Types of software

Operating System - Introduction, Operating System, Why an Operating System, Functions of Operating System, The Booting Process, Types of Reboot, Booting From Different Operating System, Types of Operating System, Some Prominent Operating Systems

Disk Operating System - Introduction, What is DOS?, Functions of DOS, Versions of DOS, DOS Commands , Important Internal Commands of DOS, Important External Commands of dos, Executable Vs Non-Executable Files In Dos.

Unit 4

Computer Virus - Introduction, Virus, History, Mechanism of virus, How a Virus Spreads, How is virus named, A few Prominent Viruses, Types of Computer Virus. **Communication and IT -** Introduction, Computer Network, Communication Process, Communication Types, Transmission Media, Wireless Media, Communication Channels/Media, Modem, Characteristics of a Modem, Types of Modem.

Unit 5

Networks- Introduction, Internet Vs Intranet, Types of Network, Topology, Types of Connectivity, Network Devices. **Internet -** Introduction, What is Internet actually ?, Growth of Internet, Owner of the Internet, Internet Service Provider, Anatomy of Internet, ARPANET and Internet history of the World Wide Web, Services Available on Internet (Internet Tools), Basic internet terminologies, net etiquette, Application of internet

CS- 4223 Programming and Problem Solving Using Java

UNIT I

Introduction to Java: Features of Java, Object-oriented programming overview, Introduction of Java Technologies, How to write simple Java programs, Data Types, Variables, Memory concepts, decision making operators, Naming Conventions, Introduction to Class, Objects, Methods and Instance Variables, Primitive type Vs Reference Type, Initializing Objects with Constructors. Type conversion & casting, Operators, Control Statements, break and continue Statements. Static Method, static field and Method Overloading.

UNIT II

String Handling: The String constructors, String operators, Character Exaction, String comparison, String Buffer. Arrays: Enhanced for Statement, Passing Arrays to Method, Multidimensional Arrays, Variable Length Argument lists, Using Command-line Arguments. Final Instance Variables, this reference, static import, overloaded Constructors, Garbage collection and method finalize, Overloading methods, Parameter passing.

UNIT III

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 Method and classes, Abstract classes and Methods, instanceof operator, Downcasting, Class class, Runtime type Identification

UNIT IV

Packages and Interfaces: Defining a Package, Understanding CLASSPATH, Access Protection, Importing packages, creating own packages. Defining an Interface, Properties of interface, advantages of interface

UNIT V

Exception Handling: Introduction, overview of doing it and keywords used, when to use it, Java Exception Hierarchy, finally block.

Text Book:

1. Java 2: The Complete Reference by Herbert Schildt, Tata McGraw- Hill, 8th Edition, 2011.

Reference Book(s):

1. The Java Programming Language, Ken Arnold , James Gosling , David Holmes, 3rd Edition, Person Education, 2000.
2. Head First Java, Kathy Sierra, Bert Bates, O'Reilly Publication, 2nd Edition,2005

CS-1501Operating Systems Basics and PC Packages

UNIT I

Evolution of an operating system, Define Operating system, objectives and functions of an operating system, the operating system as a resource manager, types of an operation system.

UNIT II

Differentiate Dos, windows and linux/Unix. Introduction to Windows-7: Windows7 features, windows Desktop Setting, managing windows explorer.
Windows-7: Using Taskbar, Start Menu options, My Computer, Recycle Bin, My Network Place, My Documents. Creating user Accounts in Windows7.

UNIT III
Windows Accessories: - Calculator, Note Pad, Word Pad, Paint, Entertainment, Address Book.
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 IV
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-PowerPoint – creating presentation using slide master, working with different view and menus, editing and formatting text, slide time management process, inserting data and pictures.

UNIT V
MS-Excel: saving and quitting worksheet, opening and moving in an worksheet, toolbar and menus, working with formulas and cell referencing, Auto sum, Absolute and relative addressing, working with graph, functions, pivot table, data sort ,data filter.

Learning Resources Required Text(s) Books:
1. Microsoft windows XP STEP BY STEP - PHI
2. operating system – William stallings – pearson education
3. Unix operating System – sumitabha das – Tata McGraw hill

Essential References
1. Introduction to computer - Nortal-Mcgraw Hill
2. Microsoft office : Ron Mansdield – BPB publication

Electronic Materials:
1. http://www.dauniv.ac.in/coursematerial.php , https://www.tutorialspoint.com/ms_excel_online_training/index.asp, other Web Sites etc
2. Other learning material such as computer-based programs/CD, professional standards/regulations

IC-3913 Financial Accounting

Unit I
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. Accounting structure :the process of accounting –journal, ledger, subsidiary books.

Unit II

Trial Balance based on Double Entry Book Keeping System. Financial Systems and related concepts : Form and preparation of Income statements (P &L A/C), Statement of Financial Position.

Unit III
Methods of Depreciation – SLM Method and WDV method. Financing Decisions : Tools of Financial Analysis : Financial Statement Analysis, Statement of Financial position.

Unit IV
Break Even Analysis. Leverages : operating , financial and combined. Accounting Package – Tally (Operations)

Unit V
Inventory Management and Responsibility Accounting : Methods of Inventory Management and Material Issues. Responsibility Accounting _ Meaning , Objectives and Importance. Required

Text(s) :

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

Reference books :

1. Financial Accounting by TS Grewal.
2. Financial Management by Khan and Jain.
3. NCERT Books on Accounting and FM for Class XI and X

CS-3424 E-Governance

Goal: To provide the knowledge of good governance using information and communication technologies and case studies of different countries.

Unit1
Introduction of E-Governance: Needs of E-Governance, Issues in E-Governance applications and the Digital Divide; Evolution of E-Governance, Its scope and content; Present global trends of growth in E-Governance: Other issues.

Unit2
Models of E-Governance: Introduction; Model of Digital Governance: Broadcasting/ Wilder Dissemination Model, Critical Flow Model, Comparative Analysis Model, Mobilization and Lobbying Model, Interactive-service Model/Government-to-Citizen-to-Government Model (G2C2G);

Unit3

Evolution in E-Governance and Maturity Models: Five Maturity Levels, Characteristics of Maturity Levels, Key areas, Towards Good Governance through E-Governance Models.

Unit4
E-Governance Infrastructure and Strategies

E-readiness: Digital System Infrastructure, Legal Infrastructural Preparedness, Institutional Infrastructural Preparedness, Human Infrastructural Preparedness, Technological Infrastructural Preparedness; Evolutionary Stages in E-Governance.

Unit5

Data Warehousing and Data Mining in Government

Introduction; National Data Warehouses: Census Data, Prices of Essential Commodities; Other areas for Data Warehousing and Data Mining: Agriculture, Rural Development, Health, Planning, Education, Commerce and Trade, Other Sectors.

Text/ Reference books:

1. E-Governance: Concepts and Case Studies, C.S.R. Prabhu, Prentice-Hall of India Private Limited, 2004.
2. Backus, Michiel, e-Governance in Developing Countries, IICD Research Brief, No. 1, March 2001.

PGDCA – II

CS-2402 Introduction to DBMS

UNIT-I
Introduction: purpose of DBMS, view of data, data models: physical model, logical model, conceptual model, hierarchical model, network model. Object oriented model. database language, Database administrator, database user, overall system structure.

UNIT-II
Entity relationship model: basic concepts, mapping constraints, keys, E-R diagram, weak, entity features, design of an E-R database schema, reduction of E-R schema to table.

UNIT-III
Structured Query Language(SQL):basic structure, set operations, aggregate functions, null values, nested sub queries, data definition language(DDL), data manipulation language(DML), data control language(DCL), transaction control language(TCL).

UNIT-IV
Relational database design: Decomposition, normalization using functional dependencies, normalization using multivalued dependencies.

UNIT-V
Concept of RDBMS, characteristics of RDBMS, Codd's 12 rules, introduction to oracle tools, security.

TEXT BOOK

1. Database system concepts by A.silberschatz, H.F.Korth, and S.Sudershan 5th Edition McGraw Hill

REFERENCE BOOKS

1. An introduction to database management system by Vipin Desai
2. Modern database system by Mcfadden

CS-4517 IT Infrastructure Management

UNIT 1
IT Infrastructure: Overview
Definitions, Infrastructure management activities, Evolutions of Systems since 1960s (Mainframes-to-Midrange-to-PCs-to-Client-server computing-to-New age systems) and their Management, growth of internet, current business demands and IT systems issues, complexity of today's computing environment, Total cost of complexity issues, Value of Systems management for business.

Unit 2
IT Infrastructure Management
Factors to consider in designing IT organizations and IT infrastructure, Determining customer's Requirements, Identifying System Components to manage, Exist Processes, Data, applications, Tools and

their integration, Patterns for IT systems management, Introduction to the design process for information systems, Models, Information Technology Infrastructure Library (ITIL).

UNIT 3

Current computing environments

Complexity of current computing, multiple technologies, multiple vendors, multiple users, e-Waste disposal, Toal cost of ownership.

UNIT 4

IT system Management

Common tasks in IT system management, approaches for organization Management, Models in IT system design, IT management systems context diagram, patterns for IT system Management

Establishing business value of information system

Information system costs and benefits, Capital budgeting for information system, Real Options pricing models, Limitation of financial models.

Unit 5

Service Delivery Processes-I, Service Delivery Processes – II, Service Support Management –I, Service Support Management –II, Storage Management – I, Storage Management – II, Security Management –I, Security Management -II

IT Ethics

Introduction to Cyber Ethics, Intellectual Property, Privacy and Law, Computer Forensics, Ethics and Internet, Cyber Crimes

CS-2602 Internet and E-Commerce

Unit –I

Internet - Evolution, Protocols, Interface Concepts, Internet Vs Intranet, Growth of Internet, ISP, Connectivity - Dial-up, Leased line, VSAT etc., URLs, Domain names, Portals, Application.

E-MAIL - Concepts, POP and WEB Based E-mail, merits, address, Basics of Sending & Receiving, E-mail Protocols, Mailing List, Free Email services.

INTERNET protocols - Data Transmission Protocols, Client/Server Architecture & its Characteristics, FTP & its usages. Telnet Concept, Remote Logging, Protocols, Terminal Emulation, Massage Board, Internet chatting - Voice chat, text chat.

Unit –II

World Wide Web (WWW)- History, Working, Web Browsers, Its functions, Concept of Search Engines, Searching the Web, HTTP, URLs, Web Servers, Web Protocols.

Unit –III

Web publishing - Concepts, Domain name Registration, Space on Host Server for Web site, HTML, Design tools, HTML editors , Image editors, Issues in Web site creations & Maintenance, FTP software for upload web site.

Unit –IV

Html - Concepts of Hypertext, Versions of HTML, Elements of HTML syntax, Head & Body Sections, Building HTML documents, Inserting texts, Images, Hyperlinks, Backgrounds and Color controls, Different HTML tags, Table layout and presentation, Use of font size & Attributes, List types and its tags, Use of Frames and Forms in web pages.

Unit –V

E - Commerce An introductions, Concepts, Advantages and disadvantages, Technology in E- Commerce, Internet & E-business, Applications, Feasibility & various constraints. E-transition challenges for Indian corporate. Electronic Payment Systems: Introduction, Types of Electronic Payment Systems, Digital Token-Based Electronic Payment Systems, Smart Cards and Electronic Payment Systems, Credit Card-Based Electronic Payment Systems, Risk and Electronic Payment Systems.

TEXT & REFERENCE BOOKS :

• **Internet and Web Design Made Easier** By A. Mansoor, Pragya Publications, Matura
• **O level Module - M 1.2** - Internet & web page designing by V.K.Jain – BPB Publications.
• ***E-Commerce An Indian Perspective (Second Edition)*** *– by P.T. Joseph, S.J. Presentice-Hall of India*
• **Internet for Everyone** - Alexis Leon and Mathews Leon, Vikas Publishing House Pvt. Ltd., New Delhi
• **Internet for Dummies** - Pustak Mahal, new Delhi
• A Beginner's Guide to HTML available at:
http://www.ncsa.uiuc.edu/General/Internet/WWW/HTMLPrimerAll.html

STUDENT KIT

Bachelor of Computer Applications - I Semester
July 2017 Onwards

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- *To produce international quality IT professionals, who can independently design, develop and implement computer applications.*
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School Of Computer Science & IT, DAVV, Indore

Scheme-July 2017 onwards

BCA – I Semester

Sub. Code	Subject	L	T	P	C	Internal	Practical/ Project	End Sem	Total
CS-1101	Mathematics – I	3	1	0	4	40	-	60	100
CS-1103	Physics - I	3	1	0	4	40	-	60	100
IC-1924	Hindi Language	3	1	0	4	40	-	60	100
CS-1201	Fundamentals of programming and Problem Solving through C - I	3	1	4	6	30	20	50	100
CS-1019	Basic Electricals & Electronics	3	1	2	5	30	20	50	100
CS-1905A	English Language Lab	0	0	2	1	50	50	0	100
CS-1809A	Comprehensive Viva				4				100
Total					**28**				**700**

Note: Proposed Scheme can be changed/amended/improved according to necessity and requirement.

CS-2111 Mathematics- I

Unit I

Basic of calculus, Maclaurin's and Taylors, partial differentiation, **P**artial differentiation, Euler's theorem and its application in approximation and error, Maxima and minima of two variables, tangents and normals, subtangent and subnormal, Curvature, radius of curvature, centre of curvature (Cartesian and polar co-ordinates)

Unit II

Definite integral as limit of a sum, Application in Summation of series, Double and Triple integrals, change of order of integration, beta and gamma functions. Length of the curve, volume and surfaces, using double and triple integral.

Unit III

Ordinary differential equation of first order, linear and higher degree, Linear higher order differential equation with constant coefficients. Homogeneous linear differential equation, simultaneous differential equations.

Unit IV

Rank of matrices, solution of simultaneous equation by elementary transformation, consistency of equation. Eigen value and Eigen vectors, Cayley-Hamilton theorem and its application to find the inverse.

Unit V

Algebra of logic, Boolean algebra, principal of duality, basis theorems, Boolean expression and function. Graph theory, Graphs, Sub-graphs, degree and distance, Tree, Cycles and Network, Elementary concept of fuzzy logic.

Required Text(s) :

1. Engineering Mathematics I by DC Agarwal
2. Fifth Edition, Published by Shree Sai Prakashan

Reference Books:

1. Higher Engineering Mathematics – Dr.B.S Grewal, Edition: 36Khanna Publishers, 2001. ISBN: 8174091157, 9788174091154
2. Higher Engineering Mathematics – B V Ramana.Tata McGraw-Hill Education, 2006, ISBN: 007063419X, 9780070634190

CS-1103 Physics-I

Unit I

Origin of Quantum Physics, Hypothesis, De-Broglie's hypothesis of matter wave and its experimental verification. Group and particle velocities and their relations, Electron microscope, Uncertainty principle of EM and its elementary proof and its application. Compton effect, Wave function and its physical significance, General idea and application of time dependent and time independent Schrodinger wave equation.

Unit II

Interference introduction, Fresnel's biprism, Interference in thin films, Newton's rings and Michelson's interferometer experiments. Diffraction at single slit and n-slit, Diffraction grating. Rayleigh criterion. Resolving power of a telescope, grating and Prism. Concept of polarized light, Brewster's laws, Double refraction, Nicol prism, quarter and half wave plate. Idea about circularly and elliptically polarized light.

Unit III

Nuclear structure and nuclear properties, Quantitative treatment of nuclear models: Liquid drop and shell models, Linear particle accelerator, Cyclotron, Synchrotron, Synchrocyclotron and Betatron. Nuclear cross-section, chain reaction, critical size. Application of $E=mc^2$, Q-Value, Nuclear fusion and fission, Nuclear reactors, Geiger-Muller counter, Bainbridge and Auston mass Spectrograph.

Unit IV

Material, Free Electron model of solids, Qualitative analysis of Kroning Penny model, Effective mass, Fermi level for Intrinsic and Extrinsic Semiconductor, PN-Junction. Zener Break down, Photodiode, Solar-cells, Hall effect, Nano material Introduction, Elementary idea about Nano structures and Nano material.

Unit V

Laser introduction, Stimulated and spontaneous emission, Einstein's A and B Coefficients, transition probabilities, active medium, population inversion, pumping. Optical resonators, characteristics of laser beam, Coherence, directionality and divergence, Principles and working of Ruby laser, Nd:YAG, He-Ne laser and Carbon-dioxide lasers with energy level diagram. Fundamental idea about optical fiber, types of fibers, acceptance angle and cone, numerical aperture, V-number, propagation of light through step index fiber, Ray theory, pulse dispersion, attenuation.

Text Books :

1. Engineering Physics -VS Yadav , TMH
2. Optics - Ghatak and Tyagrajan, TMH
3. Atomic and Nuclear Physics - Brijlal and Subramaniyam.
4. Semiconductor and solid state devices - D.C. Sarkar, S.Chand & Com
5. Fundamental of Nano Technology, S. Kulkarni,
6. Laser and its application , BB Load PHI
7. Optical Fiber Communication, Gerd Keiser TataMcHill.
8. Optical Fiber Comm. , John M Senior TataMcHill

Reference Books :

1. Concept of modern Physics - Beiser, TMH. 2. Engineering
2. Physics -V.S. Yadav, TMH

CS-1201 Fundamentals of Programming and Problem Solving through C-I

UNIT I

Introduction to Computer-Based Problem Solving : Problem Identification, Definition and Problem Solving Strategies. Program, Features of Good Program.Structured Programming and modular Programming, Classification of Programming Languages : Low-level, High –level language, Programming Environment : Assemblers, Compiler, Interpreter, Linker, Loader.

Program Design with Flowcharting and Algorithm : Symbols in flowcharts, Importance of Flowchart, Writing algorithm, Importance of Algorithm, Developing and debugging flowchart for programming problem.

UNIT II

Fundamentals of C Programming : Overview of C, History of C, Structure of a C Program, C character set, Identifiers and Keywords, Data types, Primitive data types in C, Choosing data type, Variables and Constants, Variable declaration and initialization, Type Specifier, Constant declaration.

Operators and Expressions: Arithmetic operators, Logical operators, Relational operators, assignment operator and conditional operators, Expression, Implicit and explicit type conversion, Evaluation of expression (Precedence and Associativity).

UNIT III

Basic Input/Output Operations: Formatted I/O, printf() and scanf() functions, Unformatted I/O, getchar(),putchar(),gets() and puts() functions.

Control Constructs: Sequence Control Structure, *if-else* statement, *switch-case* statement, Loop Control Structure, *while* loop, *do-while* loop, *for* loop, Jump Statements, break, continue, goto, return.

UNIT IV

Array: Array Declaration and initialization, Array operations (like traversal, searching an element, sorting array elements), 2 D Array and multidimensional array, Declaration and initialization**,** Matrix operations, Advantages and limitations of Array, String.

UNIT V

Function: User defined Function, Function declaration, definition and call, Actual and formal Arguments**,** Function with arguments and without arguments**,** Communication between function, Recursion**,** Self and Mutual recursion**,** Iterative vs. recursive function.

Text Book(s):

1. Herbert Schildt, "C The Complete Reference", Osborne/McGraw-Hill,4th Edition,2000.
2. Behrouz A. Forouzan, Richard F. Gilberg, "Computer Science: A Structured Programming Approach Using C", Thomson Brooks/cole,3rd Edition,2007.

Reference Book(s):

1. B.W. Kernighan, D.M. Ritchie, "The C Programming Language", Prentice Hall of India, 2nd Edition,1988.
2. E Balagurusami, "Programming in ANSI C", Tata McGraw-Hill,6th Edition,2012.
3. Byron S Gottfried, "Programming with C", Tata McGraw-Hill, 3rd Edition, 2010.
4. Yashavant Kanetkar, "Let us C",BPB Publications,13th Edition,2013.
5. Yashwant Kanetkar, "Test your C skills",BPB Publication, 5th Edition, 2005.

Electronic Materials

http://www.dauniv.ac.in/coursematerial.php

Assignments

1. Write a C program to display "Hello Computer" on the screen.
2. Write a C program to display Your Name, Address and City in different lines.

3. Write a C program to find the area of a circle using the formula: Area = PI * r2
4. Write a C program to find the area and volume of sphere.
   Formulas are: Area = 4*PI*R*R Volume = 4/3*PI*R*R*R.
5. Write a C program to print the multiply value of two accepted numbers.
6. Write a C program to convert centigrade into Fahrenheit. Formula: C= (F-32)/1.8.
7. Write a C program to read in a three digit number produce following output (assuming that the input is 347) 3 hundreds 4 tens 7 units
8. Write a C program to read in two integers and display one as a percentage of the other. Typically your output should look like 20 is 50.00% of 40 assuming that the input numbers where 20 and 40. Display the percentage correct to 2 decimal places.
9. Write a C program to find out whether the character presses through the keyboard is a digit or not (using conditional operator).
10. Write a C program to swap variable values of i and j.
11. Write a C program to find the maximum from given three nos.
12. Write a C program to find that the accepted no is Negative, Positive or Zero.
13. Write a program which reads two integer values. If the first is lesser print the message up. If the second is lesser, print the message down if they are equal, print the message equal if there is an error reading the data, print a message containing the word Error.
14. Write a C program that prints the given three integers in ascending order using if – else.
15. Write a C program for calculator designing using switch /case loop?
16. Write a C program to convert decimal to binary.
17. Write a C program to convert decimal to octal.
18. Write a C program to convert decimal to hexadecimal.
19. Write a C program to find the sum of first 100 natural nos.
20. Write a C program to find the sum of first 100 odd nos. and even nos.
21. Write a C program to display first 25 Fibonacci nos.
22. Write a C program to display first 100 prime nos.
23. Write a C program to find factorial of accepted nos.
24. Write a C program to find the sum of digits of accepted no.
25. Write a C program to print the accepted no and its reverse no.
26. Write a C program to print all the Factors of accepted no.
27. Write a C program to find HCF of two given numbers.
28. Write a C program to find LCM of two given numbers.
29. Write a C program to find all the prime number between two given numbers.
30. Write C programs to print the terms of each of the following series:
    i. Sin(x) ii. Cos(x) iii. Log (1+x) iv. log(1-x) v. e^{x} vi. e^{-x}
31. Write a C program to print the sum of series.(will be given in class).
32. Display the output on screen (assuming the value for input parameter n=5) :

a.	b.	c.	d.	e.
*	1	A	1	1
**	12	AB	23	23
***	123	ABC	345	456
****	1234	ABCD	4567	78910
*****	12345	ABCDE	56789	101112131415

f.	g.	h.	i.	j.
*****	ABCDE	*	1	1
****	ABCD	***	123	121
***	ABC	*****	12345	12321
**	AB	*******	1234567	1234321
*	A	*********	123456789	123454321

k.	l.	m.	n.	o.
*	ABCDE	1	*****	1
**	ABCD	12	0000	10
***	ABC	123	***	101
****	AB	1234	00	1010
*****	A	12345	*	10101

p.	q.	r.	s.	t.
1	1	A	ABCDEDCBA	1
01	22	AB	ABCD DCBA	121
101	333	ABC	ABC CBA	12321
0101	4444	AB	AB BA	1234321
10101	55555	A	A A	123454321

33. Write a C program to find minimum, maximum, sum and average of the given one dimensional array.
34. Write a C program to perform the basic Matrix operations as addition, subtraction, multiplication, Transpose.
35. Write a C Function for the following task
    a. Calculating Factorial
    b. Find value of a given Fibonacci term
    c. Swapping the values of two variable
    d. Minimum/maximum value from the given input
36. Write the following recursive C Function
    a. Factorial of a given number
    b. N^{th} Fibonacci number
    c. Reverse of a give Number

CS-1019 Basic Electrical and Electronics

Unit I

Circuit concepts: voltage, current, power and energy, circuit, network component (active and passive, unilateral or bilateral , linear and nonlinear , lumped or distributed). Resistance parameter, inductance parameter, capacitance parameter, Series and parallel elements. Energy sources (voltage source and current source), voltage and current relations.

DC resistive circuits: Kirchhoff's voltage law, Kirchhoff's current law, Practice with Examples. Voltage Division and Current Division, Series –Parallel Network Reduction Power in a Series Circuit, Power in Parallel Circuit,

Unit II

Network theorems : Star –Delta transformation , Ex. 1& 2 superposition theorem ,Explanation with example . Thevenin's theorem , Practice with Example maximum power transfer theorem.

DC mesh and node Analysis : Mesh analysis with Example . Norton's theorem , Practice with Example. Mesh equation by inspection method. Nodal analysis, node equation by inspection method. Source transformation technique.

Unit III

Circuit Transients: Introduction initially charged RC circuit, RL circuit with initial current. Time Constant, Equivalent RC or RL Circuits RL and RC Circuit with Sources.

Series RLC Circuit: Overdamped, Critically Damped, Underdamped Condition. Example on RLC Circuit Two Mesh Circuits.

Sinusoidal Circuit analysis:

Introduction, sinusoidal voltage and current(instantaneous value , peak value, peak to peak value, average value, root mean square value, peak factor, form factor.

Unit IV

Element responses (phase relation in a pure resistor, inductor and capacitor). Series RL sinusoidal Response , Example. Phasors : Phasors as Complex Numbers. Series RC Sinusoidal Response , Example. Power and Power Factor : Instantaneous Power, Average Power, Apparent Power and Power Factor , Reactive Power, Power Triangle.

Unit V

Introduction of Digital Electronics : Analog representation, Digital representation . Digital and analog systems: Advantages and Limitations of digital techniques. Digital Number Systems: Decimal system , Binary System , Binary Counting . Representing Binary Quantities, Digital Circuits/ logic circuits, Parallel and serial Transmission. Digital Computers: Block Diagram of Digital Computers, Major Part of Digital Computers. Digital Logic gates (AND,OR, Inverter, Buffer, NAND, NOR, Exclusive-OR, Exclusive-NOR: Graphic symbol, algebraic function, Truth Table) . Cascading of Gates.

Required Text(s) :

1. Electric circuits by Schaum's Outline Series
2. Circuits and Networks by Sudhakar Shyammohan

Reference Books:

1. Electrical Technology By B. L. Theraja
2. Basic electrical engineering By I J Nagrath
3. Digital Design by M. Morris Mano,Third Edition

IC-1924 हिन्दी भाषा

इकाई – 1

क– **मानक हिन्दी भाषा –**

1– मानक हिन्दी के लक्षण और उदाहरण
2– मानक हिन्दी का स्वरूप
3–मानक हिन्दी के प्रकार

ख– **अशुद्धियॉ और उनका संशोधन –**

1– अशुद्धियों के उदाहरण
2– अशुद्धियों के प्रकार (उधारण गत, वर्तनी गत, शब्द और अर्थ गल, व्याकरण गत)

इकाई–2

क– **हिन्दी का शब्द भंडार –**

1– शब्दों के प्रकार 2– शब्दों की रचना 3– नये प्रयोग

ख– **हिन्दी की वाक्य रचना –**

4– वाक्यों के प्रकार 5– वाक्य विन्यास 6– वाक्य गत सामान्य अशुद्धियॉ 7– विराम चिन्ह

इकाई–3

पत्र लेखन, सार लेखन, पल्लवन –

1– पत्रों के उदाहरण
2– पत्रों के प्रकार
3– पत्र लेखन की विशेषाताएँ (पत्र लेखन, संशोधन, अंत दिनांक आदि डालना)
4– सार लेखन
5–पल्लवन

इकाई–4

भारतीय संस्कृति, भारत देश और उसके निवासी, भारतीय समाज की संरचना, सामाजिक गतिशीलता–अद्यतन, कार्य और दर्शन

इकाई–5

भारतीय संस्कृति का विश्व पर प्रभाव, मध्य पदेश का सांस्कृतिक वैभव पाठ्यपुस्तक–भारतीयता के अमर स्तर, प्रकाशंक – म0प्र0 हिन्दी गंथ अकादमील, भोपाल ।

STUDENT KIT

Bachelor of Computer Application – II Semester

Jan-May 2018

Devi Ahilya Vishwavidyalaya

School of Computer Science & IT

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

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School of Computer Science & IT, DAVV, Indore

Scheme-Jan-May 2018 onwards

BCA-II Semester

Sub. Code	Subject Name	L	T	P	C	Internal	Practical/ Project	End Sem	Total
IC-1905	English Language and Composition	3	1	0	4	40	-	60	100
CS-1202	Programming and Problem Solving Using C - II	3	1	2	5	30	20	50	100
CS-1102	Mathematics- II	3	1	0	4	40	-	60	100
CS-2020	Electronic Circuits	3	1	2	5	30	20	50	100
CS-1501	Operating System Basics & PC Packages	2	1	2	4	30	20	50	100
CS-1809B	Comprehensive Viva				4			100	100
Total					**26**				

Note: Proposed Scheme can be changed/amended/improved according to necessity and requirement.

BCA II Semester

CS-1202 Fundamentals of Programming and Problem Solving through C-II

Unit-I

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 –II

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 –III

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 -IV

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 -V

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 Books :

Pointer in C- Yashwant Kanetkar-BPB Publication

CS-1102 Mathematics II

Unit-I

Fourier series and half range series. Laplace transforms & Inverse Laplace transforms of simple functions, their elementary properties, applications of Laplace in solution of ordinary differential Equations.

Unit-II

Second order differential equation with variables Coefficients (Only by method: One solution is known & variation of parameters).

Unit-III

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

Unit-IV

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

Unit-V

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 II " Dr. D C Agarwal"
- Fifth Edition, Published by Shree Sai Prakashan

Reference Books :

- Higher Engineering Mathematics – Dr.B.S Grewal, **Edition:** 36
  Khanna Publishers, 2001. **ISBN**: 8174091157, 9788174091154
- Higher Engineering Mathematics – BV Ramana.
  Tata McGraw-Hill Education, 2006, **ISBN**: 007063419X, 9780070634190

CS-2020Electronic Circuits

Aim : 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.

Syllabus

Unit I

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 flow 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 II

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 III

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 IV

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 V

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.

Recommended Text Books:

1. Electronic Principle by Albert Paul Malvino, McGraw-Hill 7th Edition
2. Electronic Devices and Circuits by Robert Boylstad Pearson Education
3. Malley, J. (1992). Basic Circuit Analysis, 2nd Edition. McGraw-Hill.

CS-1501 Operating System Basics & PC Packages

Unit-I

Operating System: Evolution of an operating system, Define Operating System, Objectives and functions 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 -II

Introduction to Windows XP: Windows XP features, Windows Desktop Setting, managing windows 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 -III

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 -IV

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 -V

MS EXCEL: Saving and quitting worksheet, opening and moving in an worksheet, toolbar and menus, 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 Books :

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

IC-1905 English Language and Composition

Unit I

Where the mind is without fear (poem): Explanation of the poem, exercises including comprehension and vocabulary.

The Ideals of Indian Art: Explanation, exercises including comprehension and vocabulary, grammar (Determiners and Countable/Uncountable Nouns), Exercises, Composition, Paragraph Writing, Speech Skills

The Wonder that was India: Explanation, exercises including comprehension and vocabulary, grammar (The Tense Forms: The Present Indefinite Tense, The Present continuous Tense, The Present perfect Tense, The Present perfect continuous Tense) Speech Skills (Phonetic Symbols for consonant sounds)

Unit II

The Heritage of Indian Art: Explanation, exercises including comprehension and vocabulary, grammar (The Past Tense: The Past Indefinite Tense, The Past continuous Tense, The Past perfect Tense)

Life in Vedic Literature: Explanation, exercises including comprehension and vocabulary, grammar (The Future Indefinite Tense, The Future continuous Tense, The Future perfect-Tense, The Future perfect continuous Tense, use of Some – Any, Too – Enough, 'Too' and 'Very'), Speech Skills (Phonetic Symbols for consonant sounds continued…) The Ramayana and The Mahabharata: Explanation, exercises including comprehension and vocabulary, grammar (Conditional Sentences), Speech Skills (Phonetic Symbols for consonant sounds)

Unit III

Freedom Movement in India: Explanation, exercises including comprehension and vocabulary, grammar (Modals)

Dandi Salt March: Explanation, exercises including comprehension and vocabulary, grammar (Direct and Indirect Speech: Statements, Questions, Commands, requests and advice, Exclamations)

Continuation of previous grammar part- Sentence Synthesis, Verb Pattern, Composition, Speech Skills … continued…(Phonetic Symbols)

Unit IV

Aspects of Indian Constitution: Explanation, exercises including comprehension and vocabulary, grammar (Active and Passive Voice), Composition, Speech Skills … continued…(Vowel sounds), Exercise

Individual Freedom: Explanation, exercises including comprehension and vocabulary, grammar (Prepositions, its types, exercises) Speech Skills … continued…(Vowel sounds), Exercise Fundamental

Duties: Explanation, exercises including comprehension and vocabulary, grammar (Verb + Prepositions, Verb + adverbs, Intransitive Phrasal Verbs, Possessives, Combination of Sentences), Speech Skills … continued…(Vowel sounds), Exercise, Diphthongs, Exercise

Unit V

Delhi in 1857: Explanation, exercises including comprehension and vocabulary, grammar (Word Formation, Some English Prefixes, Suffixes; Compounds: Noun, Adjective, Verb), Speech Skills … continued…(Vowel sounds), Exercise

Rajah's Diamond: Explanation, exercises including comprehension and vocabulary, grammar (Punctuation: Word Punctuation, Sentence Punctuation), Speech Skills … continued…(Syllable and Stress)

Tree: Explanation, exercises including comprehension and vocabulary, grammar (Non-finite verbs: Infinitive, Gerund, Participle)

Reference Book:

English Language and Indian Culture Published by MP Hindi Granth Academy, Bhopal.

STUDENT KIT

Bachelor of Computer Application - III Semester

July 2017 Onwards

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- *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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School of Computer Science & IT, DAVV, Indore
Subjects-July 2017 onwards

BCA – III Semester

Sub. Code	Subject	L	T	P	C	Internal	Practical / Project	End Sem	Total	Reviewer
CS-2111	Mathematics-III	3	1	0	4	40	-	60	100	
CS-3207	Object Oriented Programming through C++ I	3	1	2	5	30	20	50	100	
CS-2021	Digital Electronics	3	1	2	5	30	20	50	100	
CS-2222	Data Structure and Algorithms	3	1	2	5	30	20	50	100	
IC-3913	Financial Accounting	3	1	0	4	40	-	60	100	
CS-2809A	Comprehensive Viva				4				100	
Total					**27**				**600**	

Note:

Proposed Scheme can be changed/amended/improved according to necessity and requirement.

CS-2111 Mathematics-III

Unit –I

Numerical Analysis: Difference operators, Errors and Approximations, Interpolation, Inverse Interpolation, Numerical differentiation, Numerical Integration by using Simpson's method, Weddle's rule and Gauss Legendre open quadrate formula.

Unit –II

Solutions of algebraic and transcendental equations (Regular False, Newton-Raphson, Iterative, Graeffe's root squaring methods). Solutions of simultaneous algebraic equations: Direct methods (Gauss Elimination Method, Gauss-Jordan Method), Iterative Methods (Jacobi Iterative Method, Gauss-Seidel Iterative Method).

Unit –III

Solutions of ordinary differential equations (Tailor's Series, Picard's Method, Modified Euler's Method, Runge-Kutta Method, Predictor-Corrector Method), Solution of Partial differential equation.

Unit –IV

Introduction to optimization by linear programming, only two variable problems solution by graphical and simplex method, concept of degeneracy and duality; simple three variable transport and assignment problems and modeling into LPP.

Unit –V

Functions of Complex Variables: Analytic functions, Harmonic Conjugate, Cauchy- Riemann Equations, Line integral, Cauchy's theorem, Cauchy's Integral formula, Singular points, Poles and Residues, Residue theorem, Evaluation of Real Integral, Bilinear Transformation.

Text Book(s) :

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

Reference Books:

1. Higher Engineering Mathematics – Dr.B.S Grewal, 36th edition, Khanna Publishers, 2001. ISBN: 8174091157, 9788174091154
2. Higher Engineering Mathematics – BV Ramana,Tata McGraw-Hill Education, 2006, ISBN: 007063419X, 9780070634190

OBJECT ORIENTED PROGRAMMING USING C++-I

UNIT – I

Introduction to OOP's Languages, Difference between procedure oriented and object oriented languages, characteristics of OOP's languages, application of OOP's, basic program structure, preprocessor directives. OOP's paradigm & concepts: Objects, Class, A sample C++ program with class, Defining member function, Introduction to- Data abstraction, Data encapsulation, Inheritance, polymorphism. Difference between structure and class.

UNIT – II

Scope resolution operator, Constructors and Destructors, Types of constructors: Default, Parameterized, copy constructors. . Data types in C++, Data type conversion and casting, explicit and implicit type conversion, Block, Local and Global variables, Qualifiers effecting scope and visibility of variables : Static, Auto, Extern and Register variables, Operators in C++, manipulators.

UNIT –III

Access specifiers in C++ : Public, Private and Protected data member and member functions, Defining a member function of a class outside the class using scope resolution operator, inline functions, difference between macro, inline and simple function, Polymorphism: Function overloading, Operator overloading, Unary and Binary operator overloading, types of polymorphism : Compile time and Runtime Polymorphism,

UNIT – IV

Pointers, this pointer, pointer to object, Pointer Arithmetic, Pointer to object. Inheritance, types of inheritance : single, multiple , multilevel, hierarchical, hybrid inheritance, public, private and protected visibility in inheritance. Function overriding, pure virtual function Abstract class.

UNIT – V

Templates: Function template and class templates. Working with Files: Introduction to Classes for File Stream Operation, Opening & Closing Files, Detection of End of File.

Text book :

1. 1.C++ : The Complete Reference by Herbert Schildt

Reference Books

1. Let us C++ By Kanetkar
2. Object Oriented Programming with C++ : E. Balagurusamy
3. C++ Primer : Stanley Lippman & Lajoi
4. C++ Programming Language : Bjarne Stroustrup
5. C++ Programming Bible : Al Stevens & Clayton Walnum

CS-2021 Digital Electronics

Unit I

Introduction to Digital Computers, Difference between Analog and Digital Computer, number system. Binary codes and their representation. Computer Arithmetic: Binary representation of Negative Integers using 2's complement and Signed magnitude representation, Fixed point Arithmetic operations on Positive and Signed (Negative) Integers like addition, subtraction, multiplication,

Unit II

Signed multiplication, Booth algorithm for multiplication. Division of positive and negative binary numbers. Boolean Algebra and Logic Gates: Basic Definitions, Basic Theorems and properties of Boolean Algebra, Boolean Functions, Canonical and standard forms, Other Logic operations, Digital Logic gates, Integrated Circuits.

Unit III

Gate-Level Minimization: The K-Map Method, 3 and 4 variable K-Map, Product of sums simplification, Sum of Products simplification, Don't care conditions, NAND and NOR implementations, Exclusive-OR function. Combinational Logic: Combinational Circuits, Analysis Procedure, Design Procedure, Binary half adder, binary full adder, binary full subtractor.

Unit IV

Binary parallel adder, carry propagation delay and Propagation delay calculation of various digital circuits. Fast adder, Decimal Adder, seven segment display, BCD to excess three code converter, Decoders, Encoders, Multiplexer, and Demultiplexers. Synchronous Sequential logic: Sequential circuits, Latches, Flip Flops: SR, D, JK, T.

Unit V

Master Slave JK Flip flop. Characteristic equations and Excitation tables of flip-flops. Analysis of clocked sequential circuits: State diagrams, State equations for D, JK and T Flip flops. Shift Registers- Serial in Serial out, Serial in Parallel out, Parallel in Serial out and Parallel in Parallel, Designing of Asynchronous (Ripple) Counters, Design of Synchronous Counters. Various terms related to integrated circuits like: Noise margin, fan in, and Fan out, propagation delay, power dissipation Digital logic families like: TTL, CMOS, ECL, RTL, comparison between these families.

Required Texts :

1. Digital Design by M. Morris Mano. Publication: PHI Eastern economy edition, 2001.
2. Computer Architecture By Dr. Rajkamal. Publication: TMH Indian Special edition 2006.

Essential References:

1 Computer Fundamentals – Architecture and Organization By B. Ram. Publication: PHI Fourth edition, 2003.

2 Principles of digital communication system & computer networks,K.V.K.K.Prasad

3 Computer organization and architecture by William Stallings. Publication : PHI Fifth edition, 1999.

4 Digital systems principal and Design by Dr. Rajkamal , Publication : PHI First impression,2006.

Laboratory Experiments:

Reading: Chapter 11 (P- 437-466) By Morris Mano

S. No.	Name of the Experiment
1.	Study of Digital Logic gates with Identification numbers and Pin assignments.
2.	Study of IC type 7493 Ripple Counter and listing of ICs required for experiments
3.	Study of Binary counter using IC 7493
4.	Study of Boolean function implementation using universal logic gates.
5.	Study of combinational circuit like Parity Generator
6.	Study of IC type 74155 as 3 x 8 Decoder
7.	Study of Code converter BCD to Seven Segment Decoder (7447) and Seven Segment Display (7730)
8.	Study of IC type 74151 8 x 1 Multiplexer
9.	Study of IC type 7483 4 -Bit Binary Adder and as 4-bit Adder Subtractor
10.	Study of IC type 7474 dual Positive Edge triggered Flip Flop
11.	Study of IC type 7476 dual JK Master Slave flip flops

Note: Students are to be notified that they will have to prepare two files, one for the class assignments and other for the Lab assignments. Assignments will be given as per the class schedule and will have to be submitted and verified, before the due date as has been assigned by the respective teacher. Students are needed to bring both the files compulsorily at the time of their Comprehensive Viva Examination.

Class Assignments:

Assignment I (Week 1):

1) Write the first 20 decimal digits in base 4.
2) Write the first 20 decimal digits in base 3.
3) Add and multiply the following numbers in the given base without converting to decimal.
   (i) $(1230)_4$ and $(33)_4$
   (ii) $(130)_5$ and $(34)_5$
   (iii) $(230)_6$ and $(54)_6$
   (iv) $(130.4)_5$ and $(34.3)_5$
4) Write the first 100 decimal digits into binary.
5) Convert the following numbers into binary.
   (i) 123.56 (ii) 456.75
   (iii) 345.9 (iv) 890.9
   (v) 567.9 (vi) 668.7
6) Converts the following numbers into decimal.
   (i) 10101010 (ii) 101010110011
   (iii) 10110101.1111 (iv) 101010111.1101
   (v) 1011011010.101 (vi 111001100.1100
7) Perform the following conversion , without converting into decimal :
   (i) $(3674)_8$ to $(\ )_{16}$ to $(\ )_2$
   (ii) $(1001010101010)_2$ to $(\ )_{16}$ to $(\ )_8$
   (iii) $(AC4)_{16}$ to $(\ )_2$ to $(\ )_8$
   (iv) $(AAFF)_{16}$ to $(\ )_8$ to $(\ )_2$

Assignment II (Week 2, 3):

1) Represent the following numbers into sign magnitude representation.
   (i) -11
   (ii) 15
   (iii) –15

(iv) 7
(v) –7
(vi) 13
(vii) 31
(viii) –32

2) Represent the following numbers into sign two's complement representation.
(i) -11
(ii) 15
(iii) –15
(iv) 7
(v) –7
(vi) 13
(vii) 31
(viii) –32

3) Perform the M-N and N-M using two's complement method.
(i) M= 101100101 and N = 111000110
(ii) M=110011001 and N = 1010101010
(iii) M= 110010101 and N= 0000101
(iv) M =101 and N = 110110
(v) M= 45 and N =90

4) Perform the multiplication of following numbers using two's complement method
(i) 16 *-6
(ii) 23*-9
(iii) –12 *25
(iv) –12*-21
(v) –4 * -6

Assignment III (Week 4, 5):

1) Simplify the following Boolean functions to minimum number of literals

(i) AB+AB'+C'+ABC
(ii) ABC+ABC'+AB
(iii) AC+BC+ABC+BC'
(iv) ABC'+BC+AB
(v) ABC+ABCD+CD'+ABCD
(vi) AD + ABCD' +A'B'C'D' + ABC' + A'B'CD + ABC
(vii) A'CD + A'C'D' + A'B'C'D +ABC' +ABCD +A'B'C'D'

2) Simplify the problems of question no. 7 using karnaugh map.

3) Simplify the following functions using karnaugh map.
(i) F=∑ (1,4, 7, 8)
(ii) F=∑ (3,4, 7)
(iii) F=∑ (0,1,2,4, 7, 8,10,15,)
(iv) F=∑ (1,4, 7, 8,10) and D=∑ (2,11,12)
(v) F=∑ (1,2,3,4,7,8,10,11,12) and D=∑ (6,9)
(vi) F=∑ (0,1,2,3,6,7,8,15) and D=∑ (13,14)
(vii) F=∑ (1,2,3,4,7,8,9,11,12,15)
(viii) F=∑ (1,4, 7, 8)

Assignment IV (week 6):

1) Implement the following function using AND and OR gate.
(i) F=∑ (1,4, 7, 8)

(ii) $F=\sum (3,4, 7)$
(iii) $F=\sum (0,1,2,4, 7, 8,10,15,)$
(iv) $F=\sum (1,4, 7, 8,10)$ and $D=\sum (2,11,12)$
(v) $F=\sum (1,2,3,4,7,8,10,11,12)$ and $D=\sum (6,9)$
(vi) $F=\sum (0,1,2,3,6,7,8,15)$ and $D=\sum (13,14)$
(vii) $F=\sum (1,2,3,4,7,8,9,11,12,15)$
(viii) $F=\sum (1,4, 7, 8)$

2) Implement the following function using only NOR gate.
   (i) AB+AB'+C'+ABC
   (ii) ABC+ABC'+AB
   (iii) AC+BC+ABC+BC'
   (iv) ABC'+BC+AB
   (v) ABC+ABCD+CD'+ABCD
   (vi) AD + ABCD' +A'B'C'D' + ABC' + A'B'CD + ABC
   (vii) A'CD + A'C'D' + A'B'C'D +ABC' +ABCD
3) Implement the following function using only NOR gate.

   (i) AB+AB'+C'+ABC
   (ii) ABC+ABC'+AB
   (iii) AC+BC+ABC+BC'
   (iv) ABC'+BC+AB
   (v) ABC+ABCD+CD'+ABCD
   (vi) AD + ABCD' +A'B'C'D' + ABC' + A'B'CD + ABC

Assignment V:

1) Design a combinational circuit that accepts a three-bit number and generates an output binary number equal to the square of the input number.
2) Design a combinational circuit that accept BCD values and generate cube of That number.
3) Design a combinational circuit that generates 540321 weighted code for a BCD input.
4) Design a combinational circuit with four input lines that represent a decimal digit in BCD and four output lines that generate the 9's complement of the input number.
5) Implement a full subtractor with two half subtractor and one additional gate.
6) Design a combinational circuit that converts a BCD code to 8,4,-2,-1 code.
7) Design a excess 3 to BCD code converter using a four bit full adder MSI circuit.
8) Design a adder subtractor circuit using IC of full adder and some additional Gates.
9) Design a combinational circuit that accepts BCD input and multiply it by 3
10) Design a 4-bit circuit that generates booth multiplier for given multiplier.

Assignment VI:

1) A combinational circuit is defined by the following two functions.

   $F_1 = x'y'+xyz'$
   $F_2 = x'+y$
   $F_3 = xy+x'y'$

   Design the circuit with a decoder and external gates.
2) Design an even parity generator.
3) Design 3 to 8 decoder by using two 2 to 4 decoder.
4) Design 4 to 16 decoder by using two 3 to 8 decoder.
5) Design 5 to 32 decoder by using four 3 to 8 decoder.
6) Implement the following function by using decoder and some external gates.

a. F(A,B,C) = ∑ (1,4,5,7)
b. F(A,B,C,D) = ∑ (1,4,5,7,9,10)
c. F(A,B,C) = ∑ (1,4,5,6)
d. F(A,B,C, D) = ∑ (1,4,5,7,13,15)
e. F(A,B,C,D,E) = ∑ (1,4,5,7,8,9,12,14,16,17,27,30)

Assignment VII:

1) Derive the excitation table of all flip-flops with their truth table.
2) Design an asynchronous UP counter.
3) Design a synchronous down counter.
4) Write the various application of asynchronous and synchronous transmission.

Assignment VII:

1) Write comparison between TTL and CMOS.
2) Write comparison between ECL and TTL.
3) Write various features of CMOS.
4) Write various features of TTL.
5) Write various features of ECL.

CS-2222 Data Structures and Algorithms

Unit - I

Prerequisite, Data types, primitive and composite Data Types,Abstract data type, Data structures: Definition & types,Arrays : Definition, representation of One and Two dimensional arrays, Operations on Arrays.

Unit - II

Stacks: Definition, Implementation. Applications of Stack: Infix to Postfix Conversion, Queues: Operations on Queues, Queue Applications, Circular Queue, Double ended queue.

Unit - III

Singly Linked List: Operations and Applications - Representation of a Polynomial, Polynomial
Addition; Doubly Linked List – Operations and Applications.

Unit - IV

Introduction to Trees , Binary Trees Operations - Tree Traversals, Applications. Graph - Definition, Types of Graphs.

Unit - V

Algorithm, Concept of Algorithm analysis, Time and Space Complexity, Worst case Analysis, Searching and sorting algorithms: Implementation and Analysis, Hash Functions, Benefits of Hashing.

1. Required Text(s)-

1. E. Horowitz, S. Shani: Fundamentals of Data Structures, Schuam Series.
2. T. H. Cormen, C. E. Leiserson, R. L. Rivest and C. Stein. *Introduction to Algorithms*, 2nd edition, MIT Press, 2001

2. Essential References-

1. D.E. Knuth: The Art of Computer Programming, Vols. 1 to 3, Addison-Wesley, Massachusetts, 1973.
2. Aho Alfred V., Hopperoft John E., UIlman Jeffrey D., "Data Structures and Algorithms", AddisonWesley
3. Drozdek- Data Structures and Algorithms,Vikas
4. Horowitz, S. Sahni, and S. Rajasekaran, Computer Algorithms, Galgotia Pub. Pvt. Ltd., 1998.
5. R. Kruse C.L. Tondo and B. Leung, Data Structures and Program design in C, PFU, 1997.

IC-3913 Financial Accounting

Unit I

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. Accounting structure :the process of accounting –journal, ledger, subsidiary books.

Unit II

Trial Balance based on Double Entry Book Keeping System.

Financial Systems and related concepts : Form and preparation of Income statements (P &L A/C), Statement of Financial Position.

Unit III

Methods of Depreciation – SLM Method and WDV method.

Financing Decisions : Tools of Financial Analysis : Financial Statement Analysis, Statement of Financial position.

Unit IV

Break Even Analysis.

Leverages : operating , financial and combined. Accounting Package – Tally **(Operations)**

Unit V

Inventory Management and Responsibility Accounting :

Methods of Inventory Management and Material Issues. Responsibility Accounting _ Meaning , Objectives and Importance.

Required Text(s) :

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

Reference books :

1. Financial Accounting by TS Grewal.
2. Financial Management by Khan and Jain.
3. NCERT Books on Accounting and FM for Class XI and X

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School of Computer Science & IT, DAVV, Indore

Scheme-Jan-May 2018 onwards

BCA – IV Semester

Sub. Code	Subject Name	L	T	P	C	Internal	Practical/ Project	End Sem	Total
CS-3006	Microprocessor and Assembly Language programming	3	1	2	5	30	20	50	100
CS-3206	Database Programming using VB	2	0	4	4	30	20	50	100
CS-2133	Statistics & Probability	3	1	0	4	40	-	60	100
CS-2401	Introduction to Information System	3	1	0	4	40	-	60	100
IC-2927	Environmental Awareness	3	1	0	4	40	-	60	100
CS-1905B	English Language Lab2	0	0	2	1	50	50	-	100
CS-3801A	Mini Project			4	2	50	-	50	100
CS-2809B	Comprehensive Viva				4			100	100
Total					**28**				

Note:

Proposed Scheme can be changed/amended/improved according to necessity and requirement.

BCA IV Semester

CS: 3006 - Microprocessor and Assembly Language Programming

Unit-I

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 -II

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. Direct memory access (DMA), SID and SOD lines, Interrupt System.

Unit -III

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 -IV

Solving Problems with Flowchart, Programming Techniques: Looping, Counting. Additional Data Transfer and 16 bit Arithmetic Instructions Additional Data Transfer and 16 bit Arithmetic Instructions, Arithmetic operations related to memory, Logic Operation: Rotate, Compare. Counters and Timing Delays, Programs for modulo counters, Some Programs based on Counters and Time-Delays, Debugging Counters and Time-Delay Programs, Stack,

Subroutine, Conditional Call and Return Instruction, Some Programs based on Subroutine. Advanced Subroutine Concepts,

Unit -V

BCD to binary conversion, Binary to BCD conversion, BCD addition and subtraction. Introduction to advanced Applications, Multiplication, 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.

Text Book(s) :

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

Reference Books:

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 Microcomputer Based System Design by Mohammed Rafiquzzman Edition2, illustrated Publisher Crc Press, 1995ISBN0849344751, 9780849344756

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

CS-3206 Database Programming in Visual Basic

Unit I

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 II

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 III

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 IV

Programming Issues: Declare a variable, Change the value of a variable, Get input/output with a 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 V

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 Books:

1. Beginning Visual C# 2005 by Wrox Publication.
2. Database System Concepts, Fourth Edition Silberschatz−Korth−Sudarshan.
3. SQL, PL/SQL - The Prog. Language of Oracle - 3rd Rev. Edn. Ivan Bayross

Reference Books:

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

CS-2133 Statistics & Probability

Unit-I

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 –II

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 -III

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 -IV

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

Unit -V

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) :

1. S.C.Gupta, V.K.Kapoor "Fundamentals of Mathematical Statistics". 10th Edition, Publisher: Sultan Chand, 2000.ISBN: 8170147913, 9788170147916

Reference Books :

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.

CS-2401 Introduction to Information Systems

Unit-I

AN OVERVIEW: An introduction to information systems, Information systems in organizations.

Unit -II

INFORMATION TECHNOLOGY CONCEPTS: Hardware: input, processing, and output devices. Software: systems and application software. Telecommunications and networks: The Internet, intranets, and extranets.

Unit -III

BUSINESS INFORMATION SYSTEMS: Electronic and mobile commerce - Threats to Electronic and Mobile Commerce, Theft of Intellectual Property, Fraud.

Unit -IV

SYSTEMS DEVELOPMENT: Systems development: investigation and analysis. Design, implementation, maintenance and review.

Unit -V

An Overview of Artificial Intelligence : Artificial Intelligence in Perspective, The Nature of

Intelligence, The Difference Between Natural and Artificial Intelligence, The Major Branches of Artificial Intelligence, Expert Natural Language Processing and Voice Recognition.

Text Books :

1. Principles of information systems (A Managerial Approach) by Ralph Stair CENGAGE Learning.
2. Internet and Web Technology by Dr. Rajkamal, Tata McGraw Hill publication.

IC-2927 Environmental Awareness

Unit – I

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 – II

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 – III

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 – IV

Environmental pollution: Air, water, solid, noise pollution. Meaning, definition, sources, types, adverse effects and methods of control.

Unit – V

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) :

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

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Scheme July 2017 onwards

BCA V Semester

Sub. Code	Subject	L	T	P	C	Internal	Practical / Project	End Sem	Total
CS-2302	System Analysis & Design	2	1	2	4	30	20	50	100
CS-3604	Data and Computer Communication	3	1	2	5	30	20	50	100
CS-2402	Introduction to DBMS(SQL& PLSQL)	3	1	2	5	30	20	50	100
CS-1003	Digital Logic and Computer Organization	3	1	2	5	30	20	50	100
IC-2928	Principles and Practice of Management	3	1	0	4	40	-	60	100
CS-3801A	Project(using database and web skills)				2		100	0	100
CS-2809B	Comprehensive Viva				4				100
Total					**29**				**700**

Note:

Proposed Scheme can be changed/amended/improved according to necessity and requirement.

CS -2302 SYSTEM ANALYSIS AND DESIGN

Unit-I
Concept of System, Characteristics, Elements and Types of Systems, Transaction Processing System, Management Information System (MIS), Decision Support System. System Development Life Cycle, Waterfall Model, Prototyping Model, Spiral Model, CBD Model, Comparative Study of Various Development Models.

Unit-II
System Analysis, Role of System Analyst, Project Identification and Initiation, Feasibility Analysis, Project Selection, Creating Project Plan, Staffing the Project, Managing and Controlling the Project, Applying the concept to a case study.

Unit-III
Requirement Determination, Requirement Elicitation Techniques, Requirement Analysis Strategies, Process Modelling, Data Flow Diagram, User Interface Design, Design Process, Navigation Design, Input Design, Output Design, Applying the concepts to a case study.

Unit-IV
Implementation Phase, Managing the programming Process, Testing Fundamentals, Developing Documentation, Applying the concept to a case study.

Unit-V
Transition to a new system, The Migration Plan, Postimplementation Activities.

Text Book(s):

1. System Analysis and Design: Awad, EM, Galgotia Publications Pvt. Ltd
2. Systems Analysis and Design: Dennis, Wixom, Roth, Wiley

Reference Book(s):

3. Software Engineering-A practitioner's approach- R. S. Pressman, Tata McGraw-Hill International Editions, New York.

CS-3604 Data and Computer Communications

Unit- I

Data communications and networking for Today's Enterprise, A communication model, Data Communications, Networking, and the Internet. Network model, need for a protocol architecture, The TCP/IP protocol architecture, The OSI model, Addressing. Data transmission: Concept and terminology, Analog and digital signals, Transmission impairment, Channel capacity.

Unit -II

Digital transmission: Digital-to-digital conversion, Analog-to-digital conversion, Transmission mode. Analog transmission, Digital-to-analog conversion, Analog-to-digital conversion.

Unit- III

Bandwidth utilization: Frequency division multiplexing, Wavelength division multiplexing, Synchronous and statistical time-division multiplexing, Switching: Circuit switching Packet switching, X.25.

Unit -IV

Routing in switched network: Routing in packet switched networks, Examples: routing in ARPANET, Least-cost algorithms. Local area network overview: Background topologies and Transmission media, LAN protocol architecture, Bridges, Ethernet.

Unit- V

Internet and transport protocols: Principles of internetworking IPv4 & IPv6, Connection-oriented transport protocol mechanism, TCP and UDP. Network security: Encryption and decryption technique, Internet applications: E-mail, World Wide Web, And HTTP.

TEXT BOOK(S)

1. Data and Computer Communications: William Stallings, Prentice-Hall, 8th Ed., 2008.

Essential References

1. Data Communications and Networking, BehrouzA. Forouzan, McGraw-Hill, 4th Ed..

Recommended Books and Reference Material

1. Computer Networking: James F. Kurore& Keith W. Rose , Pearson Education, Third Edition, 2005.
2. Communication Networks: Fundamentals Concepts and Key Architecture : Alberto Leon-Garcia and IndraWidjaja, , Tata McGraw-Hill Publishing Company Limited, ISBN 0-07-0402235-3.
3. Data and Network Communication: Michael A. Miller, Delmar Thomson Learning inc ISBN 0-07668-1100-X.
4. Introduction to Computer Networks: Douglas E. Comer , Prentice-Hall. Alberto Leon-Garcia and IndraWidjaja, Communication Networks –Fundamentals
5. Concepts and Key Architecture , Tata McGraw-Hill Publishing Company Limited.

CS-2402 Introduction to DBMS (SQL &PLSQL)

Unit-I

Introduction: purpose of DBMS, view of data, data models: physical model, logical model, conceptual model, hierarchical model, network model. Object oriented model, database language, Database administrator, database user, overall system structure.

Unit-II
Entity relationship model: basic concepts, mapping constraints, keys, E-R diagram, weak, entity features, design of an E-R database schema, reduction of E-R schema to table.

Unit-III
Structured Query Language(SQL):basic structure, set operations, aggregate functions, null values, nested sub queries, data definition language(DDL), data manipulation language(DML), data control language(DCL).

Unit-IV
Relational database design: pitfalls in relational database design, decomposition, normalization using functional dependencies, normalization using multivalue dependencies, normalization using joined dependencies. Integrity constraints: domain constraints, entity integrity constraints, referential integrity constraints, Codd's 12 rules

Unit-V
Triggers, functions, procedures, cursors, PL/SQL Fundamental, Declaring Variables in PL/SQL, Executable Section in PL/SQL

TEXT BOOK(S)
1. Database System Concepts, A. Silberschatz, H. F. Korth, and S. Sudershan, 5th Edition, McGraw Hill
2. Oracle Database 10g: The Complete Reference, Oracle-Press, Tata McGraw Hill publishers.

REFERENCE BOOK(S)
1. Modern Database System by Mcfadden
2. Sql, Pl/Sql - The Programming Language of Oracle, 4/E by Ivan Bayross
3. Mastering Oracle PL/SQL: Practical Solutions, Connor Mcdonald, With Chaim Katz, Christopher Beck, Joel R. Kallman, And David C. Knox

CS-1003 Digital Logic Design and Computer Organization

Unit- I:
Difference between Computer Architecture and Organization, Structure and function, History of Computers. Various Components of Computer, Interrupts, Computer Function, Interconnection Structures, PCI, Bus Interconnection.

Unit- II:
Computer Memory System, Cache memory Principles, Elements of Cache Design, Pentium 4 and PowerPC Organizations. Semiconductor Main Memory, DRAM, SRAM, Types of ROM, Types of SRAM and DRAM, Error Correction, Advanced DRAM Organization. Magnetic Disk, RAID, Optical Memory, Compact Disk, Digital Versatile Disk, Magnetic Tape.

Unit- III:
Direct Memory Access, Intel 8237A DMA Controller, I/O Channels and Processors. Types of Interfaces. Interrupt- Driven I/O, Interrupt Processing, Intel 82C59 Interrupt Controller, External Devices, Keyboard, Monitor, I/O Modules, I/O module Structure, Programmed I/O, I/O Commands,

Unit- IV:
The Arithmetic and Logic Unit, Integer Representation, Integer Arithmetic, Floating Point Representation. Types of Operands, Types of Operations. Addressing modes, Instruction Formats, Example for Pentium and Power PCs

Unit-V:
Machine Instruction Characteristics, Instruction Representation, and Instruction set Design. Processor Organization, Register Organization, Instruction Cycle, Instruction Pipelining, Introduction to Reduced Instruction set Architecture, Complex Instruction Set Architecture.

Text Book(s):
1. Computer Organization and Architecture (Seventh Edition) Pearson Education:William Stallings

Reference Books:
1. Computer Architecture & Parallel Processing, Hwang & Briggs, McGraw Hill
2. Computer Architecture By Dr. Rajkamal. Publication: TMH Indian Special edition 2006.
3. Digital systems principal and Design by Dr. Rajkamal

Electronic Materials, Web Sites etc :
i) Williamstallings.com/COA5e.htmlm,
ii) http://www.ece.cmu.edu/~koopman/comparch.html
iii) http://deptinfo.labri.fr/~strandh/Teaching/AMP/Common/StrandhTutorial/Dir.html

IC-2928 Principles and Practices of Management

Unit-I

Concept of Management: Definition, Nature, Business, Functions and Responsibilities of Managers, Fayol's Principles of Management, Management Thoughts: the Classical School, the Human Relations School, Decision Theory School, Systems theory.

Concept and Nature of Objectives: Types of Objectives, Importance of Objectives, Setting objectives, Management by Objectives (MBO) Benefits and weaknesses of MBO.

Unit-II

Planning: Nature and Purpose of Planning, the Planning Process, Principles of Planning, Types of Planning, Advantages and Limitations of Planning.
Strategies and Policies: Concept of Corporate Strategy, formulation of Strategy, TOWS Matrix, Effective Implementation of Strategies, Types of Policies, Principles of formulation of Policies, Decision Making Process, Programmed and Non programmed Decision Making.

Unit-III

Organizing: Nature and Purpose of Organizing, Bases of Departmentation, Span of Management and Levels of authority, Line-Staff Conflict, Delegation, Bases of Delegation, Kinds of Delegation, Delegation and Decentralization.
Problem in Human Relation: Nature and Causes of Human relations problems, Strategies for establishing Healthy Human Relation.
Motivation: Definition, Theories of Motivation.

Unit-IV

Communication: Meaning and Importance of communication, Process of Communication, Channels Of Communication, Barriers to Communication, Strategies for Improving Communication Effectiveness.
Leadership: Meaning of Leadership Approaches of Leadership.

Unit-V

Controlling: Concept and Process of Control, Human Aspects of Control, Principles of Controlling, Control Techniques, Profit and Loss Control, The Challenges created by IT as a Control Tool.

Text book:

1. R. D. Agrawal, "Organization and Management", New Delhi, Tata McGraw Hill,1995.
2. Harold Koontz, O'Donnell and HeinzWeihrich, "Essentials of Management", New Delhi, Tata McGraw Hill, 1992.

Suggested Readings:

1. Harold Koontz, HeinzWeihrich, "**Management: A Global Perspective"**, New Delhi, McGraw Hill, 10th Ed., 1994.

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Scheme-Jan-May 2018 onwards

BCA – VI Semester

Sub. Code	Subject Name	L	T	P	C	Internal	Practical /Project	End Sem	Total
CS-2502	Fundamentals of Operating Systems	3	1	2	5	30	20	50	100
CS-3505	Computer Graphics and Multimedia Fundamentals	2	1	2	4	30	20	50	100
CS-3210	JAVA Programming	3	1	2	5	30	20	50	100
IC-3929	Entrepreneurship	3	1	0	4	40	-	60	100
CS-3801B	Project				4	50	-	50	100
CS-3809B	Comprehensive Viva				4			100	100
Total					**26**				

Note:

Proposed Scheme can be changed/amended/improved according to necessity and requirement.

BCA VI

CS-2502 Fundamentals of Operating Systems

Unit-I

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.

Unit -II

Introduction: Processor resource management: Explanation of processor as a resource, definition of a process, processor utilization, multi-processing and time-sharing, response times.

Unit -III

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

Unit -IV

Introduction: Memory management: Motivation for memory management, when and where primary and secondary memory management is needed. Processes and primary memory management, memory allocation policies, critique of various policies like first fit, best fit, internal and external fragmentation.

Unit -V

Introduction: Secondary memory management, fixed and variable partitions.

Text Book(s) :

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

CS-3505: Computer Graphics & Multimedia Fundamentals

Unit I

Computer Graphics: Introduction, Application of Computer Graphics, **Display Devices:** Refresh Cathode -Ray Tubes, Raster Scan Displays, Random Scan Displays, Color CRT Monitors, Flat Panel Displays. Video cards/display cards. **Input Devices:** Mouse, Trackball, Space ball, Data Glove, Joystick, Light pen, Scanner, Digital Camera, Touch Panels, Voice Systems. **Hardcopy Devices:** Printers and Plotters.

Unit II

Graphics Primitives: Line Generation Algorithms: DDA algorithm, Bresenham's algorithm. Circle Generation Algorithms: Midpoint Circle algorithm, Bresenham's circle generation algorithm. Displaying Lines, characters and polygon. Polygon filling Algorithms: Scan Line Polygon fill algorithm, Inside - Outside Tests, Boundary-Fill algorithm, Flood -Fill algorithm. Fundamentals of Aliasing, Antialiasing Technique.

Unit III

Clipping: Clipping operations. Point clipping. Line clipping: Cohen Sutherland Algorithm, Liang Barsky Algorithm, Nicholl-Lee-Nicholl Algorithm. Polygon clipping: Sutherland- Hodgeman Algorithm, Weiler Atherton Algorithm. Text clipping, Exterior clipping.

Unit IV

Two Dimensional: Two Dimensional Transformations: Translation, Scaling, Rotation, Reflection, Shear, Homogenous coordinate system, Composite transformations, Raster method of transformation. Two Dimensional Viewing: Window to Viewport coordinates transformation.

Unit V

Multimedia: Introduction, Multimedia applications, Multimedia data and File formats, Multimedia tools. Advancements in the technology in Computer graphics and Multimedia.

Text Book(s):

1. Donald Hearn and M. Pauline Baker, *Computer Graphics: C Version*, Second Edition, Prentice Hall of India.
2. Tay Vaughan, Multimedia: Making it Works, Seventh Edition, Tata McGraw-Hill Professional, New Delhi.

Reference Book(s):

1. David F. Rogers, *Procedural Elements for Computer Graphics*,Tata Mc-Graw-Hill Publishing Company Ltd.,New Delhi,2001.
2. James D. Foley, Andries van Dam, Steven K. Feiner, John F. Hughes, *Computer Graphics: Principles and Practice in C*, Second Edition,Addison-Wesley Professional.
3. Zhigang Xiang, Roy A. Plastock, *Schaum's outline of Theory and Problems of Computer Graphics*, Second Edition ,Tata McGraw-Hill Professional, New Delhi.

CS-3210 JAVA Programming

Unit-I

Features of java, Object-Oriented programming overview, Introduction of java Technologies, 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 –II

Statements: conditional, if, adding an else if, switch statement, break statement, type conversion & 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, overload constructors, garbage collection and finalize method, overloading methods, parameter passing.

Unit –III

Array declaring and creating array, passing array to methods, multidimensional array, variable-length argument lists.
Static method, static field and Math Class, method overloading.
String Handling: String constructors, string operator, 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 -IV

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 -V

STREAMS & FILES: Introduction, files and streams, sequential access text files, random access file, java stream class hierarchy.
Introduction to multithreading: what are threads, the java thread model, thread priorities, thread life cycle, creating thread and executing thread.
Applets: Applet basics, applet architecture, applet life cycle method, applet HTML tag and attributes, executing applet in web browser and in the appletviewer.

Text Books:

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

Reference Books:

1. Head Firs JAVA by KathySierra & Bert Bates.

IC – 3929 Entrepreneurship

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 II

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 III

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 IV

Managerial roles and functions in a small business. Designing and redesigning, business processes, location, layout, operations planning & control.

Unit V

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 Books:

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

STUDENT KIT

Master of Computer Applications I Semester

July 2017 Onwards

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School of Computer Science & IT
Scheme-July 2017 onwards

Sub. Code	Subject	L	T	P	C	Internal	Practical/ Project	End Sem	Total
CS-4022	Computer Organization & Assembly Language Programming	3	1	2	5	30	20	50	100
CS-4205	Programming and Problem Solving Using C	3	1	4	6	30	20	50	100
CS-5511	Operating Systems	3	1	2	5	30	20	50	100
CS-4116	Discrete Structures	3	1	0	4	40	-	60	100
IC-4916	Communication Skills and Report Writing	2	1	0	3	40	-	60	100
CS-4809A	Comprehensive Viva				4				100
Total					**27**				**600**

Note: Proposed Scheme can be changed/amended/improved according to necessity and requirement.

CS-4022 Computer Organization and Assembly Language Programming

UNIT-I

Computer Organization: Digital and Analog computers, Major components of a digital computer, Memory addressing capability of a CPU, Word length of a computer, Processing speed of a CPU, Definitions of Hardware, Software and Firmware. Definitions of Dumb, Smart and Intelligent terminals.

Binary Systems: Digital Systems, Binary Numbers, Number Base Conversions, Octal and Hexadecimal Numbers, Complements, Signed Binary Numbers, Binary Codes: BCD code, Gray Code, ASCII code, Excess 3 Code, Error detecting Code.

UNIT-II

Computer Arithmetic: Binary representation of Negative Integers using 2's complement and Signed magnitude representation, Fixed point Arithmetic operations on Positive and Signed (Negative) Integers like addition, subtraction, multiplication, Booth algorithm for multiplication,. Division of positive and negative binary numbers.

UNIT-III

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.

UNIT-IV

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 Instructions: Conditional and Unconditional and Machine control Instructions.

UNIT V

Assembly language programming: Practice on assembly language programming, pinout diagram of 8085 microprocessor, interfacing of 8085 , interrupts, Direct memory access, introduction to 8086 microprocessor.

Text Book(s) :

1. Microprocessor Architecture, Programming and Applications with 8085/8080 by Ramesh S. Gaonkar.
2. Fundamentals of Computers by B Ram Publication : PHI , Fourth edition

Reference Books:

1. Microprocessor and Its applications by R Theagrajan,S Dhanapal
2. Computer Architecture By Dr. Rajkamal. Publication: TMH Indian Special edition 2006.
3. Digital systems principal and Design by Dr. Rajkamal

CS-4205 Programming and Problem Solving Using C

UNIT I

Introduction to Computer based Problem Solving; Algorithms and flowcharts; Programming Languages; Classification of Programming Languages; Characteristics of a program; Rules/conventions of coding, documentation, naming convention; Structured Programming; Modular Programming; Programming Environment: Assembler, Interpreter, Compiler, Linker and Loader.

UNIT II

Fundamentals of C programming; History of C; Structure of C Program; Character set, Identifiers and Keywords; Data types; Constants and Variables; Operators and Expressions, Type Conversion, Operator Precedence and Associativity; Basic Input/Output operations; **Decision control structures :***if-else, switch-case* ; **Loop control structure :** *while, do-while, for*; **Jump statement :** *break ,continue* ; *goto* statement.

UNIT III

Array: One dimensional array -Declaration, initialization of one dimensional arrays; Two dimensional array -Declaration, initialization of two dimensional arrays; multi-dimensional array. **Strings:** Declaring and initializing string, reading and writing strings, string manipulation functions, array of strings. **Function:** Need of user-defined function, Arguments, return value, *return* statement; passing parameters – call by value, call by reference; Scope, visibility and lifetime of variables; Nesting of functions; passing arrays to function; passing strings to function. **Recursion:** basics, comparison with iteration, types of recursion. **Storage Classes.**

UNIT IV

Pointer: Declaring and initializing pointer variables, chain of pointers, Pointer expression, Pointer arithmetic, Array of pointer and its limitations; Pointers as Function arguments; Function returning pointer, Dynamic Memory management functions. **Structure:** Defining a Structure, Declaring & initializing Structure Variables, Membership Operator, Array in structure, Array of Structure, Structure within structure, Pointer to structure. **Union:** Defining union, Declaring & initializing union Variables; Bit Fields; **Enumerated data type; typedef; Bitwise operators**.

UNIT V

Command line arguments; File handling: Defining, opening and closing a file, input/output operations on file, merging files; **C preprocessors:** Macro substitution, file inclusion, compiler control directive.

Text Book(s):

1. Herbert Schildt, "C The Complete Reference", Osborne/McGraw-Hill,4th Edition,2000.
2. Behrouz A. Forouzan, Richard F. Gilberg, "Computer Science: A Structured Programming Approach Using C", Thomson Brooks/cole,3rd Edition,2007.

Reference Book(s):

1. B.W. Kernighan, D.M. Ritchie, "The C Programming Language", Prentice Hall of India, 2nd Edition,1988.
2. E Balagurusami, "Programming in ANSI C", Tata McGraw-Hill,6th Edition,2012.
3. Byron S Gottfried, "Programming with C", Tata McGraw-Hill, 3rd Edition, 2010.
4. Yashavant Kanetkar, "Let us C",BPB Publications,13th Edition,2013.
5. Yashwant Kanetkar, "Test your C skills", BPB Publication, 5th Edition, 2005.

CS- 5511 Operating Systems

UNIT -I

Introduction: Evolution of operating systems, operating system concepts; activities, functions and services of operating system; Computer Systems: Mainframe, Desktop, Multiprocessors, Distributed, Clustered, Real time and Hand held systems. Computer System Operations, Storage hierarchy, Hardware protection, System calls, System structures. Process Management: Process concepts, Process scheduling, Operation on processes.

UNIT-II

Cooperating processes, Inter-process communication. Threads: multithreading models, threading issues, thread examples. CPU Scheduling: concepts, scheduling criteria, scheduling algorithms, algorithm evaluation. Process synchronization: Critical section problem, Mutual exclusion and synchronization Techniques of inter process: Synchronization hardware, semaphore, classical problems of synchronization, critical regions and monitors. Deadlock: deadlock characterization, deadlock handling methods.

UNIT-III

Memory Management: Concepts, single user memory management. Partition memory allocation: paging, segmentation and segmentation with paging, Virtual memory management: concept, demand paging, process creation, page replacement, allocation of frames and thrashing.

UNIT-IV

File Management: File concepts, access methods, directory structure, file system mounting, sharing and protection of files. File system structure and implementation, allocation methods, free space management, reliability of file system. Distributed file system and structures.

UNIT-V

Device Management: Goals of input/output software design, Structure of device hardware and software. Layers of I/O software, structure of device drivers, Disk driver, disk arm scheduling algorithms, terminal driver, clock driver, Case study of Windows 2000.

Text Book :

1. A. Silberschatz, P. Galvin and Gagne, *Operating System Concepts,* Addison Wesley, 8th Edition, 2008.

Reference books :

1. Operating systems, 4th Edition, William Stallings, Pearson Education, 2003.

CS-4116 Discrete Structures

UNIT- I

The Foundations: Logic, Sets and Functions: Introduction to set theory, set operations, fuzzy sets, mathematical logic, prepositions, prepositional equivalences, predicates and quantifiers. Importance of Quantifiers. Functions, functions for computer science.

Mathematical reasoning: Introduction to Methods of proof, mathematical induction. Use of mathematical induction to solve different problems. Importance of recursions in computer science, scope of recursions, Recursive definitions, recursive algorithms.

UNIT- II

Combinatorics: The basics of counting, The sum rule, The product rule, The Pigeonhole Principle, Permutations with repetitions, Permutations without repetitions, Circular Permutations. Applications of combinations. Applications of Combinatorics to solve Committee problems, word problems, puzzle problems etc. Applications of Combinatorics to understand Telephone numbering plan, understanding Internet addresses, Advanced counting techniques, recurrence relations, solving recurrence relations, algorithm design, Basic understanding of complexities, basic problems of complexity of algorithms.

UNIT- III

Relations: Relation definition , Importance of relations in computer science, Relations and their properties, Unary relations , Binary relations, Ternary relations , n-ary relations and their applications, closures of relations, equivalence relations, partial ordering. Representing relations, relation matrix, relation graph, composite relation. Operations on relations – union, intersection and join. Concepts of least upper bond, Greatest lower bond, maximal element, minimal element, Greatest element, Least element of a partially ordered set, lattices, sub lattices, chains and antichains.

UNIT- IV

Graphs: Introduction to Graphs, Importance of graph theory in computer science, Graph terminology, representing graphs, graph types, graph models, and graph isomorphism. Connectivity, Euler and Hamiltonian Paths, shortest path problems, planar graphs, graph colouring, chromatic number, Euler's formula, Kuratowski's theorem. The four colour problem, Applications of Graph Colouring, Introduction to Trees, applications of trees, tree traversal, trees and sorting, Spanning trees, minimum spanning trees.

UNIT -V

Languages and Grammars: Introduction to Languages and Grammars, solving problems for validity of statements according to the grammar. Importance of Language theory in Computer Science, Importance of Derivation trees, solving problems of Derivation trees, Importance of Parsing, Phrase-Structure Grammars, Types of Phrase structure grammars.

Text Book(s):

1. Kenneth H. Rosen "Discrete Mathematics and its Applications", 5^{th} edition, Tata McGraw-Hill Edition.

Reference Book(s):

1. Kolman, Busby & Ross "Discrete Mathematical Structures" ,5^{th} edition, Pearson Education
2. Narsingh Deo "Graph Theory with Applications to Engineering. & Computer Science", 4^{th} edition, Prentice Hall of India .
3. Discrete Structures, Logic and Computability by James L. Hein, 2nd edition, Narosa Publishing House.

Assignments

1. Find a formula for the sum of the first *n* even positive integers.
2. Use mathematical induction to prove the formula that you found in Exercise 1.
3. Use mathematical induction to prove that $3 + 3 \cdot 5 + 3 \cdot 5^2 + \text{-----} + 3 \cdot 5^n = 3(5^{n+1} - 1)/4$ whenever *n* is a nonnegative integer.
4. Prove that $1 \cdot 1! + 2 \cdot 2! + \text{------} + n \cdot n! = (n+1)! - 1$ whenever *n* is a nonnegative integer .
5. Find a formula for $\frac{1}{2} + 1/4 + 1/8 + \ldots\ldots\ldots + 1/2^n$ by examining the values of this expression for small values of n. Use mathematical induction to prove your result.
6. Show that $1^2 + 2^2 + 3^2 + \text{--------} + n^2 = n(n + 1)(2n + 1)/6$ whenever *n* is a positive integer.

7. Prove that $1^2 + 3^2 + 5^2 + \ldots + (2n + 1)^2 = (n + 1)(2n + 1)(2n + 3)/3$ whenever n is nonnegative integer.
8. Prove that $1 \cdot 1! + 2 \cdot 2! + \cdots + n \cdot n! = (n+1)! - 1$ whenever n is a positive integer.
9. Use mathematical induction to show that 3 divides $n^3 + 2n$ whenever n is a positive integer.
10. Use mathematical induction to show that 5 divides $n^5 - n$ whenever n is a nonnegative integer.
11. Use mathematical induction to show that 6 divides $n^3 - n$ whenever n is a nonnegative integer.
12. Use mathematical induction to show that $n^2 - 1$ is divisible by 8 whenever n is an odd positive integer.
13. Use set builder notation to give a description of each of these sets.
    a) {0,3,6,9,12} b) {-3,-2,-1,0,1,2,3}
14. Draw the Venn diagrams for each of these combinations of the sets A, B and C.
    a) $A \cap (B \cup C)$ b) $A \cap B \cap C$
    c) $(A - B) \cup (A - C) \cup (B - C)$
15. Prove all the set property by truth table.
16. How many bit strings are there of length six or less?
17. How many positive integers between 1000 and 9999 inclusive
    a) are divisible by 9?
    b) are even?
    c) are not divisible by 3?
    d) are divisible by 5 or 7?
    e) are not divisible by either 5 or 7?
    f) are divisible by 5 but not by 7?
    g) are divisible by 5 or 7?
18. State pigeonhole principle and use this principle to find how many students must be in a class to guarantee that at least two student receive the same score on the final exam, if the exam is graded on a scale from 0 to 100 points?
19. How many bit string of length 10 contain
    a) exactly four 1s? b) at most three 1s?
    c) at least four 1s? d) an equal no of 0s and 1s?
20. What is the coefficient of x^9 in $(2-x)^{19}$?
21. In how many different ways can five elements be selected in order from a set with three elements when repetition is allowed?
22. How many string of 10 digits are there that contain exactly two 0s,three 1s,and five 2s?

IC-4916 Communication Skills

UNIT I

Fundamentals of Communication:

Definitions, Importance, forms of communication, process of communication, Channels, Barriers and Strategies to overcome barriers of Communication.

Common errors in parts of speech, Phonetics- British pronunciation, Vowel sounds, consonant sounds phonetic transcription, Intonation, Pitch variation, Difference between British & American English, Non-verbal communication, Soft skills in oral communication.

UNIT II

Listening:

Def, Importance, Benefits, Barriers, approaches, be a better listener, exercise and cases. conference calls, vocabulary, writing and listening, grammar and usage, pronunciation.

Group Discussions:

Group Discussion Nature, difference between GD & debate, importance of group discussion,

characteristics of successful GD, Selection of GD, subject knowledge, oral communication skills, leadership skills, team management, Group Discussion Strategies: Technique for individual contribution in GD: Topic analysis, discussion of opinions, discussing problems, discussing case studies & Group interaction Strategies.

UNIT III

Presentation Skills:

Presentation Skills Presentation Nature and importance of oral presentation; Planning the presentation; Preparing the presentation; Organizing presentation, Dos and Don'ts, Importance of body language in presentations, pronunciation, visual aids, podium panic, speaking.

Interviews:

Types of Interviews, Points to be borne in mind as an Interviewer or an Interviewee, Commonly asked questions, Dos and Don'ts.

UNIT IV Transactional

Analysis:

Transactional analysis, Johari Window.

Written Communication:

Report Writing, Business Correspondence, Preparation of Manuals and Project Report, Minutes of meeting, Notices and Circulars.

Note Making, Mechanics of note making: Reading strategy, note writing technique, topicalising, schematizing, reduction devices, organization techniques, methods of sequencing; summarizing and paraphrasing: mechanics of summarizing – selection, rejection, substitution; Outlining and paraphrasing: Do's and Don'ts of paraphrasing, techniques of paraphrasing.

UNIT V

Ethical Skills in Behaviour The illusion of communication: Failing to confirm the message, Forgetting the call to action, Fearing to disagree, Ignoring the beauty of arguments, choosing the wrong medium, the Art of explanation; word selection.

Intense Practice of : Presentations, GDs and Interviews.

Text Book(s):

1. Communication- KK Sinha
2. Organizational Behavior – Fred Luthans
3. Organizational Behavior – Stephen Robbins

Reference Book(s):

1. Communications Skills- MV Rodrigues.
2. Effective Technical Communication – M Ashraf Rizvi, Tata Mc Graw – Hill publishing company Ltd. New Delhi, 2008
3. A Text Book of English Phonetics for Indian Students, T. Bala Subramanian, Macmillan India Ltd. Delhi, 2008.
4. Communication Skills – Leena Sen, Prentice – Hall of India New Delhi, 2005
5. Times of India/ Hindustan Times/ The Hindu etc.

STUDENT KIT

Master of Computer Application II Semester

Jan-May 2018

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School of Computer Science & IT, DAVV, Indore

Scheme- Jan-May, 2018 onwards

Sub. Code	Subject Name	L	T	P	C	Internal	Practical /Project	End Sem	Total
CS-4209	Data Structures Using C++	3	1	2	5	30	20	50	100
CS-4405	Database Management System	3	1	4	6	30	20	50	100
CS-4305	Software Engineering	3	1	0	4	40	-	60	100
CS-4008	Computer Architecture	3	1	2	5	30	20	50	100
IC-4915	Organization and Management Concepts	4	0	0	4	40	-	60	100
CS-4809B	Comprehensive Viva				4			100	100
Total					**28**				**600**

Note: Proposed Scheme can be changed/amended/improved according to necessity and requirement.

MCA - II

CS-4209 Data Structures using C++

UNIT- I

Introduction to C++ & Introduction to Data Structures

C++ Basics, Structures, Variables in C++, References, Functions, Function Overloading, Default Values for Formal Arguments of Functions, Inline Functions. Introduction to Classes and Objects Constructors, destructors, friend function, dynamic memory allocation, Inheritance, Overloading, Polymorphism, Templates.

Definition of data structures and abstract data types. Static and Dynamic implementations. Examples and real life applications, Data Structures: Arrays, Address calculation in a single and multi dimensional array. Sparse matrices.

UNIT- II

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 Definition: Queues & Lists: Array based implementation of Queues / Lists, Linked List implementation of Queues / Lists, Circular implementation of Queues and Singly linked Lists, Straight / circular implementation of doubly linked Queues / Lists, Priority queues , Applications.

UNIT- III

Trees& Graphs

Definition of trees and Binary trees, Properties of Binary trees and Implementation, Binary Traversal - preorder, post order, inorder traversal, Binary Search Trees, Implementations, Threaded trees, AVL Trees, Implementations , Balanced multi way search trees, Applications Definition of Undirected and Directed Graphs and Networks, The Array based implementation of graphs, Adjacency matrix, path matrix implementation, The Linked List representation of graphs, Shortest path Algorithm, Graph Traversal – Breadth first Traversal, Depth first Traversal, Connectivity of graphs; Connected components of graphs, Weighted Graphs, Applications.

UNIT- IV

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.

Straight Sequential Search, Binary Search, non –recursive Algorithms, recursive Algorithms, Indexed Sequential Search. Definition, Hash function, Collision Resolution Techniques, Hashing Applications.

UNIT- V

Sorting Algorithms

Introduction, Sorting by exchange, selection, insertions, Bubble sort, Selection sort, Insertion sort, Pseudo code algorithm and their C++ implementation, Efficiency of above algorithms, Shell sort, Performance of shell sort, Merge sort, Merging of sorted arrays, The merge sort Algorithms, 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 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.

Required Text(s):

2. Theory & Problems of Data Structures by Jr. Symour Lipschetz, Schaum's outline by TMH 2006,Special Indian Edition.
3. Data Structures and Algorithms by A.V. Aho, J.E. Hopcroft and T.D. Ullman, Original edition, Addison-Wesley, 1999, Low Priced Edition.
4. Fundamentals of Data structures by Ellis Horowitz & Sartaj Sahni, Pub, 1983,AW, 1st Edition.
5. Data Structures and Program Design in C By Robert Kruse, PHI, 2nd Edition.

CS-4405 Database Management System

UNIT- I

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- II

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), NoSQL pros/cons, Categories of NoSQL database, Production deployment, MongoDb, Key Features, practical with MongoDb.

UNIT- III

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- IV

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- V

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 Book(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

CS-4305 Software Engineering

UNIT-I

Introduction to Software Engineering & Software Processes: Software, Software Classifications and Characteristics, 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, Spiral model, RAD model, Agile process model, and RUP process model. Component-Based Development and Reusability. Comparative study of various development models.

UNIT-II

Project Management & 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-III

Requirement Engineering: Software Requirements, Requirement Engineering Process, Requirement Elicitation, Requirement Analysis (Structured Analysis, Object Oriented Analysis, Data Oriented Analysis and Prototyping Analysis), Requirements Specification, Requirement Validation, and Requirement Management.

UNIT-IV

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 and Object Oriented Design), **Structured** Design Methodology (SDM), **Transaction Analysis and Logical Design;** Coding principles, Coding process, Code verification and documentations.

UNIT-V

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, Quality Standards: Capability Maturity Model (CMM), ISO 9000, Six Sigma. Software Reliability, Software Maintenance, Evolution, and Reengineering.

Text Book:

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

Reference Books:

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. *Software Engineering*- **Ian Sommerville**, Pearson Education, New Delhi.
4. *Software Engineering Concepts*-**Richard E. Fairly**, Tata McGraw Hill Inc. New York.
5. *Fundamentals of Software Engineering*-**Rajib Mall**, PHI, New Delhi.

CS: 4008 - Computer Architecture

Aim of the Course

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

Learning Objectives:

- To understand the various functional units of CPU.
- To learn about various measuring trends and laws.
- To understand the architecture of 8088 microprocessor.
- To learn the instruction set of 8088 processor, so that they will be able to do assembly language programming.
- To learn about computer arithmetic and various units of ALU.
- To understand about various types of instruction formats and addressing modes.
- To understand about various types of processor organization and to learn about RISC and CISC features.
- To understand the processing unit design
- To understand the pipelining and its implementation.
- To understand the parallel processing and introduction to super scalar processors.
- To learn about instruction level parallelism.

COURSE CONTENTS

UNIT-I

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 –II

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 –III

STACKS and QUEUES, 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 –IV

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 -V

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 Books:

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 1995

Electronic Materials, Web Sites etc:

1. Williamstallings.com/COA5e.htmlm,
2. http://www.ece.cmu.edu/~koopman/comparch.html
3. http://dept-info.labri.fr/~strandh/Teaching/AMP/Common/Strandh-Tutorial/Dir.html
4. http://nptel.iitk.ac.in/courses/Webcoursecontents/IIT%20Guwahati/comp_org_arc/index.htm

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.
7. They will have understanding about the processing unit design
8. Students will be able to explore the pipelining concepts and its implementation.
9. They will have the knowledge of parallel processing and introduction to super scalar processors.
10. They will be aware about instruction level parallelism.
11. They will be well familiar with the concept of cache and their implementation
12. They will have knowledge about interrupts and input outputs organization.

IC – 4915 Organization and Management Concept

UNIT- I

Introduction

Definition of Management, Management functions, Role of Managers, Principles of Management, Management Thought- Classical School, Scientific school.

Planning

Nature and purpose of planning, Types of planning, Steps in planning, Decision Making, Programmed and Non Programmed Decision Making.

UNIT -II

Organizing and Staffing

Formal and Informal Organization, Organizational division – Departments, Bases of Departmentation, Span of Management, Line and Staff conflicts, Definition of Staffing, System Approach to Staffing, Selection Process, Performance Appraisal, Career Strategy.

UNIT -III

Motivation and Leadership

Motivation, Theories of Motivation – Maslow's Need Hierarchy Theory, McGregor's Theory X and theory Y, Herzberg's two factor Theory, Leadership, Managerial Grid.

Controlling: The Basic Control process, Control as feedback System, Real Time Control.

UNIT IV

Introduction to Project Management

Project, Project Management, Role of the Project Manager, Project Phases and the Project Life Cycle, Context of Information Technology Projects, Project Selection, Preliminary Scope Statements, Project Scope Management, Project Time Management, Activity Resource and Duration Estimating, Schedule Development and Control, Project Cost Management, Cost Estimating, Cost Budgeting, Cost Control.

UNIT V

Project Quality Management, Quality Planning, Quality Assurance, Quality Control, Project Human Resource Management, Keys to Managing People, Human Resource Planning, Project Communication Management, Communication Planning, Information Distribution, Performance Reporting, Managing Stakeholders, Project Risk Management, Project Procurement Management, Planning Purchasing and Acquisitions, Planning Contracting, Requesting Seller Responses, Selecting Sellers, Administering the Contract, Closing the Contract.

Text Book(s):

1. R. D. Agarwal- Organization and Management -Tata McGraw Hill Publishing Company Ltd.
2. Harold Koontz Heinz Weihrich – Essentials of Management - Tata McGraw Hill Publishing Company Ltd.
3. Information Technology Project Management, Kathy Schwalbe, 5th Edition, Thomson Course Technology.

STUDENT KIT

Master of Computer Application -III Semester

July 2017 Onwards

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School of Computer Science & IT, DAVV, Indore

Scheme-July 2017 onwards

Sub. Code	Subject	L	T	P	C	Internal	Practical / Project	End Sem	Total
CS-4408	Database Application and Tools	3	1	4	6	30	20	50	100
CS-5613	Computer Networks	3	1	0	4	40	-	60	100
CS-5123	Theory of Computation	3	1	0	4	40	-	60	100
CS-4211	Object Oriented Programming using JAVA	3	1	4	6	30	20	50	100
IC-4917	Accounting and Financial Systems	2	1	0	3	40	-	60	100
CS-5809A	Comprehensive Viva				4				100
Total					27				

Note: Proposed Scheme can be changed/amended/improved according to necessity and requirement.

MCA III

CS-4408 Database Applications and Tools

UNIT I

Database Environment: Data versus information, traditional file processing, disadvantages, database approach, range of database application, advantages of database approach. Cost and risk factors, components of database environment, evolution of database system.

Database Development Process: Information engineering, information architecture, enterprise data model, planning, SDLC, CASE etc. Steps of planning, strategic planning factors, corporate planning objects. Developing preliminary data model, and use of planning matrices, SDLC steps, CASE role, people in database development, three-schema architecture for database development. Examples to demonstrate the development process.

UNIT II

Modeling Data in the Organization: Modeling of the rules of organization, data names and definitions, ER model constructs entities and its types, attributes, relationships, degree, unary, binary, ternary, n-ary, cardinalities constraints, ER modeling examples.

Enhanced ER modeling: supertype, subtypes, specialization, generalization, specifying constraints in EER models, completeness, Disjointness, discriminators, defining super/sub type hierarchies, EER modeling examples, live demos modelling for few scenarios.

UNIT III

Logical database design: and relational model development, Relational model properties, keys, primary, secondary, composite, properties of relations. Codd's rules, integrity constraints, creating relational tables, Transform EER diagrams into relations, seven different steps for mapping EER model into relations.

UNIT IV

Introduction to normalization: steps, functional dependencies, basic normal forms, definition of first, second, third normal form and removing anomalies from the relations. De-normalization and merging relations.

UNIT V

Special Topics (Overview) : Data Warehousing, Data Mining, Distributed Databases, Object oriented modeling, definitions, activities in phases of model development, advantages of OOM, UML class diagrams, Example of a model development.

Text Book:

1. Hoffer, Prescott, "Modern Database Management", Seventh Edition, McFadden Pearson Education.

Reference Book(s):

1. Thomas M. Connolly, Carolyn E. Begg, "Database Systems", Pearson Education.
2. Raghu R and Johannes G., "Database management Systems", Mc Hill 3rd Edition, 2002.

3. Elmasri R, Navathe S, "Fundamentals of Database Systems", Addison Wesley 4th Edition.

CS-5613 Computer Networks

UNIT I

Introduction: Overview, Goal and Applications of Computer Networks; Network Hardware - LAN, MAN, WAN and topologies; LAN components – File server, Workstations, Network Adapter Cards; 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.

UNIT II

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; 3HDLC protocol; Data link layer in the Internet - SLIP and PPP.

UNIT III

Medium Access Sublayer: Channel Allocation problem; Multiple access protocols: Pure Aloha, Slotted Aloha, CSMA Protocols, CSMA/CD, Collision-Free Protocols; IEEE MAC Sublayer protocols - 802.3, 802.4, 802.5 and their management; High speed LANs – Fast Ethernet, FDDI; Wireless LANs: IEEE 802.11, IEEE 802.16; Data Link Layer Switching – Bridges and Switches, their difference with Repeaters, Hubs, Routers and Gateways.

UNIT IV

Network Layer: Design issues; Routing algorithms - Optimality Principle, Shortest Path Routing, Flooding, Distance Vector Routing, Link State Routing, Hierarchical Routing, Broadcasting Routing, Multicast Routing; The Network Layer in the Internet - Internet Protocol, Internet addressing and Internet Control protocols.

UNIT V

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

Application layer: Client Server Architecture, DNS, WWW and HTTP, E-mail Protocols (SMTP, POP3, IMAP, MIME), FTP, TELNET.

Network Security: Cryptography, Symmetric Key Algorithms, Public key Algorithms and Digital Signatures.

Text Book(s):

1. Computer Networks, Andrew S. Tanenbaum, Addison-Wesley, 4th Ed.

Reference Book(s) :

1. Data Communications and Networking, B.A. Frouzan, McGraw-Hill, 5th Ed., 2013.
2. Data and Computer Communications: W.Stallings, Prentice-Hall, 5th Ed., 1997.
3. Computer Networking: James F. Kurore & Keith W. Rose, Pearson Education, Third Edition, 2005.
4. Communication Networks: Fundamentals Concepts and Key Architecture: Alberto Leon-Garcia and Indra Widjaja, Tata McGraw-Hill Publishing Company Limited, ISBN 0-07-0402235-3.
5. Data and Network Communication: Michael A. Miller, Delmar Thomson Learning inc. ISBN 0-07668-1100-X.
6. Introduction to Computer Networks: Douglas E. Comer, Prentice-Hall.
7. Alberto Leon-Garcia and Indra Widjaja, Communication Networks –Fundamentals Concepts and Key Architecture, Tata McGraw-Hill Publishing Company Limited.

CS-5123 Theory of Computation

UNIT I

Theory of Automata: String, Alphabet and Languages, Finite Automata, Finite State machine, Basic Definition. Description of a Finite Automaton, Deterministic Finite Accepters Transition Graphs, Languages, Non-deterministic Finite Acceptors- Definition, Finite Automata with ϵ-moves, Equivalence of Deterministic and Non-deterministic Finite Accepters, Conversion of NDFA to DFA, Removal of ϵ transition from ϵ – NDFA, Minimization of Finite Automata – Definition and Construction. Mealy and Moore models Definitions, Transformation of Mealy Machine into Moore Machine and vice-versa.

UNIT II

Properties of Regular Sets: Pumping lemma for regular set, Closure properties of regular set. **Formal Language:** Basic Definition, Chomsky Classification of languages, Initialization of Finite Automata Regular Expression and Language Regular Expressions, Connection between Regular Expressions and Regular Languages.

UNIT III

Regular Grammars – Right and Left Linear Grammars, Equivalence between Regular Languages and Regular Grammars. **Context-Free Grammars**: Leftmost and Rightmost Derivations, Derivation Trees, Parsing and Ambiguity, Simplification of CFGs. Chomsky Normal Form, Greibach Normal Form, Cocke-Kasami- Younger Algorithm, Properties of Context-Free Languages.

UNIT IV

Pushdown Automata: Definition, Non-deterministic Pushdown Automata, Pushdown Automata for Context Free Languages Context-Free Grammars for Pushdown Automata. Deterministic Pushdown Automata and Deterministic Context-Free Languages.

UNIT V

Turing Machine: Definition of Standard Turing Machine, Turing Machine as Language Accepters and Transducers.

Text Book(s):

1. Mishra and Chandrasekaran, Theory of Computer Science (Automata, language and Computation), 2nd Ed. Prentice Hall of India.
2. J. E. Hopcroft, R. Motwani and J.D Ullman, Introduction to Theory, Languages and Computation; Second Edition, Addison-Wesley, 2001 Narosa Publishing House.

Reference Book(s):

1. Moll, Arbib and Kfoury, an Introduction to Formal Language Theory, Springer-Verlag.
2. Martin, J.C.: Introduction to Languages and the Theory of Computation, McGraw-Hill, Inc.,3rd ed., 2002. ISBN 0-072-32200-4.
3. Brookshear, J.G.: Theory of Computation: Formal Languages, Automata, andComplexity, Benjamin/Cummings Publishing Company, Inc, Redwood City, California, 1989. ISBN 0-805-30143-7.
4. Peter Linz, An Introduction to Formal Languages and Automata, Narosa

CS- 4211 Object Oriented Programming Using JAVA

UNIT I

Introduction to Java: Features of Java, Object-oriented Programming Overview, Introduction of Java Technologies, Java Applets and Applications, Java Platform, Java Program structure, Basic Building Blocks (comments, character set, constants), Data Types, Variables, Operators, Expressions, Typecasting, Control Structures, Loops, 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* method.

UNIT II

String Handling: The String Constructors, String Operations, Character Exaction, String Comparison, String Buffer.

Arrays: Creating an array, Enhanced *for* Statement, Passing Multidimensional Arrays, Arrays to Method, Variable-Length Argument lists, Using Command-line Arguments.

Wrapper Class : Introduction to wrapper classes.

Inheritance: Relationship between Superclasses 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, instance of operator, Downcasting, Class class, Runtime type Identification

UNIT III

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, Comparable Interface.

Exception Handling: Introduction, keywords, Types of Exceptions, Java Exception Hierarchy, *finally* Block, Chained Exceptions, Declaring new Exception Types, Preconditions and Post-conditions.

Streams and Files: Introduction, Data Hierarchy, Files and Streams, Sequential-access Text Files, Object Serialization, Random-Access files, Java Stream Class Hierarchy.

UNIT IV

Multithreading: Introduction, Java Thread Model, Thread priorities, Thread life cycle, Creating Thread, Thread Execution, Thread Synchronization, Classes and Interfaces in *java.util.concurrent*, Monitor and Monitor Locks, 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

Applets: Applet Basics, Applet Architecture, Applet Life Cycle Methods, Applet HTML Tag and Attributes, Executing Applet in Web Browser and in Appletviewer.

UNIT V

Generic and Collection API: Introduction, Motivation for Generic Methods, Generic Methods: Implementation and Compile- time Translation Issues, Overloading Generic Methods, Generic Classes, Raw Types, Generic and Inheritance

Database connectivity: JDBC, The design of JDBC, Executing Queries.

Java Reflection API, Auto boxing, Annotations, Regular Expressions.

Text Book:

1. Java 2: The Complete Reference by Herbert Schildt, Tata McGraw- Hill, 8th Edition, 2011.

Reference Book(s):

1. The Java Programming Language, Ken Arnold , James Gosling , David Holmes, 3rd Edition, Pearson Education, 2000.
2. Head First Java, Kathy Sierra, Bert Bates, O'Reilly Publication, 2nd Edition, 2005.

IC-4917 Accounting and Financial Systems

UNIT I

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 II

Accounting Structure: The Process of Accounting – Journal, Ledger, Subsidiary books, Trial Balance based on Double Entry Book Keeping System.

UNIT III

Financial Systems and related concepts: Form and preparation of Income statements (P & L A/C), Statement of Financial Position. Methods of Depreciation – SLM Method and WDV method.

UNIT IV

Financing Decisions: Tools of Financial Analysis: Financial Statement Analysis, Statement of Financial position. Break Even Analysis. Leverages: Operating, Financial and Combined.

UNIT V

Inventory Management and Responsibility Accounting: Methods of Inventory Management and Material Issues. Responsibility Accounting -Meaning, Objectives and Importance.Accounting Package – Tally (Operations), Introduction to SPSS.

Text Book:

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

Reference Book(s):

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

STUDENT KIT

Master of Computer Application – IV Semester

Jan-May 2018

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School of Computer Science & IT, DAVV, Indore
Scheme-Jan-May 2018
onwards

Sub. Code	Subject Name	L	T	P	C	Internal	Practical /Project	End Sem	Total
CS-6518	Cloud Computing	3	1	2	5	30	20	50	100
CS-5617	Internet & Web Technology	3	1	4	6	30	20	50	100
CS-5701	Artificial Intelligence	3	1	2	5	30	20	50	100
CS-5413	Data Mining and Warehousing	3	1	4	6	30	20	50	100
IC-3912	Professional and Social Issues in IT	1	0	0	1	40	-	60	100
CS-1905A	English Language Lab	0	0	2	1	50	50	-	100
CS-5805B	Project				6			100	100
CS-5809B	**Comprehensive Viva**				4			100	100
Total					**34**				**800**

Note: Proposed Scheme can be changed/amended/improved according to necessity and requirement

CS-6518: Cloud Computing

UINT I

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 II

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 III

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 IV

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

UNIT V

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

Text Books:

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

Lab Practical and Assignments:

1. Investigating various tools such as VMWare, Eucalyptus etc.
2. Examining cloud applications in context to social networking, email, document/ spreadsheet hosting services etc. and various Google cloud applications.

CS-5617 Internet and Web Technology

UNIT-I

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 -II

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 -III

JSP Basics: JSP lifecycle, Directives, scripting elements, standard actions, implicit objects, Session handling in JSP, Types of error and exception handling. Filters in Web Application : Filter Basics, Filter Lifecycle, Filter Chaining, Filter Example

UNIT -IV

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 JDBC connectivity, Statement, Session handling in JSP.

UNIT -V

Separating Business Logic and Presentation Logic, Building and using JavaBean, JavaBean Architecture, JavaBean Characteristics, types of error and exception handling. MVC Architecture, introduction to Web Services, JQuery, JQuery forms, Introduction to AJAX, Servlet and JSP with AJAX.

Text Book(s) :

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

Reference Books :

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 and JSP", 2nd Edition, O'Reilly Media.

CS-5701 Artificial Intelligence

UNIT I

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 II

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 III

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 IV

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 V

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

Reference Book(s):

1. Elaine Rich, Kevin Knight, *Artificial Intelligence*, 2nd edition, Tata Mc-Graw-Hill Publishing Company Ltd.,New Delhi,1991.
2. N. J. Nilsson, *Artificial Intelligence: A New Synthesis*, Morgan Kaufmann Publishers, 1998.
3. Ivan Bratko, *Prolog Programming for Artificial Intelligence*, Addison Wesley; 3rd edition, 2000.

LAB Manual

Note: Students should use PROLOG programming language for Q2-Q17. Expert system case studies are from Q18-Q20.

Q1. What are the features of PROLOG language?

Q2. Create a sample program which shows backtracking mechanism.

Q3. Write a program for addition of three numbers.

Q4. Write a program to categorize bird characteristics.

Q5. Program to read and display home address of a person using compound variable.

Q6. Program to show the working of cut operator.

Q7. Program to count the number of list elements.

Q8. Program to reverse the list.

Q9. Program to add an integer into a list.

Q10. Program to replace an integer from a list.

Q11. Program to delete an integer from a list.

Q12. Program to represent family relationship.

Q13. Write a program to implement 8-queens problem

Q14. Program for Depth First Search and Breadth First Search algorithms.

Q15. Write a program for union of two lists.

Q16. Write a program for finding intersection of two lists.

Q17. Write a program to solve Monkey Banana problem.

Q18. Explain IBM WATSON Analytics system on the basis of following sections:
Software
Hardware
Operations
Information retrieval
Question Analysis
Knowledge extraction
Architecture
Hypothesis Generation, Candidate Generation, Scoring And Ranking

Q19. Explain MYCIN expert system on the basis of architecture, method used, results and application.

Q20. Explain DENDRAL expert system on the basis of architecture, method used and practical use.

CS-5413 **Data Mining & Data Warehousing**

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.

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

Learning Resources

Required Text(s)- **Text Book:**

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 the Data Warehouse- W. H. Inmon, Wiley Dreamtech India Pvt. Ltd.Fourth Edition
4. The Data Warehouse Life cycle Tool kit – RALPH KIMBALL WILEY STUDENT Third Edition

2. 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, PEARSON EDUCATION

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.

IC -3912 Professional and Social Issues in IT

Unit I

Introduction to IT policy issues.

The Internet and the Web Freedom of expression: attempts to censor the Internet, filters, international issues, also the problem of spam.

Modern problems: Identity theft, cyberbullying, Internet addiction.

Unit II

Computer reliability, and errors and failures. Liability. Risks, importance of professionalism.
Cyber-Crime: Identity theft, malware, hackers, bots, etc.
Intellectual property issues. Who owns programs? Who owns the Web? Patent and copyright. Open source, GNU GPL/lesser GPL, Creative Commons, peculiar qualities of information goods, digital rights management - watermarking, usage tracking.

Unit III

Cybercommunities. Digital society. Democracy, access, diversity, issues of online identity
Practical and professional computer ethics. Codes of practice. Ethical programming..

Unit IV

Application of ethics in computing - case studies. DES, AES, RSA, and other cryptological products and protocols. Discussion of Public Key Infrastructure - trust models, key exchange, certificates.

Unit V

Social impacts of computing. Computers and work. Ethical and moral decisions of the past and future. Ethical issues for computing professionals.

1. Required Text(s)

Computers, Internet and New Technology Laws by kernika seth.
Cyber Law & Crimes by Barkha Bhasin, Rama Mohan Ukkalam

2. Essential References

Cyber Law Cyber Crime Internet and E-Commerce by Prof. Vimlendu Tayal.
Open Source and the Law by priti suri

3. Electronic Materials, Web Sites etc

http://www.ili.ac.in
http://www.legalindia.in/cyber-crimes-and-the-law
http://www.itlaw.in/

STUDENT KIT

Master of Computer Application -V Semester

July 2017 Onwards

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Scheme-July 2017 Onwards

Sub. Code	Subject	L	T	P	C	Internal	Practical / Project	End Sem	Total
CS-5216	Design and Analysis of Algorithms	3	1	2	5	30	20	50	100
CS-6623	Mobile and Wireless Systems	3	1	0	4	40	-	60	100
CS-4409	Enterprise Resource Planning	3	1	0	4	40	-	60	100
CS-5512	Compiler Design	3	1	2	5	30	20	50	100
CS-5309	Object Oriented Analysis & Design	3	1	2	5	30	20	50	100
CS-6809	Comprehensive Viva				4				100
Total					**27**				**600**

Note: Proposed Scheme can be changed/amended/improved according to necessity and requirement.

CS-5216 Design and Analysis of Algorithms

UNIT I

Recurrence Relation, Master Theorem, Asymptotic Notations, Worst Case Analysis, Average Case Analysis, Binary Search, Hashing, Interpolation Search, Sequential Search.

UNIT II

Divide and Conquer strategy, Merge Sort, Quick Sort, Selection Sort, Heap Sort, Insertion Sort, Selection Sort.

UNIT III

Greedy Strategy,Prim and Kruskal Algorithms,KnapsackProblem, Dynamic Programming Strategy, Fibonacci Computation, Longest Common Subsequence Problem, Edit Distance Problem.

UNIT IV

Graph Algorithms, Breadth First Search, Depth First Search, Dijkstra's Algorithm, Vertex Cover Problem.

UNIT V

NP Completeness, Basic NP Complete Problems, Satisfiability, NP Completeness, Basic NP Complete Problems, Satisfiability, Approximation Algorithms, Heuristic Algorithms.

Text Book(s):

1. *Introduction to Algorithms***,** by Cormen, Leiserson, Rivest, and Stein. This book is probably worth buying if you are going to study algorithms beyond this course. It is primarily a theoretical text, and it is quite encyclopedic in nature. If you are looking for help with the proofs and mathematics, this is a good book to purchase.

2. *Algorithm Design*, by Kleinberg and Tardos. This is also an excellent book, with a different style. It follows the course quite closely, but it is not as encyclopedic as the other book, and in particular assumes a lot more background.

ASSIGNMENTS

1. Suppose you are given a six-sided die, that might be biased in an unknown way. Explain how to use die rolls to generate unbiased coin flips, and determine the expected number of die rolls until a coin flip is generated. Now suppose you want to generate unbiased die rolls (from a six-sided die) given your potentially biased die. Explain how to do this, and again determine the expected number of biased die rolls until an unbiased die roll is generated. For both problems, you need not give the most efficient solution; however, your solution should be reasonable, and exceptional solutions will receive exceptional scores.

2. On a platform of your choice, implement the three different methods for computing the Fibonacci numbers (recursive, iterative, and matrix) discussed in lecture. Use integer variables. How fast does each method appear to be? Give precise timings if possible. (This is deliberately open-ended; give what you feel is a reasonable answer. You will need to figure out how to time processes on the system you are using, if you do not already know.) Can you determine the first Fibonacci number where you reach integer overflow?

3. Buffy and Willow are facing an evil demon named Stooge, living inside Willow's computer. In an effort to slow the Scooby Gang's computing power to a crawl, the demon has replaced Willow's hand-designed super-fast sorting routine with the following recursive sorting algorithm, known as StoogeSort. For simplicity, we think of Stoogesort as running on a list of distinct numbers. StoogeSort runs in three phases. In the first phase, the first 2/3 of the list is (recursively) sorted. In the second phase, the final 2/3 of the list is (recursively) sorted. Finally, in the third phase, the first 2/3 of the list is (recursively) sorted again. Willow notices some sluggishness in her system, but doesn't notice any errors from the sorting routine. This is because StoogeSort correctly sorts. For the first part of your problem, prove rigorously that StoogeSort correctly sorts. (Note: in your proof you should also explain clearly and carefully what the algorithm should do and why it works even if the number of items to be sorted is not divisible by 3. You may assume all numbers to be sorted are distinct.) But StoogeSort can be slow. Derive a recurrence describing its running time, and use the recurrence to bound the asymptotic running time of Stoogesort.

4. Explain how to solve the following two problems using heaps. (No credit if you're not using heaps!) First, give an O(nlogk) algorithm to merge k sorted lists with n total elements into one sorted list. Second, say that a list of numbers is k-close to sorted if each number in the list is less than k positions from its actual place in the sorted order. (Hence, a list that is 1-close to sorted is actually sorted.) Give an O(nlogk) algorithm for sorting a list of n numbers that is k-close to sorted.

5. Design an efficient algorithm to find the longest path in a directed acyclic graph. (Partial credit will be given for a solution where each edge has weight 1; full credit for solutions that handle general real-valued weights on the edges, including negative values.)

6. Consider the shortest paths problem in the special case where all edge costs are non-negative integers. Describe a modification of Dijkstra's algorithm that works in time O(|E|+|V|m), where m is the maximum cost of any edge in the graph.

7. Suppose you are given a weighted graph G = (V, E) and an edge e ∈ E. You are asked whether e is in some minimum spanning tree of G. Give a linear time algorithm for the problem. (If it helps, first consider the case where all edge weights are distinct – this will get you most of the credit – and then try the more general case.)

8. Assume that the cost of any single arithmetic operation (adding, subtracting, multiplying, or dividing two real numbers) is 1, and that all other operations are free. Consider the following variant of Strassen's algorithm: to multiply two n by n matrices, start using Strassen's algorithm, but stop the recursion at some size n_0, and use the conventional algorithm below that point. You have to find a suitable value for n_0 – the cross-over point.

Analytically determine the value of n_0 that optimizes the running time of this algorithm in this model. (That is, solve the appropriate equations, somehow, numerically.) This gives a crude estimate for the cross-over point between Strassen's algorithm and the standard matrix multiplication algorithm.

9. Prove that 636127 is composite by finding an appropriate witness. Be sure to give ample evidence showing that your witness is in fact witnesses. (Note: do not use a factor as a witness! Sure, these numbers are small enough that you can exhaustively find a factor; that is not the point. A factor is not a witness, according to our definition.) Hint: you will want to write some code. You will preferably use a package that deals with big integers appropriately, as you may want to use some of this code for the next problem (RSA). We don't need a code listing for this problem– a short summary of the output should suffice.
10. We know that that all of NP-complete reduce to each other. It would be nice if this meant that an approximation for one NP-hard problem would lead to another. But this is not the case. Consider the case of Minimum Vertex Cover, for which we have a 2-approximation; that is, we are always within a factor of 2 of the optimal solution. We know (from the NP-completeness notes, which you may want to check) that C is a cover in a graph G = (V,E) if and only if V −C is an independent set in V. Explain why this does not yield an approximation algorithm that is within a constant factor of optimal for Maximum Independent Set. That is, show that for any constant c, there exists a graph for which even if we obtain a 2-approximation of the Minimum Vertex Cover, the corresponding independent set is not within a factor of c of the Maximum Independent Set.

LAB MANUAL

Design, develop and implement the specified algorithms for the following problems using C/C++ Language in LINUX / Windows environment.

1. Sort a given set of elements using the Quick sort method and determine the time required to sort the elements. Repeat the experiment for different values of n, the number of elements in the list to be sorted and plot a graph of the time taken versus n. The elements can be read from a file or can be generated using the random number generator.

2. Using Open, implement a parallelized Merge Sort algorithm to sort a given set of elements and determine the time required to sort the elements. Repeat the experiment for different values of n, the number of elements in the list to be sorted and plot a graph of the time taken versus n. The elements can be read from a file or can be generated using the random number generator.

3. a. Obtain the Topological ordering of vertices in a given digraph.
b.Compute the transitive closure of a given directed graph using Warshall's algorithm.

4. Implement 0/1 Knapsack problem using Dynamic Programming.

5. From a given vertex in a weighted connected graph, find shortest paths to other vertices using Dijikstra's algorithm.

6. Find Minimum Cost Spanning Tree of a given undirected graph using Kristal's algorithm.

7. a. Print all the nodes reachable from a given starting node in a digraph using BFS method.

b. Check whether a given graph is connected or not using DFS method.

8. Find a subset of a given set S = {sl,s2,.....,sn} of n positive integers whose sum is equal to a given positive integer d. For example, if S= {1, 2, 5, 6, 8} and d = 9 there are two olutions{1,2,6}and{1,8}.A suitable message is to be displayed if the given problem instance doesn't have a solution.

9. Implement any scheme to find the optimal solution for the Traveling Salesperson problem and then solve the same problem instance using any approximation algorithm and determine the error in the approximation.

10. Find Minimum Cost Spanning Tree of a given undirected graph using Prim's algorithm.

11. Implement All-Pairs Shortest Paths Problem using Floyd's algorithm. Parallelize his algorithm, implement it using Open and determine the speed-up achieved.

12. Implement N Queen's problem using Back Tracking.

CS-5309 Object Oriented Analysis and Design

UNIT I

Review of object oriented concepts, potential benefits and drawbacks of object oriented, Compare object oriented paradigm with structural/procedural paradigm. Elements of Object model, what is class, how to identify them, relationship among objects, relationship among classes.

Relationships: Associations, Multiplicity, Inheritance and Generalizations, Dependencies.

UNIT II

UML: Introduction, UML basics, UML Modeling, Requirement, Architecture, Design, Implementation, Deployment process.

Class diagrams – relationships, association, generalization, dependence, constraints.

UNIT III

Object diagrams, behavioral Modeling: modeling interaction, use cases, Representing Use Case Diagram, use of Use Case diagram in analysis process, Use Case relationships and its examples, Interaction diagrams.

UNIT IV

Activity diagrams, Decisions, Concurrent path, Signals, Swim lanes, events, signals, State Machines, process, threads, time, space, state chart diagrams. Interaction view- collaboration, Interaction, sequence diagrams, Best practices of software engineering.

UNIT V

Introduction to Rational Unified Process, Architecture centric process,Use-case driven process. Case study and minor project.

Text Book(s):

1. Booch, Object Oriented Analysis and Design with Applications, Addision Wesley.
2. Schach, Stephen R., An introduction to Object Oriented Systems Analysis and Design with UML and unified process, 2003, TMH.

Reference Book(s):

1. G Booch, J Rambaugh. Ivar Jacobson, The UML User guide, Pearson Education.
2. Eric Brande, Software Design, John Wiley & Sons.
3. David William Brown, An Introduction to Object Oriented Analys is", John Wiley

CS-5512 Compiler Design

UNIT-I

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-II

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

UNIT-III

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-IV

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-V

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 Book(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.

ASSIGNMENTS

List of Experiments:

- Develop a lexical analyzer to recognize a few patterns.
- Write a programme to parse using Brute force technique of Topdown parsing.
- Develop LL (1) parser (Construct parse table also).
- Develop an operator precedence parser (Construct parse table also)
- Develop a recursive descent parser
- Write a program for generating for various intermediate code forms
  i) Three address code ii) Polish notation
- Write a program to simulate Heap storage allocation strategy
- Generate Lexical analyzer using LEX
- Generate YACC specification for a few syntactic categories.
- Given any intermediate code form implement code optimization techniques
- Study of an Object Oriented Compiler.

CS-4409 Enterprise Resource Planning

Unit 1

Process view of organization: Introduction to business process, problems of functional division, ERP-introduction. Evolution of Enterprise applications, Technology as process enabler**,** mapping an existing process, Process redesign, new process validation. Salient features of Re-engineering, Re-engineering initiatives, Managerial implications of process Re-engineering efforts.

Unit 2

Business Process Re-engineering Critical success factors of re-engineering project, comparison of different re-engineering approaches, Introduction to Enterprise Resource Planning, Reasons for the growth of the ERP market, ERP packages role, Rationale for ERP, Enterprise architecture planning, Selection of an ERP vendor, Contracts with vendors, consultants and employees, Pitfalls of ERP packages, ERP implementation lifecycle, Implementation methodology, organizing the implementation, Re-engineering business cases.

Unit 3

Overview of ERP modules and ERP market place SAP AG, PeopleSoft, Baan, JD Edwards world solutions company, Oracle Corporation, ERP and related technologies. Sales and Marketing processes, Management control processes in Sales and Marketing, Sales and Marketing modules in

ERP systems, ERP and Customer Relationship Management, Integration of Sales and Distribution with other modules, ERP case studies.

Unit 4

ERP Accounting and Finance module Accounting and Finance processes, Management Control processes in Accounting, Cash Management processes, Capital Budgeting Processes, Role of Management Accounting, Managing Large-scale ERP projects, Project related factors, user training, management reporting needs, ERP Accounting and Finance case studies.

Unit 5

ERP Production Planning and Materials Management module Production planning and manufacturing processes, Management control processes in Production and Manufacturing, Materials Management module in ERP systems, Human Resource Management processes, Human Resource Information systems, Integration of HR modules with other modules, ERP HR and Production Planning / Materials Management case studies .

Text Books

1. Enterprise Resource Planning by Mary Sumner, Fifth edition, Pearson Education.
2. Enterprise Resource Planning –Alexis Leon -Tata McGraw Hill publication.

Reference Books

1. Concepts in Enterprise Resource Planning - Brady, Monk and Wagner, Thomson Learning.
2. CRM at the speed of Light .- Greenberg , Paul – TMH
3. The E-Marketplace: Strategies for success in B2B commerce – Raisch,Warren D McGraw Hill inc.2000.
4. ERP strategy – Vinod Kumar Garg , Bharat Vakharia , Jaico.

CS-6623 Mobile and Wireless Systems

UNIT-I

Overview mobile computing: Historical perspectives (mainly from the perspective of radio), Land mobile vs. Satellite vs. In-building communications systems, EM-spectrum, RF vs. IR, Mobile applications, Limitations, Health Concerns.

Mobile Radio Propagation: Introduction, Propagation mechanism, Path loss, Slow Fading, Fast Fading, Delay Spread, Inter-symbol Interference, Co-channel Interference.

UNIT-II

Cellular Concept: Characteristic of Cellular Systems, Cell area, Capacity of a cell, frequency reuse, Reducing Co-channel Interference, Cell Splitting, Cell Sectoring.

Mobile communication: Fibre or wire based transmission, Wireless Transmission: Frequencies, Antennas and Signal Propagation, Modulation Techniques, Multiplexing techniques, Coding techniques.

UNIT-III

Channel Allocation: Fixed Channel Allocation, Dynamic channel Allocation, Hybrid Channel Allocation, 3 cases of Allocation in Specialized System Structure.

Mobile Communication Systems: Cellular System Infrastructure, Registration, Handoff in cellular Systems, Roaming support, Mobile IP, Multicasting, Security and Privacy, Generation of Mobile Systems, Existing Wireless Systems, GSM frames, Inter face and planes, GSM versus CDMA.

UNIT-IV

Satellite Systems: Types of Satellite Systems, Characteristics of Satellite, Systems, Satellite System Infrastructure, Call Setup in Satellite system, Global Positioning System, limitations and beneficiaries of GPS.

Ad Hoc and Sensor Networks: Characteristic of MANETs, Application, Routing, Routing Classification, Wireless Sensor Networks.

UNIT-V

Wireless LANs and PANs: IEEE802.11, IEEE802.16 (Wi-max), ZigBee, Bluetooth: features, Layer architecture,. Case Study on Wireless LAN infrastructure, Mobile operating Systems.

Text Book(s):

1. Jochen Schiller, *Mobile Communications*, Pearson Publication, 2nd Edition, 2009.
2. D. P. Agrawal and Qing-An zeng, *Introduction to Wireless and Mobile Systems*, Cengage Learning, 2nd Edition,2006.
3. P. Nicopotidis, *Wireless Networks*, Addision –Wesley publication.

Reference Book(s):

1. Raj Kamal, Mobile Computing, Oxford University press, 2007.
2. U. Hansmann, L. Merk, M.S. Nicklons and T. Stober, *Principles of Mobile Computing*, Springer, 2003.
3. R. Behravanfar, *Mobile Computing Principles—Designing and Developing Mobile Applications with UML and XML*, Cambridge University Press, 2005.
4. Andrew S. Tanenbaum, *Computer Networks*, Addison-Wesley, 4th Edition, 2008.
5. James F. Kurore,Keith W. Rose, *Computer Networking*, Pearson Education, 3rd Edition, 2005.

STUDENT KIT

M.Sc. (Computer Science) I Semester /
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July 2017 Onwards

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School of Computer Science & IT
Scheme-July 2017 onwards

Sub. Code	Subject	L	T	P	C	Internal	Practical/ Project	End Sem	Total
CS-4022	Computer Organization & Assembly Language Programming	3	1	2	5	30	20	50	100
CS-4205	Programming and Problem Solving Using C	3	1	4	6	30	20	50	100
CS-5511	Operating Systems	3	1	2	5	30	20	50	100
CS-4116	Discrete Structures	3	1	0	4	40	-	60	100
IC-4916	Communication Skills and Report Writing	2	1	0	3	40	-	60	100
CS-4809A	Comprehensive Viva				4				100
Total					**27**				**600**

Note: Proposed Scheme can be changed/amended/improved according to necessity and requirement.

CS-4022 Computer Organization and Assembly Language Programming

UNIT-I

Computer Organization: Digital and Analog computers, Major components of a digital computer, Memory addressing capability of a CPU, Word length of a computer, Processing speed of a CPU, Definitions of Hardware, Software and Firmware. Definitions of Dumb, Smart and Intelligent terminals.

Binary Systems: Digital Systems, Binary Numbers, Number Base Conversions, Octal and Hexadecimal Numbers, Complements, Signed Binary Numbers, Binary Codes: BCD code, Gray Code, ASCII code, Excess 3 Code, Error detecting Code.

UNIT-II

Computer Arithmetic: Binary representation of Negative Integers using 2's complement and Signed magnitude representation, Fixed point Arithmetic operations on Positive and Signed (Negative) Integers like addition, subtraction, multiplication, Booth algorithm for multiplication,. Division of positive and negative binary numbers.

UNIT-III

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.

UNIT-IV

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 Instructions: Conditional and Unconditional and Machine control Instructions.

UNIT V

Assembly language programming: Practice on assembly language programming, pinout diagram of 8085 microprocessor, interfacing of 8085 , interrupts, Direct memory access, introduction to 8086 microprocessor.

Text Book(s) :

1. Microprocessor Architecture, Programming and Applications with 8085/8080 by Ramesh S. Gaonkar.
2. Fundamentals of Computers by B Ram Publication : PHI , Fourth edition

Reference Books:

1. Microprocessor and Its applications by R Theagrajan,S Dhanapal
2. Computer Architecture By Dr. Rajkamal. Publication: TMH Indian Special edition 2006.
3. Digital systems principal and Design by Dr. Rajkamal

M.Sc.(CS/IT- I
CS-4205 Programming and Problem Solving Using C

UNIT I

Introduction to Computer based Problem Solving; Algorithms and flowcharts; Programming Languages; Classification of Programming Languages; Characteristics of a program; Rules/conventions of coding, documentation, naming convention; Structured Programming; Modular Programming; Programming Environment: Assembler, Interpreter, Compiler, Linker and Loader.

UNIT II

Fundamentals of C programming; History of C; Structure of C Program; Character set, Identifiers and Keywords; Data types; Constants and Variables; Operators and Expressions, Type Conversion, Operator Precedence and Associativity; Basic Input/Output operations; **Decision control structures :***if-else, switch-case* ; **Loop control structure :** *while, do-while, for*; **Jump statement :** *break ,continue* ; *goto* statement.

UNIT III

Array: One dimensional array -Declaration, initialization of one dimensional arrays; Two dimensional array -Declaration, initialization of two dimensional arrays; multi-dimensional array. **Strings:** Declaring and initializing string, reading and writing strings, string manipulation functions, array of strings. **Function:** Need of user-defined function, Arguments, return value, *return* statement; passing parameters – call by value, call by reference; Scope, visibility and lifetime of variables; Nesting of functions; passing arrays to function; passing strings to function. **Recursion:** basics, comparison with iteration, types of recursion. **Storage Classes.**

UNIT IV

Pointer: Declaring and initializing pointer variables, chain of pointers, Pointer expression, Pointer arithmetic, Array of pointer and its limitations; Pointers as Function arguments; Function returning pointer, Dynamic Memory management functions. **Structure:** Defining a Structure, Declaring & initializing Structure Variables, Membership Operator, Array in structure, Array of Structure, Structure within structure, Pointer to structure. **Union:** Defining union, Declaring & initializing union Variables; Bit Fields; **Enumerated data type; typedef; Bitwise operators**.

UNIT V

Command line arguments; File handling: Defining, opening and closing a file, input/output operations on file, merging files; **C preprocessors:** Macro substitution, file inclusion, compiler control directive.

Text Book(s):

1. Herbert Schildt, "C The Complete Reference", Osborne/McGraw-Hill,4th Edition,2000.
2. Behrouz A. Forouzan, Richard F. Gilberg, "Computer Science: A Structured Programming Approach Using C", Thomson Brooks/cole,3rd Edition,2007.

Reference Book(s):

1. B.W. Kernighan, D.M. Ritchie, "The C Programming Language", Prentice Hall of India, 2nd Edition,1988.
2. E Balagurusami, "Programming in ANSI C", Tata McGraw-Hill,6th Edition,2012.
3. Byron S Gottfried, "Programming with C", Tata McGraw-Hill, 3rd Edition, 2010.
4. Yashavant Kanetkar, "Let us C",BPB Publications,13th Edition,2013.
5. Yashwant Kanetkar, "Test your C skills",BPB Publication, 5th Edition, 2005.

CS- 5511 Operating Systems

UNIT -I

Introduction: Evolution of operating systems, operating system concepts; activities, functions and services of operating system; Computer Systems: Mainframe, Desktop, Multiprocessors, Distributed, Clustered, Real time and Hand held systems. Computer System Operations, Storage hierarchy, Hardware protection, System calls, System structures. Process Management: Process concepts, Process scheduling, Operation on processes.

UNIT-II

Cooperating processes, Inter-process communication. Threads: multithreading models, threading issues, thread examples. CPU Scheduling: concepts, scheduling criteria, scheduling algorithms, algorithm evaluation. Process synchronization: Critical section problem, Mutual exclusion and synchronization Techniques of inter process: Synchronization hardware, semaphore, classical problems of synchronization, critical regions and monitors. Deadlock: deadlock characterization, deadlock handling methods.

UNIT-III

Memory Management: Concepts, single user memory management. Partition memory allocation: paging, segmentation and segmentation with paging, Virtual memory management: concept, demand paging, process creation, page replacement, allocation of frames and thrashing.

UNIT-IV

File Management: File concepts, access methods, directory structure, file system mounting, sharing and protection of files. File system structure and implementation, allocation methods, free space management, reliability of file system. Distributed file system and structures.

UNIT-V

Device Management: Goals of input/output software design, Structure of device hardware and software. Layers of I/O software, structure of device drivers, Disk driver, disk arm scheduling algorithms, terminal driver, clock driver, Case study of Windows 2000.

Text Book :

1. A. Silberschatz, P. Galvin and Gagne, *Operating System Concepts*, Addison Wesley, 8th Edition, 2008.

Reference books :

1. Operating systems, 4th Edition, William Stallings, Pearson Education, 2003.

CS-4116 Discrete Structures

UNIT- I

The Foundations: Logic, Sets and Functions: Introduction to set theory, set operations, fuzzy sets, mathematical logic, prepositions, prepositional equivalences, predicates and quantifiers. Importance of Quantifiers. Functions, functions for computer science.

Mathematical reasoning: Introduction to Methods of proof, mathematical induction. Use of mathematical induction to solve different problems. Importance of recursions in computer science, scope of recursions, Recursive definitions, recursive algorithms.

UNIT- II

Combinatorics: The basics of counting, The sum rule, The product rule, The Pigeonhole Principle, Permutations with repetitions, Permutations without repetitions, Circular Permutations. Applications of combinations. Applications of Combinatorics to solve Committee problems, word problems, puzzle problems etc. Applications of Combinatorics to understand Telephone numbering plan, understanding Internet addresses, Advanced counting techniques, recurrence relations, solving recurrence relations, algorithm design, Basic understanding of complexities, basic problems of complexity of algorithms.

UNIT- III

Relations: Relation definition , Importance of relations in computer science, Relations and their properties, Unary relations , Binary relations, Ternary relations , n-ary relations and their applications, closures of relations, equivalence relations, partial ordering. Representing relations, relation matrix, relation graph, composite relation. Operations on relations – union, intersection and join. Concepts of least upper bond, Greatest lower bond, maximal element, minimal element, Greatest element, Least element of a partially ordered set, lattices, sub lattices, chains and antichains.

UNIT- IV

Graphs: Introduction to Graphs, Importance of graph theory in computer science, Graph terminology, representing graphs, graph types, graph models, and graph isomorphism. Connectivity, Euler and Hamiltonian Paths, shortest path problems, planar graphs, graph colouring, chromatic number, Euler's formula, Kuratowski's theorem. The four colour problem, Applications of Graph Colouring, Introduction to Trees, applications of trees, tree traversal, trees and sorting, Spanning trees, minimum spanning trees.

UNIT -V

Languages and Grammars: Introduction to Languages and Grammars, solving problems for validity of statements according to the grammar. Importance of Language theory in Computer Science, Importance of Derivation trees, solving problems of Derivation trees, Importance of Parsing, Phrase-Structure Grammars, Types of Phrase structure grammars.

Text Book(s):

1. Kenneth H. Rosen "Discrete Mathematics and its Applications", 5^{th} edition, Tata McGraw-Hill Edition.

Reference Book(s):

1. Kolman, Busby & Ross "Discrete Mathematical Structures" ,5^{th} edition, Pearson Education
2. Narsingh Deo "Graph Theory with Applications to Engineering. & Computer Science", 4^{th} edition, Prentice Hall of India .
3. Discrete Structures, Logic and Computability by James L. Hein, 2nd edition, Narosa Publishing House.

Assignments

1. Find a formula for the sum of the first *n* even positive integers.
2. Use mathematical induction to prove the formula that you found in Exercise 1.
3. Use mathematical induction to prove that $3 + 3 \cdot 5 + 3 \cdot 5^2 + \text{-----} + 3 \cdot 5^n = 3(5^{n+1} - 1)/4$ whenever *n* is a nonnegative integer.
4. Prove that $1 \cdot 1! + 2 \cdot 2! + \text{------} + n \cdot n! = (n+1)! - 1$ whenever *n* is a nonnegative integer .

5. Find a formula for ½ +1/4 + 1/8 +…….+$1/2^n$ by examining the values of this expression for small values of n. Use mathematical induction to prove your result.
6. Show that $1^2 + 2^2 + 3^2 +$ --------+n^2 = n(n + l)(2n + l)/6 whenever *n* is a positive integer.
7. Prove that $1^2 + 3^2 + 5^2$ + ….. + $(2n + l)^2$ = (n + 1) *(2n* + l)(2n + 3)/3 whenever *n* is nonnegative integer.
8. Prove that 1 • 1! + 2 . 2! +----+ *n . n! = (n +1)! – 1* whenever *n* is a positive integer.
9. Use mathematical induction to show that 3 divides n^3 + *2n* whenever *n* is a positive integer.
10. Use mathematical induction to show that 5 divides n^5 - *n* whenever *n* is a nonnegative integer.
11. Use mathematical induction to show that 6 divides n^3 - *n* whenever *n* is a nonnegative integer.
12. Use mathematical induction to show that n^2 - 1 is divisible by 8 whenever *n* is an odd positive integer.
13. Use set builder notation to give a description of each of these sets.
a) {0,3,6,9,12} b) {-3,-2,-1,0,1,2,3}
14. Draw the Venn diagrams for each of these combinations of the sets A, B and C.
a) A ∩(B ∪ C) b) A B C∩
c) (A – B) ∪ (A - C) ∪ (B - C)
15. Prove all the set property by truth table.
16. How many bit strings are there of length six or less?
17. How many positive integers between 1000 and 9999 inclusive
    a) are divisible by 9?
    b) are even?
    c) are not divisible by 3?
    d) are divisible by 5 or 7?
    e) are not divisible by either 5 or 7?
    f) are divisible by 5 but not by 7?
    g) are divisible by 5 or 7?
18. State pigeonhole principle and use this principle to find how many students must be in a class to guarantee that at least two student receive the same score on the final exam, if the exam is graded on a scale from 0 to 100 points?
19. How many bit string of length 10 contain
    a) exactly four 1s? b) at most three 1s?
    c) at least four 1s? d) an equal no of 0s and 1s?
20. What is the coefficient of x^9 in $(2-x)^{19}$?
21. In how many different ways can five elements be selected in order from a set with three elements when repetition is allowed?
22. How many string of 10 digits are there that contain exactly two 0s,three 1s,and five 2s?

IC-4916 Communication Skills

UNIT I

Fundamentals of Communication:

Definitions, Importance, forms of communication, process of communication, Channels, Barriers and Strategies to overcome barriers of Communication.

Common errors in parts of speech, Phonetics- British pronunciation, Vowel sounds, consonant sounds phonetic transcription, Intonation, Pitch variation, Difference between British & American English, Non-verbal communication, Soft skills in oral communication.

UNIT II

Listening:

Def, Importance, Benefits, Barriers, approaches, be a better listener, exercise and cases. conference calls, vocabulary, writing and listening, grammar and usage, pronunciation.

Group Discussions:

Group Discussion Nature, difference between GD & debate, importance of group discussion, characteristics of successful GD, Selection of GD, subject knowledge, oral communication skills, leadership skills, team management, Group Discussion Strategies: Technique for individual contribution in GD: Topic analysis, discussion of opinions, discussing problems, discussing case studies & Group interaction Strategies.

UNIT III

Presentation Skills:

Presentation Skills Presentation Nature and importance of oral presentation; Planning the presentation; Preparing the presentation; Organizing presentation, Dos and Don'ts, Importance of body language in presentations, pronunciation, visual aids, podium panic, speaking.

Interviews:

Types of Interviews, Points to be borne in mind as an Interviewer or an Interviewee, Commonly asked questions, Dos and Don'ts.

UNIT IV Transactional

Analysis:

Transactional analysis, Johari Window.

Written Communication:

Report Writing, Business Correspondence, Preparation of Manuals and Project Report, Minutes of meeting, Notices and Circulars.

Note Making, Mechanics of note making: Reading strategy, note writing technique, topicalising, schematizing, reduction devices, organization techniques, methods of sequencing; summarizing and paraphrasing: mechanics of summarizing – selection, rejection, substitution; Outlining and paraphrasing: Do's and Don'ts of paraphrasing, techniques of paraphrasing.

UNIT V

Ethical Skills in Behaviour The illusion of communication: Failing to confirm the message, Forgetting the call to action, Fearing to disagree, Ignoring the beauty of arguments, choosing the wrong medium, the Art of explanation; word selection.

Intense Practice of : Presentations, GDs and Interviews.

Text Book(s):

1. Communication- KK Sinha
2. Organizational Behavior – Fred Luthans
3. Organizational Behavior – Stephen Robbins

Reference Book(s):

1. Communications Skills- MV Rodrigues.
2. Times of India/ Hindustan Times/ The Hindu etc

STUDENT KIT

M.Sc. (Computer Science) /

M.Sc. (Information Technology) II semester

Jan-May 2018

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Scheme-Jan-May 2018 onwards

Sub. Code	Subject Name	L	T	P	C	Internal	Practical / Project	End Sem	Total
CS-4209	Data Structures Using C++	3	1	2	5	30	20	50	100
CS-4405	Database Management System	3	1	4	6	30	20	50	100
CS-4305	Software Engineering	3	1	0	4	40	-	60	100
CS-4008	Computer Architecture	3	1	2	5	30	20	50	100
IC-4915	Organization and Management Concepts	4	0	0	4	40	-	60	100
CS-4809B	Comprehensive Viva				4			100	100
Total					**28**				

Note: Proposed Scheme can be changed/amended/improved according to necessity and requirement.

CS-4209 Data Structures using C++

UNIT- I

Introduction to C++ & Introduction to Data Structures

C++ Basics, Structures, Variables in C++, References, Functions, Function Overloading, Default Values for Formal Arguments of Functions, Inline Functions. Introduction to Classes and Objects Constructors, destructors, friend function, dynamic memory allocation, Inheritance, Overloading, Polymorphism, Templates.

Definition of data structures and abstract data types. Static and Dynamic implementations. Examples and real life applications, Data Structures: Arrays, Address calculation in a single and multi dimensional array. Sparse matrices.

UNIT- II

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 Definition: Queues & Lists: Array based implementation of Queues / Lists, Linked List implementation of Queues / Lists, Circular implementation of Queues and Singly linked Lists, Straight / circular implementation of doubly linked Queues / Lists, Priority queues , Applications.

UNIT- III

Trees& Graphs

Definition of trees and Binary trees, Properties of Binary trees and Implementation, Binary Traversal - preorder, post order, inorder traversal, Binary Search Trees, Implementations, Threaded trees, AVL Trees, Implementations , Balanced multi way search trees, Applications Definition of Undirected and Directed Graphs and Networks, The Array based implementation of graphs, Adjacency matrix, path matrix implementation, The Linked List representation of graphs, Shortest path Algorithm, Graph Traversal – Breadth first Traversal, Depth first Traversal, Connectivity of graphs; Connected components of graphs, Weighted Graphs, Applications.

UNIT- IV

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.

Straight Sequential Search, Binary Search, non –recursive Algorithms, recursive Algorithms, Indexed Sequential Search. Definition, Hash function, Collision Resolution Techniques, Hashing Applications.

UNIT- V

Sorting Algorithms

Introduction, Sorting by exchange, selection, insertions, Bubble sort, Selection sort, Insertion sort, Pseudo code algorithm and their C++ implementation, Efficiency of above algorithms, Shell

sort, Performance of shell sort, Merge sort, Merging of sorted arrays, The merge sort Algorithms, 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 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.

Required Text(s):

1. Theory & Problems of Data Structures by Jr. Symour Lipschetz, Schaum's outline by 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 Edition.
3. Fundamentals of Data structures by Ellis Horowitz & Sartaj Sahni, Pub, 1983,AW, 1st Edition.
4. Data Structures and Program Design in C By Robert Kruse, PHI, 2nd Edition.

Lab Assignments: C++ Programming Assignments (WEEK-1,2)

Programs related to : Class, Objects, . Private, public, protected, Pointers, References. Constructors, destructors, friend function, dynamic memory allocation, Inheritance, Overloading, Polymorphism, Templates.

Data Structure Assignments

1. Array based implementation of Stacks
2. Array based implementation of Queues.
    a. Implementation of priority queues.
3. Linked List implementation: insert, delete from 1st, last and nth position.
4. Linked list implementation of Stack & Queues.
5. Expression Evaluation Implementation.
6. Circular queue implementation.
7. Circular Linked List implementation.
8. Implementation of Doubly Linked list
9. Implementation of Binary Tree
10. Tree Traversal
11. Implementation of binary search trees.
12. Implementation of multiway search trees.
13. Implementation of AVL trees.
14. C++ implementation of searching techniques (Linear and Binary)
15. Sorting algorithms (selection, insertions, Bubble sort, Selection sort).

CS-4405 Database Management System

UNIT- I

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- II

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), NoSQL pros/cons, Categories of NoSQL database, Production deployment, MongoDb, Key Features, practical with MongoDb.

UNIT- III

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- IV

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- V

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 Book(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

CS-4305 Software Engineering

UNIT-I

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, Spiral model, RAD model, Agile process model, and RUP process model. Component-Based Development and Reusability. Comparative study of various development models.

UNIT-II

Project Management & 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-III

Requirement Engineering: Software Requirements, Requirement Engineering Process, Requirement Elicitation, Requirement Analysis (Structured Analysis, Object Oriented Analysis, Data Oriented Analysis and Prototyping Analysis), Requirements Specification, Requirement Validation, and Requirement Management.

UNIT-IV

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 and Object Oriented Design), Structured Design Methodology (SDM), Transaction Analysis and Logical Design; Coding principles, Coding process, Code verification and documentations.

UNIT-V

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, Quality Standards: Capability Maturity Model (CMM), ISO 9000, Six Sigma. Software Reliability, Software Maintenance, Evolution, and Reengineering.

Text Book:

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

Reference Books:

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. *Software Engineering*- **Ian Sommerville**, Pearson Education, New Delhi.
4. *Software Engineering Concepts*-**Richard E. Fairly**, Tata McGraw Hill Inc. New York.
5. *Fundamentals of Software Engineering*-**Rajib Mall**, PHI, New Delhi.

CS: 4008 - Computer Architecture

UNIT-I

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 –II

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 –III

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 –IV

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 -V

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 Books:

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 1995

Electronic Materials, Web Sites etc:

1. Williamstallings.com/COA5e.htmlm,
2. http://www.ece.cmu.edu/~koopman/comparch.html
3. http://dept-info.labri.fr/~strandh/Teaching/AMP/Common/Strandh-Tutorial/Dir.html
4. http://nptel.iitk.ac.in/courses/Webcoursecontents/IIT%20Guwahati/comp_org_arc/index.htm

IC – 4915 Organization and Management Concept

UNIT- I

Introduction

Definition of Management, Management functions, Role of Managers, Principles of Management, Management Thought- Classical School, Scientific school.

Planning

Nature and purpose of planning, Types of planning, Steps in planning, Decision Making, Programmed and Non Programmed Decision Making.

UNIT -II

Organizing and Staffing

Formal and Informal Organization, Organizational division – Departments, Bases of Departmentation, Span of Management, Line and Staff conflicts, Definition of Staffing, System Approach to Staffing, Selection Process, Performance Appraisal, Career Strategy.

UNIT -III

Motivation and Leadership

Motivation, Theories of Motivation – Maslow's Need Hierarchy Theory, McGregor's Theory X and theory Y, Herzberg's two factor Theory, Leadership, Managerial Grid.

Controlling: The Basic Control process, Control as feedback System, Real Time Control.

UNIT IV

Introduction to Project Management

Project, Project Management, Role of the Project Manager, Project Phases and the Project Life Cycle, Context of Information Technology Projects, Project Selection, Preliminary Scope Statements, Project Scope Management, Project Time Management, Activity Resource and Duration Estimating, Schedule Development and Control, Project Cost Management, Cost Estimating, Cost Budgeting, Cost Control.

UNIT V

Project Quality Management, Quality Planning, Quality Assurance, Quality Control, Project Human Resource Management, Keys to Managing People, Human Resource Planning, Project Communication Management, Communication Planning, Information Distribution, Performance Reporting, Managing Stakeholders, Project Risk Management, Project Procurement Management, Planning Purchasing and Acquisitions, Planning Contracting, Requesting Seller Responses, Selecting Sellers, Administering the Contract, Closing the Contract.

Text Book(s):

1. R. D. Agarwal- Organization and Management -Tata McGraw Hill Publishing Company Ltd.
2. Harold Koontz Heinz Weihrich – Essentials of Management - Tata McGraw Hill Publishing Company Ltd.

STUDENT KIT

M.Sc.(Computer Science)-III Semester /
M.Sc.(Information Technology) –III Semester

July 2017 Onwards

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School of Computer Science & IT, DAVV, Indore

Scheme-July 2017 onwards

M.Sc.(Computer Science)-III/ M.Sc.(Information Technology) -III

Sub. Code	Subject	L	T	P	C	Internal	Practical / Project	End Sem	Total
CS-4408	Database Application and Tools	3	1	4	6	30	20	50	100
CS-5613	Computer Networks	3	1	0	4	40	-	60	100
CS-5123	Theory of Computation	3	1	0	4	40	-	60	100
CS-4211	Object Oriented Programming using JAVA	3	1	4	6	30	20	50	100
CS-4508	Computer Graphics and Multimedia	3	1	2	5	30	20	50	100
CS-1905A	English Language Lab	0	0	2	1	50	50	0	100
CS-5809A	Comprehensive Viva				4				100
Total					30				

Note: Proposed Scheme can be changed/amended/improved according to necessity and requirement.

M.Sc.(CS/IT)-III
CS-4408 Database Applications and Tools

UNIT I

Database Environment: Data versus information, traditional file processing, disadvantages, database approach, range of database application, advantages of database approach. Cost and risk factors, components of database environment, evolution of database system.

Database Development Process: Information engineering, information architecture, enterprise data model, planning, SDLC, CASE etc. Steps of planning, strategic planning factors, corporate planning objects. Developing preliminary data model, and use of planning matrices, SDLC steps, CASE role, people in database development, three-schema architecture for database development. Examples to demonstrate the development process.

UNIT II

Modeling Data in the Organization: Modeling of the rules of organization, data names and definitions, ER model constructs entities and its types, attributes, relationships, degree, unary, binary, ternary, n-ary, cardinalities constraints, ER modeling examples.

Enhanced ER modeling: supertype, subtypes, specialization, generalization, specifying constraints in EER models, completeness, Disjointness, discriminators, defining super/sub type hierarchies, EER modeling examples, live demos modelling for few scenarios.

UNIT III

Logical database design: and relational model development, Relational model properties, keys, primary, secondary, composite, properties of relations. Codd's rules, integrity constraints, creating relational tables, Transform EER diagrams into relations, seven different steps for mapping EER model into relations.

UNIT IV

Introduction to normalization: steps, functional dependencies, basic normal forms, definition of first, second, third normal form and removing anomalies from the relations. De-normalization and merging relations.

UNIT V

Special Topics (Overview) : Data Warehousing, Data Mining, Distributed Databases, Object oriented modeling, definitions, activities in phases of model development, advantages of OOM, UML class diagrams, Example of a model development. Minor Project/Case study

Text Book:

1. Hoffer, Prescott, "Modern Database Management", Seventh Edition, McFadden Pearson Education.

Reference Book(s):

1. Thomas M. Connolly, Carolyn E. Begg, "Database Systems", Pearson Education.
2. Raghu R and Johannes G., "Database management Systems", Mc Hill 3rd Edition, 2002.
3. Elmasri R, Navathe S, "Fundamentals of Database Systems", Addison Wesley 4th Edition.

CS-5613 Computer Networks

UNIT I

Introduction: Overview, Goal and Applications of Computer Networks; Network Hardware - LAN, MAN, WAN and topologies; LAN components – File server, Workstations, Network Adapter Cards; 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.

UNIT II

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; 3HDLC protocol; Data link layer in the Internet - SLIP and PPP.

UNIT III

Medium Access Sublayer: Channel Allocation problem; Multiple access protocols: Pure Aloha, Slotted Aloha, CSMA Protocols, CSMA/CD, Collision-Free Protocols; IEEE MAC Sublayer protocols - 802.3, 802.4, 802.5 and their management; High speed LANs – Fast Ethernet, FDDI; Wireless LANs: IEEE 802.11, IEEE 802.16; Data Link Layer Switching – Bridges and Switches, their difference with Repeaters, Hubs, Routers and Gateways.

UNIT IV

Network Layer: Design issues; Routing algorithms - Optimality Principle, Shortest Path Routing, Flooding, Distance Vector Routing, Link State Routing, Hierarchical Routing, Broadcasting Routing, Multicast Routing; The Network Layer in the Internet - Internet Protocol, Internet addressing and Internet Control protocols.

UNIT V

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

Application layer: Client Server Architecture, DNS, WWW and HTTP, E-mail Protocols (SMTP, POP3, IMAP, MIME), FTP, TELNET.

Network Security: Cryptography, Symmetric Key Algorithms, Public key Algorithms and Digital Signatures.

Text Book(s):

1. Computer Networks, Andrew S. Tanenbaum, Addison-Wesley, 4th Ed.

Reference Book(s) :

1. Data Communications and Networking, B.A. Frouzan, McGraw-Hill, 5th Ed., 2013.
2. Data and Computer Communications: W.Stallings, Prentice-Hall, 5th Ed., 1997.
3. Computer Networking: James F. Kurore & Keith W. Rose, Pearson Education, Third Edition, 2005.
4. Communication Networks: Fundamentals Concepts and Key Architecture: Alberto Leon-Garcia and Indra Widjaja, Tata McGraw-Hill Publishing Company Limited, ISBN 0-07-0402235-3.
5. Data and Network Communication: Michael A. Miller, Delmar Thomson Learning inc. ISBN 0-07668-1100-X.
6. Introduction to Computer Networks: Douglas E. Comer, Prentice-Hall.
7. Alberto Leon-Garcia and Indra Widjaja, Communication Networks –Fundamentals Concepts and Key Architecture, Tata McGraw-Hill Publishing Company Limited.

CS-5123 Theory of Computation

UNIT I

Theory of Automata: String, Alphabet and Languages, Finite Automata, Finite State machine, Basic Definition. Description of a Finite Automaton, Deterministic Finite Accepters Transition Graphs, Languages, Non-deterministic Finite Acceptors- Definition, Finite Automata with ϵ-moves, Equivalence of Deterministic and Non-deterministic Finite Accepters, Conversion of NDFA to DFA, Removal of ϵ transition from ϵ – NDFA, Minimization of Finite Automata – Definition and Construction. Mealy and Moore models Definitions, Transformation of Mealy Machine into Moore Machine and vice-versa.

UNIT II

Properties of Regular Sets: Pumping lemma for regular set, Closure properties of regular set. **Formal Language:** Basic Definition, Chomsky Classification of languages, Initialization of Finite Automata Regular Expression and Language Regular Expressions, Connection between Regular Expressions and Regular Languages.

UNIT III

Regular Grammars – Right and Left Linear Grammars, Equivalence between Regular Languages and Regular Grammars. **Context-Free Grammars**: Leftmost and Rightmost Derivations, Derivation Trees, Parsing and Ambiguity, Simplification of CFGs. Chomsky Normal Form, Greibach Normal Form, Cocke-Kasami- Younger Algorithm, Properties of Context-Free Languages.

UNIT IV

Pushdown Automata: Definition, Non-deterministic Pushdown Automata, Pushdown Automata for Context Free Languages Context-Free Grammars for Pushdown Automata. Deterministic Pushdown Automata and Deterministic Context-Free Languages.

UNIT V

Turing Machine: Definition of Standard Turing Machine, Turing Machine as Language Accepters and Transducers.

Text Book(s):

1. Mishra and Chandrasekaran, Theory of Computer Science (Automata, language and Computation), 2nd Ed. Prentice Hall of India.

2. J. E. Hopcroft, R. Motwani and J.D Ullman, Introduction to Theory, Languages and Computation; Second Edition, Addison-Wesley, 2001 Narosa Publishing House.

Reference Book(s):

1. Moll, Arbib and Kfoury, an Introduction to Formal Language Theory, Springer-Verlag.
2. Martin, J.C.: Introduction to Languages and the Theory of Computation, McGraw-Hill, Inc.,3rd ed., 2002. ISBN 0-072-32200-4.
3. Brookshear, J.G.: Theory of Computation: Formal Languages, Automata, andComplexity, Benjamin/Cummings Publishing Company, Inc, Redwood City, California, 1989. ISBN 0-805-30143-7.
4. Peter Linz, An Introduction to Formal Languages and Automata, Narosa

CS- 4211 Object Oriented Programming Using JAVA

UNIT I

Introduction to Java: Features of Java, Object-oriented Programming Overview, Introduction of Java Technologies, Java Applets and Applications, Java Platform, Java Program structure, Basic Building Blocks (comments, character set, constants), Data Types, Variables, Operators, Expressions, Typecasting, Control Structures, Loops, 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* method.

UNIT II

String Handling: The String Constructors, String Operations, Character Exaction, String Comparison, String Buffer.

Arrays: Creating an array, Enhanced *for* Statement, Passing Multidimensional Arrays, Arrays to Method, Variable-Length Argument lists, Using Command-line Arguments.

Wrapper Class : Introduction to wrapper classes.

Inheritance: Relationship between Superclasses 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, instanceOf operator, Downcasting, Class class, Runtime type Identification

UNIT III

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, Comparable Interface.

Exception Handling: Introduction, keywords, Types of Exceptions, Java Exception Hierarchy, *finally* Block, Chained Exceptions, Declaring new Exception Types, Preconditions and Post-conditions.

Streams and Files: Introduction, Data Hierarchy, Files and Streams, Sequential-access Text Files, Object Serialization, Random-Access files, Java Stream Class Hierarchy.

UNIT IV

Multithreading: Introduction, Java Thread Model, Thread priorities, Thread life cycle, Creating Thread, Thread Execution, Thread Synchronization, Classes and Interfaces in *java.util.concurrent*, Monitor and Monitor Locks, 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

Applets: Applet Basics, Applet Architecture, Applet Life Cycle Methods, Applet HTML Tag and Attributes, Executing Applet in Web Browser and in Appletviewer.

UNIT V

Generic and Collection API: Introduction, Motivation for Generic Methods, Generic Methods: Implementation and Compile- time Translation Issues, Overloading Generic Methods, Generic Classes, Raw Types, Generic and Inheritance

Database connectivity: JDBC, The design of JDBC, Executing Queries.

New Feature of Java: Java Reflection API, Auto boxing, Annotations, Regular Expressions..

Text Book:

1. Java 2: The Complete Reference by Herbert Schildt, Tata McGraw- Hill, 8th Edition, 2011.

Reference Book(s):

1. The Java Programming Language, Ken Arnold , James Gosling , David Holmes, 3rd Edition, Pearson Education, 2000.
2. Head First Java, Kathy Sierra, Bert Bates, O'Reilly Publication, 2nd Edition, 2005.

CS-4508: COMPUTER GRAPHICS & MULTIMEDIA

UNIT I

Introduction to Computer Graphics, Application of Graphics, Display Devices: Refresh Cathode -Ray Tubes, Raster Scan Displays, Random Scan Displays, Color CRT Monitors, Flat Panel Displays. Video cards/display cards,**Input Devices:** Mouse, Trackball, Space ball, Data Glove, Joystick, Light pen, Scanner, Digital Camera, Touch Panels, Voice Systems. **Hardcopy Devices:** Printers and Plotters

UNIT II

Graphics Primitives: Line Generation Algorithms: DDA algorithm, Bresenham's algorithm. **Circle Generation Algorithms:** Midpoint Circle algorithm, Bresenham's circle generation algorithm.Ellipse Generation algorithm. Displaying Lines, characters and polygon. **Polygon filling Algorithms:** Scan Line Polygon fill algorithm, Inside - Outside Tests, Boundary-Fill algorithm, Flood - Fill algorithm.Fundamentals of aliasing and Antialiasing Techniques.

UNIT III

Two Dimensional Viewing: Window to Viewport coordinates transformation.

Clipping: Clipping operations, Point clipping, Line clipping: Cohen Sutherland Algorithm, Liang Barsky Algorithm, Nicholl-Lee-Nicholl Algorithm.**Polygon clipping:** Sutherland- Hodgeman Algorithm, Weiler Atherton Algorithm. **Text clipping, Exterior clipping.**

Two Dimensional Transformations: Translation, Scaling, Rotation, Reflection, Shear, Homogenous coordinate system, Composite transformations, Raster method of transformation.

UNIT IV

Three Dimensional Viewing: 3D Geometry, 3D display techniques, transformations.

Projections: Parallel Projection, Perspective Projection.

Color Models and Color Application: Color models: Properties of Light. Standard Primaries and the Chromaticity Diagram, XYZ Color Model, CIE Chromaticity Diagram. RGB Color Model, YIQ Color Model, CMY Color Model, HSV Color Model. Conversion between HSV and RGB Models. HLS Color Model, Color Selection and Application.

UNIT V

Multimedia: Introduction, Multimedia applications, Multimedia data and File formats, RTF, TIFF, MIDI, JPEG, DIB, MPEG, Multimedia tools.

Text Books:

1. Donald Hearn and M. Pauline Baker, Computer Graphics: C Version, Second Edition, Prentice Hall of India.
2. Tay Vaughan, Multimedia: Making it Works, Seventh Edition,Tata McGraw-Hill Professional, New Delhi.

Reference Books:

1. David F. Rogers, *Procedural Elements for Computer Graphics*,Tata Mc-Graw-Hill Publishing Company Ltd.,New Delhi,2001.
2. James D. Foley, Andries van Dam, Steven K. Feiner, John F. Hughes, *Computer Graphics: Principles and Practice in C,* Second Edition,Addison-Wesley Professional.
3. Zhigang Xiang, Roy A. Plastock, *Schaum's outline of Theory and Problems of Computer Graphics*, Second Edition ,Tata McGraw-Hill Professional, New Delhi.

STUDENT KIT

M.Sc.(Computer Science) /
M.Sc.(Information Technology)
IV Semester

Jan-May 2018

Devi Ahilya Vishwavidyalaya

School of Computer Science & IT

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School of Computer Science & IT, DAVV, Indore
Scheme-Jan-May 2018 onwards

M.Sc. (CS) / M.Sc. (IT) – IV Semester

Sub. Code	Subject Name	L	T	P	C	Internal	Practical /Project	End Sem	Total
CS-4517	Linux/UNIX Administration	3	1	2	5	30	20	50	100
CS-5512	Compiler Design	3	1	2	5	30	20	50	100
CS-5617	Internet & Web Technology	3	1	4	6	30	20	50	100
CS-5216	Design and Analysis of Algorithms	3	1	2	5	30	20	50	100
IC-3912	Professional and Social Issues in IT	1	0	0	1	40	-	60	100
CS-5805B	Project				6			100	100
CS-5809B	Comprehensive Viva				4			100	100
Total					**32**				

Note:

Proposed Scheme can be changed/amended/improved according to necessity and requirement.

M.Sc (CS/IT) - IV

CS- 4517 UNIX /LINUX ADMINISTRATION

UNIT-I

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-II

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-III

Shell programming: Features of shell, Shell variables, Control statements, Advance shell programming: Command line arguments, Interactive shell scripts, Debugging shell scripts. Communication facilities in Unix.

UNIT-IV

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

UNIT-V

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

System Administrator Tools: Monitor processes: truss/strace, ps top, Monitor network: lsof, netstat, Misc: which, whereis, dmesg, Logfiles.

Text Book(s) :

1. UNIX Operating Systems: Sumitabh Das, Tata McGraw Hills publication.

Reference Book(s)

1. UNIX System Administration Handbook(Second edition): Evi Nemeth, Garth Synder, Scott Seebass, Trent R Hein, Pearson Education - Asia, 2000.
2. Design of UNIX Operating System: Maurice J. Back, Pearson Education Asia.

CS-5617 Internet and Web Technology

UNIT-I

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 -II

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 -III

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

UNIT -IV

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 JDBC connectivity, Session handling in JSP.

UNIT -V

Separating Business Logic and Presentation Logic, Building and using JavaBean, JavaBean Architecture, JavaBean Characteristics, types of error and exception handling. MVC Architecture, introduction to Web Services, JQuery, JQuery forms, Introduction to AJAX, Servlet and JSP with AJAX.

Text Book(s) :

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

Reference Books :

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 and JSP", 2nd Edition, O'Reilly Media.

CS-5216 Design and Analysis of Algorithms

UNIT I

Recurrence Relation, Master Theorem, Asymptotic Notations, Worst Case Analysis, Average Case Analysis, Binary Search, Hashing, Interpolation Search, Sequential Search.

UNIT II

Divide and Conquer strategy, Merge Sort, Quick Sort, Selection Sort, Heap Sort, Insertion Sort, Selection Sort.

UNIT III

Greedy Strategy,Prim and Kruskal Algorithms,KnapsackProblem, Dynamic Programming Strategy, Fibonacci Computation, Longest Common Subsequence Problem, Edit Distance Problem.

UNIT IV

Graph Algorithms, Breadth First Search, Depth First Search, Dijkstra's Algorithm, Vertex Cover Problem.

UNIT V

NP Completeness, Basic NP Complete Problems, Satisfiability, Approximation Algorithms, Heuristic Algorithms.

Text Book(s):

1. "Introduction to Algorithms", by Cormen, Leiserson, Rivest, and Stein, Third Edition, 2009.

CS-5512 Compiler Design

UNIT-I

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-II

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. Canonical LR and LALR parsing tables.

UNIT-III

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-IV

Definition of basic block control flow 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-V

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

Text Book(s):

1. Aho-Ullman, Principles of Compiler Design, Narosa Publishing House.

Reference Book(s):

1. Aho-Ullman, Compilers: Principles Techniques & Tools, Addison Wesley.
2. Dhamdhere, Compiler Construction.

IC-3912 Professional and Social Issues in IT

Unit I

Introduction to IT policy issues.

The Internet and the Web Freedom of expression: attempts to censor the Internet, filters, international issues, also the problem of spam.

Modern problems: Identity theft, cyberbullying, Internet addiction.

Unit II

Computer reliability, and errors and failures. Liability. Risks, importance of professionalism.

Cyber-Crime: Identity theft, malware, hackers, bots, etc.

Intellectual property issues. Who owns programs? Who owns the Web? Patent and copyright. Open source, GNU GPL/lesser GPL, Creative Commons, peculiar qualities of information goods, digital rights management - watermarking, usage tracking.

Unit III

Cybercommunities. Digital society. Democracy, access, diversity, issues of online identity

Practical and professional computer ethics. Codes of practice. Ethical programming..

Unit IV

Application of ethics in computing - case studies. DES, AES, RSA, and other cryptological products and protocols. Discussion of Public Key Infrastructure - trust models, key exchange, certificates.

Unit V

Social impacts of computing. Computers and work. Ethical and moral decisions of the past and future. Ethical issues for computing professionals.

1. Required Text(s)

Computers, Internet and New Technology Laws by kernika seth.

Cyber Law & Crimes by Barkha Bhasin, Rama Mohan Ukkalam

2. Essential References

Cyber Law Cyber Crime Internet and E-Commerce by Prof. Vimlendu Tayal.

Open Source and the Law by priti suri

3. Electronic Materials, Web Sites etc

http://www.ili.ac.in

http://www.legalindia.in/cyber-crimes-and-the-law

http://www.itlaw.in/

STUDENT KIT

MBA (Computer Management)-I Semester

July 2017 Onwards

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- *Professionals who dedicate themselves to mankind.*

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School of Computer Science & IT
Scheme-July 2017 onwards

Code	Subject	L	T	P	C
CS-4022	Computer Organization & Assembly Language Programming	3	1	2	5
CS-4205	Programming and Problem Solving Using C	3	1	4	6
CS-5511	Operating Systems	3	1	2	5
CS-4121	Mathematical Foundation of Computer Science	3	1	0	4
IC-4916	Communication Skills and Report Writing	2	1	0	3
CS-4809A	Comprehensive Viva				4
Total					**27**

Note: Proposed Scheme can be changed/amended/improved according to necessity and requirement.

MCA(CM) - I

CS-4022 Computer Organization and Assembly Language Programming

UNIT-I

Computer Organization: Digital and Analog computers, Major components of a digital computer, Memory addressing capability of a CPU, Word length of a computer, Processing speed of a CPU, Definitions of Hardware, Software and Firmware. Definitions of Dumb, Smart and Intelligent terminals.

Binary Systems: Digital Systems, Binary Numbers, Number Base Conversions, Octal and Hexadecimal Numbers, Complements, Signed Binary Numbers, Binary Codes: BCD code, Gray Code, ASCII code, Excess 3 Code, Error detecting Code.

UNIT-II

Computer Arithmetic: Binary representation of Negative Integers using 2's complement and Signed magnitude representation, Fixed point Arithmetic operations on Positive and Signed (Negative) Integers like addition, subtraction, multiplication, Booth algorithm for multiplication,. Division of positive and negative binary numbers.

UNIT-III

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.

UNIT-IV

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 Instructions: Conditional and Unconditional and Machine control Instructions.

UNIT V

Assembly language programming: Practice on assembly language programming, pinout diagram of 8085 microprocessor, interfacing of 8085 , interrupts, Direct memory access, introduction to 8086 microprocessor.

Text Book(s) :

1. Microprocessor Architecture, Programming and Applications with 8085/8080 by Ramesh S. Gaonkar.
2. Fundamentals of Computers by B Ram Publication : PHI , Fourth edition

Reference Books:

1. Microprocessor and Its applications by R Theagrajan,S Dhanapal
2. Computer Architecture By Dr. Rajkamal. Publication: TMH Indian Special edition 2006.
3. Digital systems principal and Design by Dr. Rajkamal

CS-4205 Programming and Problem Solving Using C

UNIT I

Introduction to Computer based Problem Solving; Algorithms and flowcharts; Programming Languages; Classification of Programming Languages; Characteristics of a program; Rules/conventions of coding, documentation, naming convention; Structured Programming; Modular Programming; Programming Environment: Assembler, Interpreter, Compiler, Linker and Loader.

UNIT II

Fundamentals of C programming; History of C; Structure of C Program; Character set, Identifiers and Keywords; Data types; Constants and Variables; Operators and Expressions, Type Conversion, Operator Precedence and Associativity; Basic Input/Output operations; **Decision control structures :***if-else, switch-case* ; **Loop control structure :** *while, do-while, for*; **Jump statement :** *break ,continue* ; *goto* statement.

UNIT III

Array: One dimensional array -Declaration, initialization of one dimensional arrays; Two dimensional array -Declaration, initialization of two dimensional arrays; multi-dimensional array. **Strings:** Declaring and initializing string, reading and writing strings, string manipulation functions, array of strings. **Function:** Need of user-defined function, Arguments, return value, *return* statement; passing parameters – call by value, call by reference; Scope, visibility and lifetime of variables; Nesting of functions; passing arrays to function; passing strings to function. **Recursion:** basics, comparison with iteration, types of recursion. **Storage Classes.**

UNIT IV

Pointer: Declaring and initializing pointer variables, chain of pointers, Pointer expression, Pointer arithmetic, Array of pointer and its limitations; Pointers as Function arguments; Function returning pointer, Dynamic Memory management functions. **Structure:** Defining a Structure, Declaring & initializing Structure Variables, Membership Operator, Array in structure, Array of Structure, Structure within structure, Pointer to structure. **Union:** Defining union, Declaring & initializing union Variables; Bit Fields; **Enumerated data type; typedef; Bitwise operators**.

UNIT V

Command line arguments; File handling: Defining, opening and closing a file, input/output operations on file, merging files; **C preprocessors:** Macro substitution, file inclusion, compiler control directive.

Text Book(s):

1. Herbert Schildt, "C The Complete Reference", Osborne/McGraw-Hill,4th Edition,2000.
2. Behrouz A. Forouzan, Richard F. Gilberg, "Computer Science: A Structured Programming Approach Using C", Thomson Brooks/cole,3rd Edition,2007.

Reference Book(s):

1. B.W. Kernighan, D.M. Ritchie, "The C Programming Language", Prentice Hall of India, 2nd Edition,1988.
2. E Balagurusami, "Programming in ANSI C", Tata McGraw-Hill,6th Edition,2012.
3. Byron S Gottfried, "Programming with C", Tata McGraw-Hill, 3rd Edition, 2010.
4. Yashavant Kanetkar, "Let us C",BPB Publications,13th Edition,2013.
5. Yashwant Kanetkar, "Test your C skills",BPB Publication, 5th Edition, 2005.

CS- 5511 Operating Systems

UNIT -I

Introduction: Evolution of operating systems, operating system concepts; activities, functions and services of operating system; Computer Systems: Mainframe, Desktop, Multiprocessors, Distributed, Clustered, Real time and Hand held systems. Computer System Operations, Storage hierarchy, Hardware protection, System calls, System structures. Process Management: Process concepts, Process scheduling, Operation on processes.

UNIT-II

Cooperating processes, Inter-process communication. Threads: multithreading models, threading issues, thread examples. CPU Scheduling: concepts, scheduling criteria, scheduling algorithms, algorithm evaluation. Process synchronization: Critical section problem, Mutual exclusion and synchronization Techniques of inter process: Synchronization hardware, semaphore, classical problems of synchronization, critical regions and monitors. Deadlock: deadlock characterization, deadlock handling methods.

UNIT-III

Memory Management: Concepts, single user memory management. Partition memory allocation: paging, segmentation and segmentation with paging, Virtual memory management: concept, demand paging, process creation, page replacement, allocation of frames and thrashing.

UNIT-IV

File Management: File concepts, access methods, directory structure, file system mounting, sharing and protection of files. File system structure and implementation, allocation methods, free space management, reliability of file system. Distributed file system and structures.

UNIT-V

Device Management: Goals of input/output software design, Structure of device hardware and software. Layers of I/O software, structure of device drivers, Disk driver, disk arm scheduling algorithms, terminal driver, clock driver, Case study of Windows 2000.

Text Book :

1. A. Silberschatz, P. Galvin and Gagne, *Operating System Concepts*, Addison Wesley, 8th Edition, 2008.

Reference books :

1. Operating systems, 4th Edition, William Stallings, Pearson Education, 2003.

CS-4121 Mathematical Foundation for Computer Science

Unit I

Set Theory : Sets and Membership ,subset and set equality,set operations, fundamental law of set operations. set construction. Cartesian products, Relations, Functions and Binary operations, operations on functions.

Unit II

Algebra of Propositions- Statements, Conjunctions, Disjunctions, Negation, Conditional, Bi-

conditional, Polynomials and Boolean polynomials. Propositions and Truth Tables, tautologies and contradictions, Logical equivalence, algebra of Propositions, Logical implication, Logically True and Logically equivalent statements.

Unit III

Co-ordinate geometry of two dimensions, Co-ordinate of a point, Distance between two points, Point dividing the join of two points. Area of triangle, Locus and its equations. Transformation of co-ordinates.

Unit IV

Functions, limits and continuity- Functions, Constructions of Functions. Linear and quadratic Functions Sequences, Application to Management problems. Differential and integral calculus – derative, basic Laws of derivatives. Higher order derivatives. Maximum and Minima of functions of one variable. Integration by parts and simple method of integration of simple algebraic and transcendental functions.

Unit V

Definite integral application to management problems including EOO model for Inventory control. progressions and annuity – Progressions. A.P. and G.P. Depreciation by double declining balance method. Present Value, Annuity, Present value of an annuity, Depreciation by sinking fund method. Present value under continues compounding.

Required Text:

1. Mathematics for Business and Economics: J. K. Sharma , Asian Books Pvt. Ltd., New Delhi.

IC-4916 Communication Skills

UNIT I

Fundamentals of Communication:

Definitions, Importance, forms of communication, process of communication, Channels, Barriers and Strategies to overcome barriers of Communication.

Common errors in parts of speech, Phonetics- British pronunciation, Vowel sounds, consonant sounds phonetic transcription, Intonation, Pitch variation, Difference between British & American English, Non-verbal communication, Soft skills in oral communication.

UNIT II

Listening:

Def, Importance, Benefits, Barriers, approaches, be a better listener, exercise and cases. conference calls, vocabulary, writing and listening, grammar and usage, pronunciation.

Group Discussions:

Group Discussion Nature, difference between GD & debate, importance of group discussion, characteristics of successful GD, Selection of GD, subject knowledge, oral communication skills, leadership skills, team management, Group Discussion Strategies: Technique for individual contribution in GD: Topic analysis, discussion of opinions, discussing problems, discussing case studies & Group interaction Strategies.

UNIT III

Presentation Skills:

Presentation Skills Presentation Nature and importance of oral presentation; Planning the presentation; Preparing the presentation; Organizing presentation, Dos and Don'ts, Importance of

body language in presentations, pronunciation, visual aids, podium panic, speaking.

Interviews:

Types of Interviews, Points to be borne in mind as an Interviewer or an Interviewee, Commonly asked questions, Dos and Don'ts.

UNIT IV Transactional Analysis:

Transactional analysis, Johari Window.

Written Communication:

Report Writing, Business Correspondence, Preparation of Manuals and Project Report, Minutes of meeting, Notices and Circulars.

Note Making, Mechanics of note making: Reading strategy, note writing technique, topicalising, schematizing, reduction devices, organization techniques, methods of sequencing; summarizing and paraphrasing: mechanics of summarizing – selection, rejection, substitution; Outlining and paraphrasing: Do's and Don'ts of paraphrasing, techniques of paraphrasing.

UNIT V

Ethical Skills in Behaviour The illusion of communication: Failing to confirm the message, Forgetting the call to action, Fearing to disagree, Ignoring the beauty of arguments, choosing the wrong medium, the Art of explanation; word selection.

Intense Practice of : Presentations, GDs and Interviews.

Text Book(s):

1. Communication- KK Sinha
2. Organizational Behavior – Fred Luthans
3. Organizational Behavior – Stephen Robbins

Reference Book(s):

1. Communications Skills- MV Rodrigues.
2. Times of India/ Hindustan Times/ The Hindu etc

STUDENT KIT

MBA (Computer Management)-II Semester

Jan-May 2018

Devi Ahilya Vishwavidyalaya

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School of Computer Science & IT, DAVV, Indore

Scheme-Jan-May 2018 onwards

Sub. Code	Subject Name	L	T	P	C	Internal	Practical / Project	End Sem	Total
CS-4209	Data Structures Using C++	3	1	2	5	30	20	50	100
CS-4405	Database Management System	3	1	4	6	30	20	50	100
CS-4305	Software Engineering	3	1	0	4	40	-	60	100
CS-4008	Computer Architecture	3	1	2	5	30	20	50	100
IC-4915	Organization and Management Concepts	4	0	0	4	40	-	60	100
CS-4809B	Comprehensive Viva				4			100	100
Total					**28**				

Note: Proposed Scheme can be changed/amended/improved according to necessity and requirement.

MBA(CM) – II

CS-4209 Data Structures using C++

UNIT- I

Introduction to C++ & Introduction to Data Structures

C++ Basics, Structures, Variables in C++, References, Functions, Function Overloading, Default Values for Formal Arguments of Functions, Inline Functions. Introduction to Classes and Objects Constructors, destructors, friend function, dynamic memory allocation, Inheritance, Overloading, Polymorphism, Templates.

Definition of data structures and abstract data types. Static and Dynamic implementations. Examples and real life applications, Data Structures: Arrays, Address calculation in a single and multi dimensional array. Sparse matrices.

UNIT- II

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 Definition: Queues & Lists: Array based implementation of Queues / Lists, Linked List implementation of Queues / Lists, Circular implementation of Queues and Singly linked Lists, Straight / circular implementation of doubly linked Queues / Lists, Priority queues , Applications.

UNIT- III

Trees& Graphs

Definition of trees and Binary trees, Properties of Binary trees and Implementation, Binary Traversal - preorder, post order, inorder traversal, Binary Search Trees, Implementations, Threaded trees, AVL Trees, Implementations , Balanced multi way search trees, Applications Definition of Undirected and Directed Graphs and Networks, The Array based implementation of graphs, Adjacency matrix, path matrix implementation, The Linked List representation of graphs, Shortest path Algorithm, Graph Traversal – Breadth first Traversal, Depth first Traversal, Connectivity of graphs; Connected components of graphs, Weighted Graphs, Applications.

UNIT- IV

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.

Straight Sequential Search, Binary Search, non –recursive Algorithms, recursive Algorithms, Indexed Sequential Search. Definition, Hash function, Collision Resolution Techniques, Hashing Applications.

UNIT- V

Sorting Algorithms

Introduction, Sorting by exchange, selection, insertions, Bubble sort, Selection sort, Insertion sort, Pseudo code algorithm and their C++ implementation, Efficiency of above algorithms, Shell sort, Performance of shell sort, Merge sort, Merging of sorted arrays, The merge sort Algorithms, 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 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.

Required Text(s):

1. Theory & Problems of Data Structures by Jr. Symour Lipschetz, Schaum's outline by 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 Edition.
3. Fundamentals of Data structures by Ellis Horowitz & Sartaj Sahni, Pub, 1983,AW, 1st Edition.
4. Data Structures and Program Design in C By Robert Kruse, PHI, 2nd Edition.

Lab Assignments: C++ Programming Assignments (WEEK-1,2)

Programs related to : Class, Objects, . Private, public, protected, Pointers, References. Constructors, destructors, friend function, dynamic memory allocation, Inheritance, Overloading, Polymorphism, Templates.

Data Structure Assignments

1. Array based implementation of Stacks
2. Array based implementation of Queues.
    a. Implementation of priority queues.
3. Linked List implementation: insert, delete from 1st, last and nth position.
4. Linked list implementation of Stack & Queues.
5. Expression Evaluation Implementation.
6. Circular queue implementation.
7. Circular Linked List implementation.
8. Implementation of Doubly Linked list
9. Implementation of Binary Tree
10. Tree Traversal
11. Implementation of binary search trees.
12. Implementation of multiway search trees.
13. Implementation of AVL trees.
14. C++ implementation of searching techniques (Linear and Binary)
15. Sorting algorithms (selection, insertions, Bubble sort, Selection sort).

CS-4405 Database Management System

UNIT- I

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- II

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), NoSQL pros/cons, Categories of NoSQL database, Production deployment, MongoDb, Key Features, practical with MongoDb.

UNIT- III

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- IV

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- V

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 Book(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

CS-4305 Software Engineering

UNIT-I

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, Spiral model, RAD model, Agile process model, and RUP process model. Component-Based Development and Reusability. Comparative study of various development models.

UNIT-II

Project Management & 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-III

Requirement Engineering: Software Requirements, Requirement Engineering Process, Requirement Elicitation, Requirement Analysis (Structured Analysis, Object Oriented Analysis, Data Oriented Analysis and Prototyping Analysis), Requirements Specification, Requirement Validation, and Requirement Management.

UNIT-IV

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 and Object Oriented Design), Structured Design Methodology (SDM), Transaction Analysis and Logical Design; Coding principles, Coding process, Code verification and documentations.

UNIT-V

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, Quality Standards: Capability Maturity Model (CMM), ISO 9000, Six Sigma. Software Reliability, Software Maintenance, Evolution, and Reengineering.

Text Book:

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

Reference Books:

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. *Software Engineering*- **Ian Sommerville**, Pearson Education, New Delhi.
4. *Software Engineering Concepts*-**Richard E. Fairly**, Tata McGraw Hill Inc. New York.
5. *Fundamentals of Software Engineering*-**Rajib Mall**, PHI, New Delhi.

CS: 4008 - Computer Architecture

UNIT-I

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 –II

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 –III

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 –IV

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 -V

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 Books:

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 1995

Electronic Materials, Web Sites etc:

1. Williamstallings.com/COA5e.htmlm,
2. http://www.ece.cmu.edu/~koopman/comparch.html
3. http://dept-info.labri.fr/~strandh/Teaching/AMP/Common/Strandh-Tutorial/Dir.html
4. http://nptel.iitk.ac.in/courses/Webcoursecontents/IIT%20Guwahati/comp_org_arc/index.htm

IC – 4915 Organization and Management Concept

UNIT- I

Introduction

Definition of Management, Management functions, Role of Managers, Principles of Management, Management Thought- Classical School, Scientific school.

Planning

Nature and purpose of planning, Types of planning, Steps in planning, Decision Making, Programmed and Non Programmed Decision Making.

UNIT -II

Organizing and Staffing

STUDENT KIT

MBA (Computer Management)-III Semester

July 2017 Onwards

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Scheme-July 2017 onwards

Code	Subject	L	T	P	C	Internal	Practical/ Project	End Sem	Total
CS-5613	Computer Networks	3	1	0	4	40	0	60	100
CS-4408	Database Application and Tools	3	1	4	6	30	20	50	100
CS-5616	E- Commerce	3	1	0	4	40	-	60	100
CS-4409A	Introduction to Enterprise Resource Planning	3	1	2	5	30	20	50	100
CS-4211	Object Oriented Programming using JAVA	3	1	4	6	30	20	50	100
CS-5809A	Comprehensive Viva				4				100
Total					**29**				**600**

Note: Proposed Scheme can be changed/amended/improved according to necessity and requirement.

MBA(CM) III

CS-4408 Database Applications and Tools

UNIT I

Database Environment: Data versus information, traditional file processing, disadvantages, database approach, range of database application, advantages of database approach. Cost and risk factors, components of database environment, evolution of database system.

Database Development Process: Information engineering, information architecture, enterprise data model, planning, SDLC, CASE etc. Steps of planning, strategic planning factors, corporate planning objects. Developing preliminary data model, and use of planning matrices, SDLC steps, CASE role, people in database development, three-schema architecture for database development. Examples to demonstrate the development process.

UNIT II

Modeling Data in the Organization: Modeling of the rules of organization, data names and definitions, ER model constructs entities and its types, attributes, relationships, degree, unary, binary, ternary, n-ary, cardinalities constraints, ER modeling examples.

Enhanced ER modeling: supertype, subtypes, specialization, generalization, specifying constraints in EER models, completeness, Disjointness, discriminators, defining super/sub type hierarchies, EER modeling examples, live demos modelling for few scenarios.

UNIT III

Logical database design: and relational model development, Relational model properties, keys, primary, secondary, composite, properties of relations. Codd's rules, integrity constraints, creating relational tables, Transform EER diagrams into relations, seven different steps for mapping EER model into relations.

UNIT IV

Introduction to normalization: steps, functional dependencies, basic normal forms, definition of first, second, third normal form and removing anomalies from the relations. De-normalization and merging relations.

UNIT V

Special Topics (Overview) : Data Warehousing, Data Mining, Distributed Databases, Object oriented modeling, definitions, activities in phases of model development, advantages of OOM, UML class diagrams, Example of a model development.

Text Book:

1. Hoffer, Prescott, "Modern Database Management", Seventh Edition, McFadden Pearson Education.

Reference Book(s):

1. Thomas M. Connolly, Carolyn E. Begg, "Database Systems", Pearson Education.
2. Raghu R and Johannes G., "Database management Systems", Mc Hill 3rd Edition, 2002.

3. Elmasri R, Navathe S, "Fundamentals of Database Systems", Addison Wesley 4th Edition.

CS-5613 Computer Networks

UNIT I

Introduction: Overview, Goal and Applications of Computer Networks; Network Hardware - LAN, MAN, WAN and topologies; LAN components – File server, Workstations, Network Adapter Cards; 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.

UNIT II

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; 3HDLC protocol; Data link layer in the Internet - SLIP and PPP.

UNIT III

Medium Access Sublayer: Channel Allocation problem; Multiple access protocols: Pure Aloha, Slotted Aloha, CSMA Protocols, CSMA/CD, Collision-Free Protocols; IEEE MAC Sublayer protocols - 802.3, 802.4, 802.5 and their management; High speed LANs – Fast Ethernet, FDDI; Wireless LANs: IEEE 802.11, IEEE 802.16; Data Link Layer Switching – Bridges and Switches, their difference with Repeaters, Hubs, Routers and Gateways.

UNIT IV

Network Layer: Design issues; Routing algorithms - Optimality Principle, Shortest Path Routing, Flooding, Distance Vector Routing, Link State Routing, Hierarchical Routing, Broadcasting Routing, Multicast Routing; The Network Layer in the Internet - Internet Protocol, Internet addressing and Internet Control protocols.

UNIT V

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

Application layer: Client Server Architecture, DNS, WWW and HTTP, E-mail Protocols (SMTP, POP3, IMAP, MIME), FTP, TELNET.

Network Security: Cryptography, Symmetric Key Algorithms, Public key Algorithms and Digital Signatures.

Text Book(s):

1. Computer Networks, Andrew S. Tanenbaum, Addison-Wesley, 4th Ed.

Reference Book(s) :

1. Data Communications and Networking, B.A. Frouzan, McGraw-Hill, 5th Ed., 2013.
2. Data and Computer Communications: W.Stallings, Prentice-Hall, 5th Ed., 1997.
3. Computer Networking: James F. Kurore & Keith W. Rose, Pearson Education, Third Edition, 2005.
4. Communication Networks: Fundamentals Concepts and Key Architecture: Alberto Leon-Garcia and Indra Widjaja, Tata McGraw-Hill Publishing Company Limited, ISBN 0-07-0402235-3.
5. Data and Network Communication: Michael A. Miller, Delmar Thomson Learning inc. ISBN 0-07668-1100-X.
6. Introduction to Computer Networks: Douglas E. Comer, Prentice-Hall.
7. Alberto Leon-Garcia and Indra Widjaja, Communication Networks –Fundamentals Concepts and Key Architecture, Tata McGraw-Hill Publishing Company Limited.

CS-4409A Introduction to Enterprise Resource Planning

Unit 1

Process view of organization: Introduction to business process, problems of functional division, ERP-introduction.

Evolution of Enterprise applications, Technology as process enabler**,** Mapping an existing process, Process redesign, new process validation.

Approaches to process improvement: Salient features of Re-engineering, Re-engineering initiatives, Managerial implications of process Re-engineering efforts, Kaizen.

Total quality management, implementing new process.

Critical success factors of re-engineering project, comparison of different approaches.

Unit 2

Introduction to Enterprise Resource Planning: Reasons for the growth of the ERP market, ERP packages role.

Enterprise application implementation projects: Rationale for ERP, Enterprise architecture planning, Selection of an ERP vendor, Contracts with vendors, consultants and employees, ERP project management and monitoring, Pitfalls of ERP packages, ERP implementation lifecycle, Implementation methodology, organizing the implementation.

Unit 3

Overview of ERP modules and ERP market place: SAP AG, PeopleSoft, Baan company, JD Edwards world solutions company, Oracle Corporation, ERP and related technologies.

Sales and marketing processes, management control processes in sales and marketing, sales and marketing modules in ERP systems, ERP and CRM, integration of sales and distribution with other modules, ERP case studies.

ERP accounting and finance module: Accounting and finance processes, management control processes in accounting, cash management processes, capital budgeting processes.

Role of management accounting, managing large-scale ERP projects, project related factors, user training, management reporting needs, ERP accounting and finance case studies.

Unit 4

ERP production planning and materials management: Production planning and manufacturing processes, management control processes in production and manufacturing, materials management module in ERP systems.

Human resource management processes, human resource information systems, integration of human resource module with other modules, human resource/production planning/materials management case

Unit 5

Supply chain and CRM applications: Overview of supply and demand chain, supply chain framework, advanced planning systems, introduction to CRM applications, growth of CRM applications, ERP and related technologies, detailed study of any one ERP package with emphasis on - application basics, cross-sectional analysis of the other ERP systems with the application, package architecture, and understanding of the application with the business process reference model.

Required Text(s) – Text Books

1. Enterprise Resource Planning by Mary Sumner, Fifth Edition, Pearson Education.

References Books :

1. Enterprise Resource Planning –Alexis Leon -Tata McGraw Hill publication.
2. Concepts in Enterprise Resource Planning–Brady , Monk and Wagner – Thomson Learning.
3. CRM at the speed of Light .- Greenberg , Paul – TMH
4. The E-Marketplace: Strategies for success in B2B commerce – Raisch ,Warren D – McGraw Hill inc.2000.
5. ERP strategy – Vinod Kumar Garg , Bharat Vakharia , Jaico

Recommended Books and Reference Material (Journals, Reports, etc)

Electronic Materials, Web Sites etc

www.ibm.com/solutions/businesssolutions/erp/

www.sap.com/solutions/business-suite/erp/

www.sap.com/usa/solutions/index.epx

Other learning material such as computer-based programs/CD, professional standards/regulations

Business Process Integration Part-I and Business Process Integration Part-II

List of Assignment:

1. Discuss elaborately the 'evolution phases' of Enterprise Resource Planning (ERP) right from 1960s to till date.
2. Explain the various criteria to be met and possessed by an ERP system, when proposed for the small and medium enterprises.
3. Discuss manufacturing business process as regards to an enterprise.
4. Discuss accounting process as regards to an enterprise.
5. Discuss sales and distribution business process as regards to an enterprise.
6. Discuss purchasing business process as regards to an enterprise.
7. Explain Fed-Ex e-Procurement journey.
8. Explain ERP implementation at BPCL
9. Explain the Supply Chain Applications– SCM Practices (A), Wal-Mart SCM Practices (B).
10. Explain the CRM Applications – CRM initiatives at 3M, Mobile CRM, Dow Chemical e-CRM Strategy.
11. Explain Sears Logistics Management Practices.
12. Discuss elaborately the 'evolution phases' of Enterprise Resource Planning (ERP) right from 1960s to till date.
13. Explain the various criteria to be met and possessed by an ERP system, when proposed for the small and medium enterprises.
14. Using a flow diagram, explain the various 'Phases' involved in the ERP implementation life cycle.
15. Explain with suitable examples, the eight areas in which the hidden costs are incurred leading to budget overrun, while implementing ERP.
16. With relevant points and suitable examples, describe the various factors and sub-factors that determine the success of ERP implementation.
17. Why the Demand Chain and Supply Chain have to be decoupled?
18. What is Business Analytics?
19. When an ERP system does is considered as an 'Ideal ERP System'?
20. List out the common sub-systems of a HR Module of an ERP system.
21. What is 'Business Logic' in ERP perspective?
22. What do you understand by 'Analytical Hierarchical Process'?

23. What is 'Data Migration' process of an ERP system?
24. List out the steps involved in the maintenance of the ERP Systems.
25. Learn working of a free ware ERP suite.
    How you will model an enterprise with the help of an example ERP application. Explain in detail.

CS-5616 E- Commerce

Unit I

Introduction to E-Commerce, The Anatomy of E-Commerce Applications, E Commerce Framework, E-Commerce Consumer Applications, E-Commerce organization Applications, Advantageous and disadvantageous of E-Commerce.
Network infrastructure for E-Commerce:- Market forces influencing the I-Way, Component of I-Way, Network Access Equipment.
The Internet as a Network infrastructure : The internet Terminology, History of Internet, Internet Governance.

Unit II

The Business of Internet Commercialization: National independent ISPs, Regional-Level ISPs, Local-Level ISPs, Service Provider Connectivity, Internet connectivity options.
Network Security and Firewalls: Client-Server Network Security, Firewall and Network Security. Data and message Security, Encrypted Document and Electronic mail. U.S. government Regulation and Encryption.

Unit III

Electronic Commerce and world wide web: Architectural Framework for E-Commerce, WWW as the Architecture, Technology behind Web.
Consumer-Oriented E-Commerce: Consumer Oriented Applications, Process Models from consumer's perspective and Merchant's perspective.
Electronic Payment Systems: Types of Electronic payment Systems, Digital Token-Based Electronic Payment Systems, Smart Cards.

Unit IV

Credit Card Based Electronic Payment Systems, Risk and E-Payment Interorganizational Commerce and EDI: Electronic Data Interchange, EDI Application in Business.
EDI: Legal, Security and Privacy Issues, EDI and E-Commerce,
EDI Implementation, MIME and Value-Added Networks: Standardization and EDI, EDI Software Implementation

Unit V

Advertising and Marketing on the Internet: Information-Based Marketing, Advertising on the internet.
Consumer Search and Resource Discovery: Search and Resource Discovery Paradigms, Information Search and Retrieval, information Filtering.
Software Agents : History of Software Agents, Characteristics and Properties of software Agents, Technology behind software agents. Ethical, Social and Political issues in E-Commerce.

Required Text(s):

Frontiers of Electronic Commerce, By Ravi Kalakota and Andrew B. Whinston, First Edition, 200.

CS- 4211 Object Oriented Programming Using JAVA

UNIT I

Introduction to Java: Features of Java, Object-oriented Programming Overview, Introduction of Java Technologies, Java Applets and Applications, Java Platform, Java Program structure, Basic Building Blocks (comments, character set, constants), Data Types, Variables, Operators, Expressions, Typecasting, Control Structures, Loops, 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* method.

UNIT II

String Handling: The String Constructors, String Operations, Character Exaction, String Comparison, String Buffer.
Arrays: Creating an array, Enhanced *for* Statement, Passing Multidimensional Arrays, Arrays to Method, Variable-Length Argument lists, Using Command-line Arguments.
Wrapper Class : Introduction to wrapper classes.
Inheritance: Relationship between Superclasses 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, instance of operator, Downcasting, Class class, Runtime type Identification

UNIT III

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, Comparable Interface.
Exception Handling: Introduction, keywords, Types of Exceptions, Java Exception Hierarchy, *finally* Block, Chained Exceptions, Declaring new Exception Types, Preconditions and Post-conditions.
Streams and Files: Introduction, Data Hierarchy, Files and Streams, Sequential-access Text Files, Object Serialization, Random-Access files, Java Stream Class Hierarchy.

UNIT IV

Multithreading: Introduction, Java Thread Model, Thread priorities, Thread life cycle, Creating Thread, Thread Execution, Thread Synchronization, Classes and Interfaces in *java.util.concurrent*, Monitor and Monitor Locks, 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
Applets: Applet Basics, Applet Architecture, Applet Life Cycle Methods, Applet HTML Tag and Attributes, Executing Applet in Web Browser and in Appletviewer.

UNIT V

Generic and Collection API: Introduction, Motivation for Generic Methods, Generic Methods: Implementation and Compile- time Translation Issues, Overloading Generic Methods, Generic Classes, Raw Types, Generic and Inheritance

Database connectivity: JDBC, The design of JDBC, Executing Queries.

Java Reflection API, Auto boxing, Annotations, Regular Expressions.

Text Book:

1. Java 2: The Complete Reference by Herbert Schildt, Tata McGraw- Hill, 8th Edition, 2011.

Reference Book(s):

1. The Java Programming Language, Ken Arnold , James Gosling , David Holmes, 3rd Edition, Pearson Education, 2000.
2. Head First Java, Kathy Sierra, Bert Bates, O'Reilly Publication, 2nd Edition, 2005.

STUDENT KIT

MBA (Computer Management) – IV Semester

Jan-May 2018

Devi Ahilya Vishwavidyalaya

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School of Computer Science & IT, DAVV, Indore
Scheme-Jan-May 2018
onwards

MBA(CM) IV

Sub. Code	Subject Name	L	T	P	C	Internal	Practical /Project	End Sem	Total	Faculty
CS-6518	Cloud Computing	3	1	2	5	30	20	50	100	Dr. Nitin Uikey
CS-4422	ERP Applications	3	1	4	6	30	20	50	100	Dr. Archana Thakur
CS-5617	Internet & Web Technology	3	1	0	4	40		60	100	Mr. Mohit Varma
IC-3912	Professional and Social Issues in IT	1	0	0	1	40	-	60	100	Dr. Nitin Uikey
CS-5805B	Project on ERP				6			100	100	Dr. Archana Thakur
CS-5809B	**Comprehensive Viva**				4			100	100	
Total					**26**					

Note: Proposed Scheme can be changed/amended/improved according to necessity and requirement

MBA(CM) - IV

CS-6518: Cloud Computing

UINT I

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 II

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 III

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 IV

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

UNIT V

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

Text Books:

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

Lab Practical and Assignments:

1. Investigating various tools such as VMWare, Eucalyptus etc.
2. Examining cloud applications in context to social networking, email, document/ spreadsheet hosting services etc. and various Google cloud applications.

CS-5617 Internet and Web Technology

UNIT-I

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 -II

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 -III

JSP Basics: JSP lifecycle, Directives, scripting elements, standard actions, implicit objects, Session handling in JSP, Types of error and exception handling. Filters in Web Application : Filter Basics, Filter Lifecycle, Filter Chaining, Filter Example

UNIT -IV

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 JDBC connectivity, Statement, Session handling in JSP.

UNIT -V

Separating Business Logic and Presentation Logic, Building and using JavaBean, JavaBean Architecture, JavaBean Characteristics, types of error and exception handling. MVC Architecture, introduction to Web Services, JQuery, JQuery forms, Introduction to AJAX, Servlet and JSP with AJAX.

Text Book(s) :

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

Reference Books :

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 and JSP", 2nd Edition, O'Reilly Media.

CS-4422 ERP Applications

Unit 1:

Introduction to ERP solutions: An Overview of ERP software solutions– small, medium and large enterprise vendor solutions, BPR, and best business practices – Business process Management, Functional modules.

ERP implementation: Planning Evaluation and selection of ERP systems – Implementation life cycle – ERP implementation, Methodology and Frame work, Training – Data Migration, People Organization in implementation–Consultants, Vendors and Employees.

ERP applications: Maintenance of ERP – Organizational and Industrial impact, success and failure factors of ERP Implementation, Extended ERP systems and ERP add-ons – CRM, SCM, Business Integration. Introduction to Open source ERP packages – Open ERP, ERP next, features and components, introduction to Web school ERP.

Unit 2:

SAP Project Basics: SAP technology, best platform for SAP, memory: fast but volatile, SAP system landscapes, database basics for SAP, future developments.

Running SAP project, Steps in pursuing SAP project, the SAP project lifecycle, organizing SAP project by tasks, organizing SAP project by roles

SAP Applications and Components: A real time vision, SAP business suite components, SAP NetWeaver components, SAP Business by design, all in one SAP.

Unit 3:

SAP NetWeaver and HANA: The foundation for SAP, SAP NetWeaver umbrella, bringing it all together, the business case for HANA, HANA cloud offerings.

SAP ERP and Business Suite: SAP ERP Business scenarios, SAP way to cloud, newly acquired SAP solutions; steps to be taken before SAP is deployed, sample SAP business transactions.

SAP User Interfaces: The SAPGUI, SAPGUI elements and other basics, navigation basics, screen objects, using Windows clipboard, additional legacy interfaces, SAP's new User Interfaces and tools.

Unit 4

Using other SAP Business Suite Applications: Using SAP SRM, using SAP CRM, using SAP SCM, using SAP PLM

SAP Reporting: Types of SAP reporting – SAP business objects, SAP NetWeaver BW family, SAP ERP operational reporting tools, legacy SAP reporting options.

SAP simple finance Add-on, integrating SAP with desktop applications, open text archiving for SAP.

SAP program and project leadership, project team members, project tools and other methodologies.

Unit 5

SAP installation and implementation: SAP installation preparation, locating and downloading the software, infrastructure readiness, installing the SAP trial version. HANA on public cloud

platforms, the SAP cloud library, introducing SAP single sign-on. Basic open SQL commands – Select, Insert, Update, Modify, Delete and so on. ABAP data elements, tables, structures, aggregated objects of ABAP dictionary, lock objects.

1. Required Text(s) – **Text Books**

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

2. References Books :

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 by Mary Sumner, Fifth Edition, Pearson Education.
4. CRM at the speed of Light .- Greenberg , Paul – TMH
5. The E-Marketplace: Strategies for success in B2B commerce – Raisch ,Warren D – McGraw Hill inc.2000.
6. ERP strategy – Vinod Kumar Garg , Bharat Vakharia , Jaico

3-.Electronic Materials, Web Sites etc

www.ibm.com/solutions/businesssolutions/erp/

www.sap.com/solutions/business-suite/erp/

www.sap.com/usa/solutions/index.epx

List of Assignments:

1. What are some of the strategic benefits that MNC may realize by implementing new NetWeaver functionality including HANA?
2. Which two of the six NetWeaver component areas or themes focus on development?
3. What sources or guides can be used to assist with the planning and implementation of information broadcasting on the new SAP BW system?
4. Using SAP NetWeaver process integration, how might MNC connect SAP BW with its old legacy system that adhered to the chemical EDI standard?
5. Discuss sales and distribution business process as regards to an enterprise.
6. Discuss purchasing business process as regards to an enterprise.
7. What are the components of SAP ERP Plant Maintenance?
8. What kind of business solutions do SAP ERP operations address?
9. Why is there so much overlap among SAP ERP's business solutions, modules and business processes?
10. For the most robust yet targeted set of SAP ERP analytics, what should MNC consider implementing?
11. Which features in SAP CRM augment your capability to support new customers?
12. Discuss elaborately the 'evolution phases' of Enterprise Resource Planning (ERP) right from 1960s to till date.
13. Explain the various criteria to be met and possessed by an ERP system, when proposed for the small and medium enterprises.

14. Using a flow diagram, explain the various 'Phases' involved in the ERP implementation life cycle.
15. Explain with suitable examples, the eight areas in which the hidden costs are incurred leading to budget overrun, while implementing ERP.
16. With relevant points and suitable examples, describe the various factors and sub-factors that determine the success of ERP implementation.
17. Can an organization purchase SAP Manufacturing in the same way it can purchase one of the 5 SAP Business Suite components like SAP CRM or SRM?
18. What is Business Analytics?
19. When an ERP system does is considered as an 'Ideal ERP System'?
20. List out the common sub-systems of a HR Module of an ERP system.
21. What are the three general components of a supply chain?
22. Is the SAP HANA Enterprise Cloud (HEC) the only option for running HANA in the cloud?
23. What is 'Data Migration' process of an ERP system?
24. List out the steps involved in the maintenance of the ERP Systems.
25. Learn working of a free ware ERP suite.
26. What type of cloud offerings can be considered for classic SAP solutions?

IC -3912 Professional and Social Issues in IT

Unit I

Introduction to IT policy issues.

The Internet and the Web Freedom of expression: attempts to censor the Internet, filters, international issues, also the problem of spam.

Modern problems: Identity theft, cyberbullying, Internet addiction.

Unit II

Computer reliability, and errors and failures. Liability. Risks, importance of professionalism.

Cyber-Crime: Identity theft, malware, hackers, bots, etc.

Intellectual property issues. Who owns programs? Who owns the Web? Patent and copyright. Open source, GNU GPL/lesser GPL, Creative Commons, peculiar qualities of information goods, digital rights management - watermarking, usage tracking.

Unit III

Cybercommunities. Digital society. Democracy, access, diversity, issues of online identity

Practical and professional computer ethics. Codes of practice. Ethical programming..

Unit IV

Application of ethics in computing - case studies. DES, AES, RSA, and other cryptological products and protocols. Discussion of Public Key Infrastructure - trust models, key exchange, certificates.

Unit V

Social impacts of computing. Computers and work. Ethical and moral decisions of the past and future. Ethical issues for computing professionals.

1. Required Text(s)

Computers, Internet and New Technology Laws by kernika seth.
Cyber Law & Crimes by Barkha Bhasin, Rama Mohan Ukkalam

2. Essential References

Cyber Law Cyber Crime Internet and E-Commerce by Prof. Vimlendu Tayal.
Open Source and the Law by priti suri

3. Electronic Materials, Web Sites etc

http://www.ili.ac.in
http://www.legalindia.in/cyber-crimes-and-the-law
http://www.itlaw.in/

Formal and Informal Organization, Organizational division – Departments, Bases of Departmentation, Span of Management, Line and Staff conflicts, Definition of Staffing, System Approach to Staffing, Selection Process, Performance Appraisal, Career Strategy.

UNIT -III

Motivation and Leadership

Motivation, Theories of Motivation – Maslow's Need Hierarchy Theory, McGregor's Theory X and theory Y, Herzberg's two factor Theory, Leadership, Managerial Grid.

Controlling: The Basic Control process, Control as feedback System, Real Time Control.

UNIT IV

Introduction to Project Management

Project, Project Management, Role of the Project Manager, Project Phases and the Project Life Cycle, Context of Information Technology Projects, Project Selection, Preliminary Scope Statements, Project Scope Management, Project Time Management, Activity Resource and Duration Estimating, Schedule Development and Control, Project Cost Management, Cost Estimating, Cost Budgeting, Cost Control.

UNIT V

Project Quality Management, Quality Planning, Quality Assurance, Quality Control, Project Human Resource Management, Keys to Managing People, Human Resource Planning, Project Communication Management, Communication Planning, Information Distribution, Performance Reporting, Managing Stakeholders, Project Risk Management, Project Procurement Management, Planning Purchasing and Acquisitions, Planning Contracting, Requesting Seller Responses, Selecting Sellers, Administering the Contract, Closing the Contract.

Text Book(s):

1. R. D. Agarwal- Organization and Management -Tata McGraw Hill Publishing Company Ltd.
2. Harold Koontz Heinz Weihrich – Essentials of Management - Tata McGraw Hill Publishing Company Ltd.

Course Curriculum

M.Tech. (Computer Science)
M.Tech. (Information Architecture & Software Engineering)
M.Tech. (Network Management & Information Security)

2017-18

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School of Computer Science & IT, DAVV, Indore
Scheme for M.Tech. : 2017-18

M.Tech.(Computer Science) I

Sub. Code	Subject	L	T	P	C	Inter-nal	Practical/Project	End Sem	Total
CS-6516	Advanced Operating Systems	3	1	4	6	30	20	50	100
CS-5010	Advanced Computer Architecture	3	1	2	5	30	20	50	100
CS-6220	Internet Programming Using Java	3	1	4	6	30	20	50	100
CS-5413	Data Mining and Warehousing	3	1	4	6	30	20	50	100
CS-6221	Advanced Algorithm Design	3	1	4	6	30	20	50	100
CS-6809A	Comprehensive Viva				4				
Total					27				

M.Tech.(Computer Science) II

Sub. Code	Subject Name	L	T	P	C	Internal	Practical /Project	End Sem	Total
CS-6418	Advanced Database Management Systems	3	1	4	6	30	20	50	100
CS-6517	Advanced Compiler Design	3	1	2	5	30	20	50	100
CS-6518	Cloud Computing	3	1	2	5	30	20	50	100
CS-6711	Soft Computing	3	1	4	6	30	20	50	100
CS-6809B	**Comprehensive Viva**				4			100	100

M.Tech. (Network Management& Information Security) I

Sub. Code	Subject	L	T	P	C	Inter-nal	Practical/Project	End Sem	Total
CS-5615	Information Security	3	1	2	5	30	20	50	100
CS-6220	Internet Programming Using Java	3	1	4	6	30	20	50	100
CS-6622	Advanced Computer Network	3	1	2	5	30	20	50	100
CS-6624	Network Management	3	1	4	6	30	20	50	100
	Elective-I								100
CS-6809A	Comprehensive Viva				4				

Elective-I may be opted from any one of the optional subjects specified in list I of Electives for M.Tech. (NM) Sem I. Total credits in every semester should be >=26

List I of Electives for M.Tech.(Network Management) Semester I

Sub. Code	Subject	L	T	P	C	Inter-nal	Practical/ Project	End Sem	Total
CS-6516	Advanced Operating Systems	2	1	2	4	30	20	50	100
CS-5413	Data Mining and Warehousing	3	1	2	5	30	20	50	100
CS-6221	Advanced Algorithm Design	3	1	4	6	30	20	50	100

M.Tech. (Network Management& Information Security) II

Sub. Code	Subject Name	L	T	P	C	Internal	Practical /Project	End Sem	Total
CS-6628	Legal Aspects of Information Security	3	1	0	4	40	-	60	100
CS-5618	Network Security	3	1	2	5	30	20	50	100
CS-6623	Mobile & Wireless Systems	3	1	2	5	30	20	50	100
CS-6518	Cloud Computing	3	1	2	5	30	20	50	100
CS-6630	Internet of Things	3	1	4	6	30	20	50	100

CS-6809B	**Comprehensive Viva**				4			100	100

M.Tech. (Information Architecture & Software Engineering) I

Sub. Code	Subject	L	T	P	C	Inter-nal	Practical/Project	End Sem	Total
CS-7314	Information Architecture	3	1	2	5	30	20	50	100
CS-6315	Advanced Software Engineering	3	1	4	6	30	20	50	100
CS-6316	Information System Design	3	1	2	5	30	20	50	100
CS-6220	Internet Programming Using Java	3	1	4	6	30	20	50	100
	Elective-I								100
CS-6809A	Comprehensive Viva				**4**				

Elective-I may be opted from any one of the optional subjects specified in list I for M. Tech. (SE&IA) Sem I . Total credits in every semester should be >=26.

List I of Electives for M.Tech.(SE&IA) Semester I

Sub. Code	Subject	L	T	P	C	Inter-nal	Practical/Project	End Sem	Total
CS-5413	Data Mining and Warehousing	3	1	4	6	30	20	50	100
CS-6221	Advanced Algorithm Design	3	1	4	6	30	20	50	100
CS-6516	Advanced Operating Systems	3	1	4	6	30	20	50	100

M.Tech. (Information Architecture & Software Engineering) II

Sub. Code	Subject Name	L	T	P	C	Internal	Practical /Project	End Sem	Total
CS - 6313	Software Testing & Quality Assurance	3	1	2	5	30	20	50	100
CS-6418	Advanced Database Management Systems	3	1	2	5	30	20	50	100

CS-6316	Software Reuse & Customization	3	1	2	5	30	20	50	100
CS-6712	Data Science	3	1	2	5	30	20	50	100
CS-6518	Cloud Computing	3	1	2	5	30	20	50	100
CS-6809B	**Comprehensive Viva**				4			100	100

M. Tech . (CS/NM/SE) – I Semester

CS-6516: Advance Operating System

1. **Review of Operating System Concepts**: Process management, Synchronization, Interprocess Communication techniques, Processor Scheduling, Memory Management, Device Management, File System etc.
   Limitations of centralized and uniprocessor operating systems. Need of advance operating systems, Types of advance operating systems.
2. **Distributed Systems**: Difference between network and distributed operating systems, Design objectives and features of distributed operating systems, Distributed systems architectures, distributed system software, and distributed operating systems.
3. **Resource Management in distributed Computing:**
   (i) Distributed Scheduling, process management, process migration
   (ii) Distributed Shared Memory
   (iii) Distributed File System: File caching, replication management, Naming of resources, name resolution process.
4. **Process management in distributed operating systems**: Process synchronization and IPC, RPC, Clock synchronization, mutual exclusion, deadlock handling, security aspects, case studies.
5. **Multiprocessor systems**: Multiprocessor architecture, multiprocessor Operating systems, process synchronization and IPC, processor scheduling, memory management.
6. **Database Systems' support**: Need of OS support for databases, concurrency control in database systems.

Recommended Books:

[i] Distributed Operating Systems (Concept and Esign), II Edition, P. K. Sinha, PHI, 1997.
[ii] Advance Concepts in Operating Systems, Mukesh SInghal, Niranjan G. Shivratri, Mc GRaw Hills, 1994.
[iii] Modern Operating Systems(III Edition) , Andrew S. Tanenbomb, Pearson.
[iv] Distributed Systems (Concept and Design), II Edition, GEprge Couloris, Jean Dollimore and Tim Kindberg, Addison-Wesley, 1994.

CS-6622 Advanced Computer Network

Unit 1

Review of Basic Network Architectures: OSI reference model, TCP/IP reference model, ATM reference model; Applications (WWW, Audio/Video Streaming, Video conference, Networked Games, Client/Server); Traffic Characterization (CBR, VBR); Switching Paradigms; Multiplexing; Error Control; Flow Control, SONET, Optical Networks.

Unit 2

Local Area Network Technologies: Wired LANS: Ethernet Protocol, Fast Ethernet, Gigabit Ethernet, Wireless LANs, IEEE 802.11 Project, Bluetooth, Connecting LANs.

Unit 3

Internetworking: Interdomain Routing, Border Gateway Protocol version 4, IPv6, Multicast Routing Protocols, Multi-Protocol Label Switching, Virtual Private Networks, High speed transport protocols, Quality of Service Mechanisms, Improving QoS in Internet.

Unit 4

Distributed Systems: Naming, DNS, DDNS, Paradigms for Communication in Internet, Caching, Issues of Scaling in Internet and Distributed Systems, Caching Techniques for Web, Protocols to Support Streaming Media, Multimedia Transport Protocols, Content Delivery Networks, Overlay and P2P Networks.

Unit 5

Applications and Other Networking Technologies: RTP, RTSP, SIP, VoIP, Security Systems, SSH, PGP, TLS, IPSEC, DDoS Attack, Mitigation in Internet, Security in MPLS; Introduction to Cellular, Satellite and Ad hoc Networks.

Recommended Books:
Main Reading:

1. Behrouz A. Forouzan, Data Communications and Networking, Fourth Ed., Tata McGraw Hill
2. Larry L. Peterson and Bruce S. Davie, Computer Networks: A Systems Approach, Fourth Ed., Morgan Kaufmann
3. Jean Walrand and Pravin Varaiya, High performance Communication Networking, 2nd Ed., Morgan Kaufmann, 1999.
4. Markus Hoffmann and Leland R. Beaumont, Content Networking: Architecture, Protocols, and Practice, Morgan Kaufmann, 2005.

CS-5010 Advanced Computer Architecture

Unit I

Review: Pipeline, Performance, Cache, Virtual Memory ,Review: Moore's Law, Cost.

Unit II

Caches and Memory systems ,Memory Systems continued ,Storage: Disks, Tapes, RAID ,Storage: Benchmarks, Examples

Unit III

Multiprocessors: motivation, classification, apps Multiprocessors: Snooping Protocol, Directory Protocol, Synchronization, Consistency Multiprocessors: Measurements, Crosscutting Issues, Examples, Fallacies & Pitfalls

Unit IV

Instruction Set: Vector, Dynamic Pipeline: Tomasulo, Reorder Buffers, Dynamic Pipeline: Branch prediction, ILP limits, Dynamic Wrap-up: Examples and SMT

Unit V

Static Pipeline : VLIW, static branch prediction, IA-64 ,Static Pipeline Wrap-up:

Textbook: J. L. Hennessy and D. A. Patterson, *Computer Architecture: A Quantitative Approach* 4th Edition, Morgan Kaufmann Publishers

CS-5413 Data Mining & Data Warehousing

UNIT I

Fundamentals of data mining, Data Mining definitions, KDD vs Data Mining, Data Mining Functionalities, From Data Warehousing to Data Mining, DBMS vs DM, Issues and challenges in Data Mining. Data Mining Primitives, Data Mining Query Languages. Data Mining applications-Case studies.

UNIT II

Association rules: Methods to discover association rules. Various algorithms to discover association rules like A Priori Algorithm. Partition, Pincer search, Dynamic Item set Counting Algorithm etc. Cluster Analysis Introduction: Types of Data in Cluster Analysis, A Categorization of Major Clustering Methods, Partitioning Algorithms, Hierarchical and Categorical clustering, Classification methods, Decision Trees, Neural networks, Genetic Algorithm.

UNIT III

Web Mining, Web content mining, Web Structure mining, Text mining.,Temporal Data Mining, Spatial Data Mining, Data Mining tools.

UNIT IV

Introduction: Data Warehouse, Evolution, Definition, Very large database, Application, Multidimensional Data Model, OLTP vs Data Warehouse, 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, Components of metadata.

UNIT V

Warehouse Schema, Schema Design, Database Design, Dimension Tables, Fact Table, Star Schema, Snowflake schema, Fact Constellation, De-normalization, Data Partitioning, Data Warehouse and Data Marts. SQL Extensions, PL/SQL. 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, Data Warehouse Tools.

Text Book(s) :

1. Data Mining Techniques – Arun K Pujari, University Press,4th edition
2. The Data Warehouse Life cycle Tool kit – Ralph Kimball Wiley Student Edition, 2nd Edition.

Reference Book(s):

1. Data Mining – Concepts and Techniques - Jiawei Han & Micheline Kamber, Harcourt India. 2nd Edition.
2. Building the Data Warehouse- W. H. Inmon, Wiley Dreamtech India Pvt. Ltd, 3rd Edition.
3. Data Warehousing in the Real World – SAM ANAHORY & DENNIS MURRAY. Pearson Education, 1st Edition.
4. Data Warehousing Fundamentals – Paulraj Ponnaiah, Wiley Student Edition, 2nd Edition.
5. Data Mining Introductory and advanced topics –Margaret H Dunham, Pearson Education, 3rd Edition.

CS-6221 Advanced Algorithm Design

(Introduced in Jul-Dec, 2017)

Unit 1 Order Analysis: Objectives of time analysis of algorithms; Big-oh and Theta notations. Master Theorem and its proof, solution of divide and conquer recurrence relations. Searching, Sorting and Divide and Conquer Strategy: Linear Search, Binary Search

Unit 2: Searching, Sorting and Divide and Conquer Strategy: Merge - sort; Quick - sort with average case analysis. Heaps and heap - sort. Lower bound on comparison - based sorting and Counting sort. Dynamic Programming: methodology and examples (Fibonaci numbers, Knapsack problem and some other simple examples) Dynamic Programming: Longest integer subsequence, Longest common subsequence, Weighted interval scheduling.

Unit 3 Greedy Method: Methodology, examples (lecture Scheduling, process scheduling) and comparison with DP (more examples to come later in graph algorithms) Greedy Method: Knapsack problem and some other simple examples. Graph Algorithms: Basics of graphs and their representations. BFS. DFS. Topological sorting.

Unit 4 Minimum spanning trees (Kruskal and Prim'salgorithms and brief discussions of disjoint set and Fibonacci heap data structures). Shortest Paths (Dijkstra, Bellman - Ford, Floyd - Warshall). Hard problems and approximation algorithms. Problem classes P, NP, NP - hard and NP - complete, deterministic and nondeterministic polynomial - time algorithms, Approximation algorithms for some NP - complete problems

Unit 5 Backtracking, Branch and Bound technique, String Matching, Naive algorithm, KMP algorithm, Parallel Algorithms

Text Book: Cormen, Leiserson, and Rivest. Algorithms, MIT Press 2011

CS-6220 Internet Programming Using Java

(Introduced in Jul-Dec, 2017)

UNIT-I

Review of java concepts: Features of Java, Object-oriented programming overview, Introduction of Java Technologies, How to write simple Java programs, Data Types, Variables, Memory concepts, control statements, looping, Method Call Stack and Activation Record, Argument Promotion and Casting, Scope of declaration and Method Overloading, String Handling: The String constructors, String operators, Character Exaction, String comparison, String Buffer. Arrays: Declaring and Creating Arrays, Enhanced for Statement, Passing Arrays to Method, Multidimensional Arrays, Variable-Length Argument lists, Using Command-line Arguments,

UNIT-II

Inheritance: Extending classes & related things. Packages and Interfaces: Defining a Package, Understanding CLASSPATH, Access Protection, Importing packages, creating own packages

Exception Handling: Introduction, overview of doing it and keywords used, when to use it, Multithreading: What are threads, The java thread model, Thread priorities, Thread life cycle, Thread Synchronization, Applets: Applet basics, Applet Architecture, Applet life cycle methods, Database connectivity: JDBC, The design of JDBC, Typical uses of JDBC,

UNIT-III

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

UNIT-IV

JSP Basics: JSP lifecycle, Directives, scripting elements, standard actions, implicit objects. Connection of JSP and Servlet with different database viz. Oracle, MS-SQL Server, MySQL. java.sql Package. Querying a database, adding records, deleting records, modifying records, types of Statement. Separating Business Logic and Presentation Logic, Building and using JavaBean. Session handling in JSP, Types of errors and exceptions handling..

UNIT-V

MVC Architecture

Introduction to Remote Method Invocation, Introduction to Enterprise Java Bean, Types of EJB, Creating and working with Session Bean,

Text Books:

1. Java 2: The Complete Reference by Herbert Schildt, Tata McGraw- Hill, 8th Edition, 2011.

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

Reference Books:

1. The Java Programming Language, Ken Arnold , James Gosling , David Holmes, 3rd Edition, Person Education, 2000.
2. Head First Java, Kathy Sierra, Bert Bates, O'Reilly Publication, 2nd Edition, 2005
3. M. Hall, L. Brown, "Core Servlets and Java Server Pages", 2nd edition, Pearson Education
4. G. Franciscus, "Struts Recipes", Manning Press
5. C. Bauer, G. King, "Hibernate in Action", Manning Press
6. B. Basham, K. Sierra, B. Bates, "Head First Servlet and JSP", 2nd Edition, O'Reilly Media.

CS-5615 INFORMATION SECURITY

UNIT I

A Definition of Computer Security, The Challenges of Computer Security, **The OSI Security Architecture**. **Security Attacks (**Passive Attacks, Active Attacks**).**
Security Services (Authentication, Access Control, Data Confidentiality, Data Integrity, Nonrepudiation, Availability Service**). Security Mechanisms, Model for Network Security (** Bell LaPadula, Biba, Clark Wilson, Chinese wall, Role based, Object oriented, Resource allocation monitor models).

UNIT II

Symmetric Encryption Principle (Cryptography, Cryptanalysis, Feistel Cipher structure)
Symmetric Block Encryption Algorithms (Data Encryption Standard, Triple DES, Advanced Encryption Standard). **Stream Ciphers and RC4** (Stream Cipher Structure, The RC4 Algorithm). **Cipher Block Modes of Operation (**Electronic Codebook Mode, Cipher Block Chaining Mode, Cipher Feedback Mode, Counter Mode).

UNIT III

Approaches to Message Authentication (Authentication Using Conventional Encryption, Message Authentication without Message Encryption). **Secure Hash Functions (**Hash Function Requirements, Security of Hash Functions, Simple Hash Functions, The SHA Secure Hash Function). **Message Authentication Codes (** HMAC , MACs Based on Block Ciphers). **Public-Key Cryptography Principles** (Public-Key Encryption Structure, Applications for Public-Key Cryptosystems, Requirements for Public-Key Cryptography) . **Public-Key Cryptography Algorithms** (The RSA Public-Key Encryption Algorithm, Diffie-Hellman Key Exchange, Other Public-Key Cryptography Algorithms). **Digital Signatures.**

UNIT IV

Secure sockets – IPsec overview – IP security architecture – IPsec-Internet Key Exchanging(IKE) – IKE phases – encoding – Internet security – Threats to privacy – Packet.
sniffing – Spoofing - Real Time communication security – Security standards– Kerberos.X.509AuthenticationService**.**

UNIT V

IEEE 802.11 Wireless LAN Overview(The Wi-Fi Alliance, IEEE 802 Protocol Architecture, IEEE 802.11 Network Components and Architectural Model, IEEE 802.11 Services). **. IEEE 802.11i Wireless LAN Security** (IEEE 802.11i Services, IEEE 802.11i Phases of Operation, Discovery Phase, Authentication Phase, Key Management Phase, Protected Data Transfer Phase, The IEEE 802.11i Pseudorandom Function). **Wireless Application Protocol Overview**(Operational Overview, Wireless Markup Language, WAP Architecture, Wireless Application Environment, WAP Protocol Architecture**). Wireless Transport Layer Security** (WTLS Sessions and Connections, WTLS Protocol Architecture, Cryptographic Algorithms **), WAP End-to-End Security**.

References

1. W. Stallings, Cryptography and Network Security Principles and practice, 3/e, Pearson Education Asia, 2003.
2. Charlie Kaufman, Radia Perlman and Mike Speciner, "Network Security: Private Communication in a public world", Prentice Hall India, 2nd Edition, 2002.
3. Charles P. Pleeger, "Security in Computing", Pearson Education Asia, 5th Edition, 2001.
4. William Stallings, "Network Security Essentials: Applications and standards", Person Education Asia, 2000.
5. W. Mao, Modern Cryptography: Theory & Practice, Pearson Education, 2004

CS-6624 Network Management

Introduction:- Computer Network, Goals and Applications, Data Communications and Network Management Overview : Communications protocols and Standards. Case Histories of Networking and Management, Network Management: Goals, Organization, and Functions, Network and System Management, Network Management System Platform, Current Status and future of Network Management.

Fundamentals of computer network technology: Network Topology, LANs. Network node components Hubs, Bridges, Routers, Gateways, Switches, WAN, ISDN Transmission Technology. Network Management Standards, Network Management Model, Organization Model, Information Model, Communication Model, ASN.1, Encoding Structure.

SNMPV1 Network Management: Managed network: Case Histories and Examples, The History of SNMP Management. The SNMP Model, The Organization Model, System Overview. The Information Model, The SNMP Communication Model, Functional Model.

SNMP Management: SNMPv2: Major Changes in SNMPv2, SNMPv2 System Architecture, SNMPv2 Structure of Management Information. The SNMPv2 Management Information Base, SNMPv2 Protocol, Compatibility With SNMPv1.

SNMP Management- RMON: Introduction, RMON SMI and MIB, RMON1.

Broadband Network Management-ATM Networks: Broadband Networks and Services, ATM Technology, ATM Network Management.

Broadband Network Management: Broadband Access Networks and Technologies, HFC Technology, HFC Management, DSL Technology, ADSL Technology, ADSL Management.

Telecommunication Management Network: Introduction, Operations Systems, TMN conceptual Model, TMN Architecture, TMN Management Service Architecture, An integrated view of TMN.

Network Management Tools and Systems: Network Management Tools, Network Statistics Measurement Systems, History of Enterprise Management. Network Management systems, Commercial Network management Systems, System Management, Enterprise Management Solutions.

Network Management Applications: Configuration management, Fault management, performance management. Event Correlation Techniques, security Management, Accounting management, Report Management, Policy Based Management Service Level Management.

1. Required Text(s)

- Network Management, Principles and Practice, Mani Subrahmanian, Pearson Education.

2. Essential References

- Network management, Morris, Pearson Education.
- Principles of Network System Administration, Mark Burges, Wiley Dreamtech.
- Distributed Network Management, Paul, John Wiley.
- Computer Networks, Andrew S. Tanenbaum, Addison-Wesley, 4th Ed.
-

3- Recommended Books and Reference Material (Journals, Reports, etc) (Attach List)

- Data Communications and Networking, B.A. Forouzan, McGraw-Hill.
- Data and Computer Communications : W.Stallings, , Prentice-Hall, 5th Ed., 1997.
- Computer Networking : James F. Kurore & Keith W. Rose , Pearson Education, Third Edition, 2005.
- Communication Networks : Fundamentals Concepts and Key Architecture : Alberto Leon-Garcia and Indra Widjaja, , Tata McGraw-Hill Publishing Company Limited, ISBN 0-07-0402235-3.
- Data and Network Communication : Michael A. Miller, Delmar Thomson Learning inc. ISBN 0-07668-1100-X.
- Introduction to Computer Networks : Douglas E. Comer , Prentice-Hall.
- Alberto Leon-Garcia and Indra Widjaja, Communication Networks –Fundamentals Concepts and Key Architecture , Tata McGraw-Hill Publishing Company Limited, ISBN 0-07-0402235-3

CS 7314 Information Architecture

Aim This course is designed to help students acquire an understanding of information architecture, principles and concepts of designing effective architecture. The course also offers an easy understanding of The Open Group Architecture Framework.

Unit 1 Introduction to Information Architecture: Principles of information architecture, role of information architect, areas of information architecture, types of architecture, system architecture, enterprise architecture, application architecture, internet architecture, research and practice in information architecture.

Unit 2 Organizing information: Organizing information, organizational challenges, organizing websites and intranets, creating cohesive organization system, organizing WWW, browser navigation features, building context, improving flexibility, types of navigation systems, integrated navigation elements, remote navigation elements, designing elegant navigation systems

Unit 3 Labeling Systems: Labeling systems, not labels, types of labeling systems, creating effective labeling systems, fine-tuning the labeling system, non-representational labeling systems, double challenge, searching website, website understanding how users search, designing the search interface, reference interview, indexing the right stuff, search or not to search.

Unit 4 Research: Getting started, defining goals, learning about the intended audiences, identifying content and function requirements, grouping content, archipelagos of information, architectural page mock-ups, design sketches, web-based prototypes,
Case Study: Henry Ford Health System.

Unit 5 The Open Group Architecture Framework: Introduction to TOGAF 9, TOGAF 9 management overview, TOGAF 9 components, introduction to ADM, ADM phases, ADM deliverables, enterprise continuum, architecture repository, architecture governance, views and view points, architecture building blocks.

Text Book(s)

1. Information Architecture on the World Wide Web, First Edition, Peter Morville.

Reference Books

1. TOGAF Version 9 – The Open Group Architecture Framework. Publisher – The Open Group.
2. TOGAF – Quick start guide for Enterprise Architect, Wolfgang Keller.

CS-4407: Information System Design

Unit-I **No. of Hrs: 8**

Introduction, Elements of Information System Design, Software Processes, Project planning & Estimation, Risk analysis, Roles and responsibilities in IS Design, Case Study.

Unit-II **No. of Hrs: 8**

Information System Design Models, A comparative study of Information System design models such as SDLC, Prototyping, Spiral, Iterative, Time-boxing, RAD model, CBD approach, Agile development and RUP model. Requirement engineering process: Requirement analysis, Requirement Specification, Requirement Validation and Requirement Management.

Unit-III **No. of Hrs: 8**

Information systems design Methodologies - Structured approach and Object-oriented approach, CASE tools. Software Architecture: Why software architecture is important? Architectural styles, architectural decisions, Architectural design and documentation.

Unit-IV **No. of Hrs: 8**

Fundamentals of Information System Testing, Testing strategies, Levels of Testing, Debugging approaches. Software Change & Evolution, Software Maintenance, Maintenance Process Models Reengineering Process.

Unit-V **No. of Hrs: 8**

Case studies: Software Reuse, Software Repositories, Service Oriented Software Engineering, Client Server Software Engineering, Aspect Oriented design, Usability engineering, Model Driven Software Engineering.

Text Books:

1. *Introduction to Information System,* **O'Brain,** Printice Hall, 1997.
2. *Software Engineering: Concepts & Practices*- **Ugrasen Suman**, *Cengage Learning publications, 2013*.
3. *Fundamentals of Software Engineering*- **Rajib Mall**, Pearson Education. Third Edition 2012.

Assignments:

1. Students have to select a project to trace the activities of information system design.
2. Chapter wise selected exercises will assigned from Text Book 2 and 3.

M.Tech. (CS/NM/SE) - II Semester

CS 6418 Advanced Database Management System

Unit I

Database: Overview of database design, introduction to Relational model and its queries, review of SQL, review of computer networks.

Unit II

Distributed Databases: features of distributed database, Study of reference architectures for DDBMS, Comparison of Homogeneous and Heterogeneous Databases, fragmentation, distribution transparency for read-only and update applications.

Unit III

Distributed database design: a framework for distributed database design, the design of database fragmentation, the allocation of fragmentation. Overview of Transaction processing and concurrency control

Unit IV

The management of distributed Transactions: a framework for transaction management, supporting atomicity of distributed transactions, concurrency control for distributed transactions, architectural aspects of distributed transactions. Concurrency control and reliability.

Unit V

Query processing, query optimization, database security: Security and integrity threats, Defence mechanisms, Statistical database auditing & control. Security issue based on granting/revoking of privileges, Introduction to statistical database security. PL/SQL Security – Locks – Implicit locking, types and levels of locks, explicit locking, Oracles' named Exception Handlers.

Recommended Books:

Date C. J., An Introduction to Database Systems, Addison Wesley Longman (8th Ed), 2003.
Silberschatz A., Korth H., and Sudarshan S., Database System Concepts, McGraw - Hill (6th Ed), 2010.
Stefano Ceri., Giuseppe Pelagatti., Distributed databases principles & systems, McGraw – Hill.
M. Tamer Ozsu., Patrick Valduriez., Principle Of Distributed Database System, Springer(3rd Ed.)

CS-6517 Advanced Compiler Design

Unit I

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 II

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. Canonical LR and LALR parsing tables.

Unit III

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 IV

Definition of basic block control flow 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 V
Issues in design of code generator, A simple code generator, Code generation from DAG. Code Optimization.

Text Book:
1. Aho-Ullman, Principles of Compiler Design, Narosa Publishing House.
Reference Book(s):
1. Aho-Ullman, Compilers: Principles Techniques & Tools, Addison Wesley.
2. Dhamdhere, Compiler Construction.

CS-6518 Cloud Computing

COURSE TOPICS:

- Enabling Technologies and System Models for Cloud Computing (2 Lectures)
- Introduction to Cloud Computing including benefits, challenges, and risks(2 Lectures)
- Cloud Computing Models including Infrastructure/Platform/Software as-a-service (4 Lectures)
- Public cloud, private cloud and hybrid clouds(2 Lectures)
- Cloud OS(4 Lectures)
- Cloud Architectures including Federated Clouds(4Lectures)
- Scalability, Performance, QoS (2 Lectures)
- Data centers for Cloud Computing(2 Lexctures)
- Principles of Virtualization platforms(2 Lectures)
- Security and Privacy issues in the Cloud(2 Lectures)
- Energy Efficient and Green Cloud Computing (4 Lectures)
- Capacity Planning (4 Lectures)
- Disaster Recovery in Cloud Computing(2 Lecurtres)
- Research Issues in Cloud Computing(2 Lectures)
- Case Study CloudSim Simulator(4 Lectures)
- Case Study Hadoop, HDFS and MapReduce(10 Lectures)

Recommended Books;

- Cloud Compute Bible: Barrie Sosinsky, Wiley India Pvt Ltd.,2010
- *Cloud Computing: Principles and Paradigms*, Editors: Rajkumar Buyya, James Broberg, Andrzej M. Goscinski, *Wile*, 2011
- *Cloud Computing: Principles, Systems and Applications, Editors:* Nikos Antonopoulos, Lee Gillam, *Springer*, 2012
- *Cloud Security: A Comprehensive Guide to Secure Cloud Computing,* Ronald L. Krutz, Russell Dean Vines, *Wiley-India,* 2011
- Distributed and Cloud Computing, 1st edition, Morgan Kaufmann, 2011.
- *Cloud Computing: Principles, Systems and Applications, Editors:* Nikos Antonopoulos, Lee Gillam, *Springer*, 2012

CS-6628 Legal Aspects of Information Security

Cyber World: An Overview: The internet and online resources, Security of information, Digital signature.

An Overview of Cyber Law: Introduction about the cyber space , Regulation of cyber space – introducing cyber law, UNCITRAL Model Law on Electronics Commerce 1996

Understanding Cyber Crimes: Defining Crime, Crime in context of Internet –Actus Rea/Mens Rea, Types of crime in Internet, Computing damage in Internet crime.

Indian Penal Law & Cyber Crimes: Fraud, Hacking, Mischief, Tresspass, Defamation, Stalking, Spam.

Case #1: Study various cases relate to Phishing in people's account and write a report.

Obscenity: Internet and Potential of Obscenity, Indian Law on Obscenity & Pornography, Technical and Legal solutions, International efforts, Changes in Indian Law ,Search and Seizure powers,Digital Forgery.

Case #2: Study Section 67,67A,67B,69A,69A and 69B related case study

Freedom of Speech & Human Rights Issues in Internet : Freedom of Expression in Internet, Issues of Censorship ,Hate speech, Sedition, Libel, Subversion, Privacy Issues, International Positions on Free Speech in Internet.

Contract in the InfoTech world

Understanding Electronic Contracts: The Indian Law of Contract, Construction of Electronic Contracts, Issues of Security Issues of Privacy Technical Issues in Cyber Contracts.

Assignment: Write a contact policy b/w Your IT company and Client.

Types of Electronic Contracts : Employment Contracts Consultant Agreements Contractor Agreements Sales, Re-Seller and Distributor Agreements Non-Disclosure Agreements , Software Development & Licensing Agreements Shrink Wrap Contract ,Source Code Escrow Agreements.

Cyber Contracts & Indian Legal Position: Legal Issues in Cyber Contracts, Cyber Contract and IT Act 2000, Indian Law on Shrink Wrap/ Click wrap Contracts Drafting of Cyber Contracts.

E-Commerce & Taxation

E-Commerce - Salient Features : On-line contracts, Mail Box rule, Privity of Contracts, Jurisdiction issues in E-Commerce, Electronic Data Interchange

Security and Evidence in E-Commerce : Dual Key Encryption ,Digital Signatures, Security issues in E-Commerce , Evidence related issues ,UNCITRAL model law of E-Commerce, Indian Legal Position on E- Commerce, IT Act 2000/Indian Evidence Act/ Draft law on E-Commerce.

Taxation Issues in Cyber Space : Indian Tax System, Transactions in E- Commerce, Taxing Internet Commerce, Indirect Taxes, Tax evasion in Cyber space

International Taxation in E-Commerce : Understanding International Taxation, Fixed place vs. Website, Permanent Establishments, Double Taxation, Role of ISPs, OECD initiatives in International Taxation.

Impact of Technology on Law

Understanding Copy Right in Information Technology: Understanding the technology of Software, Software - Copyrights vs. Patents debate, Authorship and Assignment Issues, Commissioned Work and Work for Hire, Idea/Expression dichotomy, Copyright in Internet.

Legal Issues in Internet and Software Copyright: Jurisdiction Issues and Copyright, Infringement, Remedies of Infringement, Multimedia and Copyright issues, Software Piracy.

Assignment : Write a Content uses copywrite policy for your open source software.

Patents: Understanding Patents, International context of Patents, European Position on Computer related Patents, Legal position of U.S. on Computer related Patents and Indian Position on Computer related Patents.

Trademarks: Understanding Trademarks, Trademark Law in India, Infringement and Passing Off, Trademarks in Internet, Domain name registration, Domain Name Disputes & WIPO.

Practical on Information Security Tools: Nmap,SARA

Databases: Databases in Information Technology, Protection of Databases, Legal Position of Database protection in U.S., European Legal position on Databases, Indian Law on Databases, Sui Generis Extraction Right**.**

Practical on Information Security Tools: CyberCheck 4.0

1.Required Text(s) :

1. Vivek Sood, Cyber law Simplified ,Tata Mcgraw-Hill Publishing(2001).
2. Chris Reed and john Angel, Cyber law(2007)
3. Sudhir Naib, The Information Technology Act, 2005: A Handbook, OUP, New York, (2011)
4. S. R. Bhansali, Information Technology Act, 2000, University Book House Pvt. Ltd.

2. Essential References:

1. The Information Technology Act,2000.
2 .Information Technology Law and practices by Vakulsharma.
3. Computers, Internet and New Technology Laws (A comprehensive reference work with a special focus on developments in India)" By: Karnika Seth.
4. Cyber Law & Crimes By: BarkhaBhasin, Rama Mohan Ukkalam.

3. Electronic Materials, Web Sites:

i) http://www.cyberlawsindia.net
ii) http://www.madaan.com/cyberlaw.html

Network Security (CS-5618)

Aim:

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.

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

Outcomes:
1. Develop strategies to protect organization information assets from common attacks.
2. Understand how security policies, standards and practices are developed.
3. Identify the major techniques, approaches and tools used to discover network and system vulnerabilities.
4. To be exposed to original research in Network Security.

References:

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, ISBN-13: 978-01323907744.
3. Ulysess Black, "Internet Security Protocols: Protecting IP Traffic", Prentice Hall PTR; 1st edition, 2000, ISBN-10: 0130142492, ISBN-13: 978-0130142498.
4. Amir Ranjbar 2007, CCNP ONT Official Exam Certification Guide, Cisco Press [ISBN: 978-1-58720-176-3].
5. Luc De Ghein 2006, MPLS Fundamentals, 1st Ed. Ed., Cisco Press [ISBN: 978-1- 58705-197-5]
6. William Stallings, "Cryptography and Network Security", Pearson Education, 6th Edition, 2013,ISBN 10: 0133354695.

CS-6623 Mobile and Wireless Systems

UNIT I

Overview of the emerging fields of mobile computing; Historical perspectives (mainly from the perspective of radio), Mobile applications, Limitations, Health Concerns, Cordless phone, Land mobile vs. Satellite vs. In-building communications systems, Frequencies for radio transmission. Characteristics of Cellular Systems, Mobility support in cellular telephone networks, Personal Communications Systems/Personal Communications Networks, Wireless Personal Area Network, Wireless Local Area Network and Internet Access. Mobility management, Security, Cellular telephony as a case study in network support: hand-off, mobility, roaming, billing/authorization/authentication.

UNIT II

Mobile communication: Fibre or wire based transmission, Wireless Transmission - Frequencies, Signals, Antennas and Signal Propagation, Modulation Techniques, Multiplexing techniques, Coding techniques.

Cellular structure, Voice Oriented Data Communication - GSM, CDMA, GSM Architecture, Authentication & security, frequency hopping, Speech coding, Data communication with PCs, Wireless web browsing, Testing cellular Systems Speech coding.

UNIT III

Satellite Systems: History, Application, and Basics of Satellite Systems: LEO, MEO, GEO, Routing, Handover, VSAT, installation & Configuration. Cyclic repetition of data, Digital Audio Video Broadcasting, Multimedia object tran-sfer Protocol, Wireless LAN topologies, requirements. Physical layer, MAC sublayer, IEEE802.11.HIPERLAN: Protocol architecture, layers, Information bases and networking, Bluetooth.

UNIT IV

Basics of Discrete Event Simulation, Application and Experimentation, Simulation models. Case Study on Performance Evolution of IEEE 802.11 WLAN configuration using Simulation, MobileIP, goals, assumptions requirements, entities and terminology, IP packet delivery, tunnelling

and encapsulation, Feature and format of IPv6, DHCP, TCP over Wireless. Characteristic of Ad Hoc networks, Applications, need for routing, routing classification, Wireless sensor networks, classification and Fundamentals of MAC protocol for wireless sensor networks.

UNIT V

Economics Benefits of Wireless Networks, Wireless Data Forecast, Charging issues, Role of Government, Infrastructure manufacturer, Enabling Applications Mobile operating System, file system, Process, Task, Thread, ISR and IST, CODA, HTTP versus HTML, WML, XML application for wireless handheld devices. UWB systems Characteristics, Current approaches for security.

Text Book(s):

1. Mobile Communications author Jochen Schiller, publication John Willy & Sons, Ltd.

Reference Book(s):

1. Wireless And Mobile Systems,D. P. Agrawal,Qing-An zeng, Thomson publication.
2. Wireless Networks, P Nicopotidis, Addision –Wesley-An zeng publication

CS-6630 Internet of Things

(Introduced in Jan-May, 2018)

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 IoT, Advantages and Disadvantages of IoT.
Machine-to-Machine Communication: Definition, How M2M relates to 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 (CoAP), 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 IoT, IoT Privacy, Security and Vulnerabilities Issues and Solutions, Prototyping and designing the software for IoT 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 BOOKS:

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 BOOKS:

1. Jan Holler, Vlasios Tsiatsis, Catherine Mulligan, Stefan Avesand, Stamatis Karnouskos, David Boyle, "From Machine-to-Machine to the Internet of Things: Introduction to a New Age of Intelligence", 1st Edition, Academic Press, 2014.
2. Dr. Ovidiu Vermesan, Dr. Peter Friess, "Internet of Things: Converging Technologies for Smart Environments and Integrated Ecosystems", River Publishers , 2014
3. Jean-Philippe Vasseur, Adam Dunkels, Morgan Kuffmann, "Interconnecting Smart Objects with IP: The Next Internet"
4. Michael Miller, "The Internet of Things", Pearson Education, 2015.
5. Vijay Madisetti , Arshdeep Bahga, " Internet of Things (A Hands-on-Approach)", Universities Press, 2015, ISBN: 9788173719547
6. Tanenbaum, Andrew S, "Computer Networks", Pearson Education Pte. Ltd., Delhi, 4 th Edition
7. Barrie Sosinsky, "Cloud Computing Bible", Wiley-India, 2010
8. Charalampos Doukas, "Building Internet of Things with the Arduino"
9. Tom Igoe, "Making Things Talk Using Sensors, Networks, and Arduino to see, hear, and feel your world" (Second Edition)

CS-6313 Software Testing & Quality Assurance

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

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

Configuration and Compatibility testing: Isolating configuration bugs, identifying requirements of hardware, software and network, Identifying platform and application versions, backward and forward compatibility, Data sharing compatibility
Foreign Language testing: Translation issues, ASCII, EBCDIC, Hotkeys and shortcuts, extended characters, computation on characters, localisation, compatibility and configurability issues

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 Winrunner and Rational ROBO. 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

Usability Engineering
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.
Capability Maturity Model

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.

Essential References:

1. Software testing Ron Patton SAMS Publishing
2. CMM Level 5 unleashed'

Recommended Book(s)

1. Effective methods of software testing' Wiley Publishers, William E. Perry

Electronic Materials, Web Sites:

1. CMM Level 5 and Carnegie Mellon University Site reference material on aspects of software quality

CS- 6316: Software Reuse & Customization

Unit-I

Introducing to Software Reuse: What is Software Reuse?, Reuse types, Reuse Approaches, Reuse Technology, Reuse benefits & barriers, Reuse success & failure Factors, Reuse Driven Software Engineering is a business.

Unit-II

Architectural Style: Application and component systems- Application Developers can reuse OOSE model components; Application families allow significant reuse, Application Systems Are Built from Reusable Components, Group Components into Component Systems, Facades Control Access to Component System Internals, Component Systems Export Components Via Facades. Use Case Components, Object Components, Layered Architecture.

Unit-III

Process- Object Oriented Business Engineering, Applying Business Engineering to Define Process and Organization, Application Family engineering, Component System Engineering, Application System Engineering.

Unit-IV

Organizing a Reuse Business: Transition to a Reuse Business, Reengineering and Reuse, Managing the Reuse Business.

Unit-V

Design Patterns: Object Oriented Principles, Importance of Design Patterns in Reuse, Introduction to Creational Patterns, Structural Patterns, Behavioral Patterns, Miscellaneous Patterns, Implementation of Design Patterns.

Text Book:

1. Ivar Jacobson, Martin Griss, Patrick Johnson, "*Software Reuse Architecture, Process and Organization for Business Success"*, First Edition, Pearson Education, 2000.
2. Erich Gamma at al., "*Design Patterns: Elements of Reusable Object-Oriented Software*", Addison Wesley, 1999.

Reference Books:

1. Eric Braude, "*Software Design: From Programming to Architecture*", John Wiley & Sons, 2003.
2. Bernd Bruegge & A. Dutoit, "*Object Oriented Software Engineering using UML, Design Patterns, and Java*", Pearson Education, 2004.

3. Ugrasen Suman, "*Software Engineering: Concepts & Practices*", Cengage Learning publications, 2013.

CS-6711 Soft Computing

UNIT 1

Soft Computing: Soft computing, 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, Lambda Cuts for Fuzzy Sets and Fuzzy Relations, Defuzzification Methods, Fuzzy Arithmetic, Fuzzy Logic and Approximate Reasoning, Rule Based Systems and Graphical Techniques of Inference.**Rough Sets:** Rough Sets,Upper and Lower Approximations, Boundary Region, Decision Tables and Decision Algorithms. Properties of Rough Sets.

UNIT 3

Elementary Search techniques:

Uninformed Search Techniques: Breadth First Search, Depth First Search, Depth first Iteravtive Deepining, Bidirectional Search.**Heuristic Search Techniques:** Best First Search, Hill Climbing Search,Branch and Bound Search, A*, AO*, Means-ends Analysis, Constraint Satisfaction**. Genetic Algorithm(GA):** Introduction to Genetic Algorithms (GA), Representation, Operators in GA, Fitness function, population, building block hypothesis and schema theorem.; Genetic algorithms operators- methods of selection, crossover and mutation, simple GA(SGA), **Multi-objective GA,** steady state GA, Applications of GA, **Stimulated Annealing**

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, Self Organizing Maps, Learning Vector Quantization.

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.

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.

CS-6712 Data Science

UNIT I

Structured data Analytics, Data Warehouse, Evolution, Definition, Very large database, Application, Multidimensional Data Model, OLTP vs. Data Warehouse, Data Warehouse Architecture. Metadata, ETL and Data warehouse, Metadata, Components of metadata.

Dimension Tables, Fact Table, Warehouse Schema Design: Star Schema, Snowflake schema, Fact Constellation, Data Marts, PL/SQL. OLAP, Strengths of OLAP, OLTP vs OLAP, Multi-dimensional Data, Slicing and Dicing, Roll-up and Drill Down, Pivot. Data Warehouse Implementation.

UNIT II

Unstructured Data Analytics: Descriptive, diagnostic, predictive and prescriptive data Analytics. Introduction to R, Vectors, Matrices, Factors, Lists, Data Frames., Basic Graphics

UNIT III

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

UNIT IV

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

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

UNIT V

R and Hadoop, Overview of Hadoop, Hadoop Streaming, Packages for Parallel Computation with R: Segue, doMC.

Text:

[1] Data Mining Techniques, Arun K Pujari, University Press Second Edition.
[2] R in a Nutshell, Joseph Adler Second Edition O'REILLY.

STUDENT KIT

M.Tech. (Executive) in Computer Science

Jan 2018 Onwards

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The Need for Executive M.Tech (Executive) in Computer Science

The M.Tech executive programme in Computer Science is designed for professionals, who have basic degree in Computer Science and are working in IT/ITES field.

The students/professionals aspiring to upgrade their skill set and acquire knowledge in the emerging areas like Cyber Security, IoT, BigData, Machine Learning, and Cloud Computing can take admission in this programme. These areas offer tremendous job opportunities.

The teaching/learning in the subjects will be supplemented with expert lectures by leading industry experts, hands on sessions over and above taught by regular faculty.

A student is expected to earn credits from theory-cum-practical classes, online courses and project work. The classes will be held over the weekends (or other timings suitable for working professionals). About 12-14 hours teaching-cum-practical classes per week will be conducted. The tentative syllabus for the programme is framed and included with the brochure.

Salient Features of the Programme:

Duration of the programme: Minimum Duration: 2 Years & Maximum Duration: 4 Years.
The academic activities (examination, evaluation and other related activities) will be governed by Ordinance 14 of Devi Ahilya University.

Degree Requirements: 90 Credit Hours (80 Valid Credit Hours +16 virtual Credit Hours).
The progamme is flexible. The study may take total 96 Credit Hours in two to four years (keeping minimum 12 credit hours per semester).

Course Scheme

M.Tech (Executive) in Computer Science - I Sem

Course Code	Course Name	L	T	P	C	Type	Inter -nal	Practical/ Project	End Sem	Total
CS-6518	Cloud Computing	2	1	2	4	Core	30	20	50	100
CS-6627	Web Technologies & Java Security	2	1	2	4	Core	30	20	50	100
CS-5243	AngularJS	2	0	4	4	Core	30	20	50	100
	Elective -I									
CS-5805A	Mini Project				4					

List of Electives for M.Tech (Executive) in Computer Science - Semester I

Code	Subject	L	T	P	C	Type	Inter -nal	Practical/ Project	End Sem	Total
CS-6516	Advanced Operating Systems	2	1	2	4	Core	30	20	50	100
CS-6518	Linux	2	1	2	4	MOOC	30	20	50	100

M.Tech (Executive) in Computer Science - II Sem

Course Code	Course Name	L	T	P	C	Type	Inter -nal	Practical/ Project	End Sem	Total
CS-6313	Software Testing & Quality Assurance	2	1	2	4	Core	30	20	50	100
	Elective-I									
CS-6321	Software Processes and Agile Practices	2	1	2	4	MOOC	30	20	50	100
CS-5241	Android Programming	2	0	4	4	MOOC	30	20	50	100
CS-5805B	Mini Project				4					

List of Electives for M.Tech (Executive) in Computer Science - Semester II

Code	Subject	L	T	P	C	Type	Inter -nal	Practical/ Project	End Sem	Total
CS-5701	Artificial Intelligence	2	0	4	4	Core	30	20	50	100
CS-5731	Machine Learning	2	0	4	4	MOOC	30	20	50	100
CS-5732	Natural Language Processing	2	0	4	4	MOOC	30	20	50	100

M.Tech (Executive) in Computer Science - III Sem

Course Code	Course Name	L	T	P	C	Type	Inter -nal	Practical/ Project	End Sem	Total
	Elective -I									
	Elective -II	2	1	2	4		30	20	50	100
CS-6807A	Major Project Phase – I				12					

List of Electives forM.Tech (Executive) in Computer Science - Semester III

Code	Subject	L	T	P	C	Type	Inter -nal	Practical/ Project	End Sem	Total
CS-6418	Advanced Database Management System	2	1	2	4	Core	30	20	50	100
CS-6221	Advanced Algorithm Design	2	1	2	4	Core	30	20	50	100
CS-5621	Bitcoin and Cryptocurrency Technologies	2	1	2	4	MOOC	30	20	50	100

M.Tech (Executive) in Computer Science - IV Sem

Course Code	Course Name	L	T	P	C	Type	Inter -nal	Practical/ Project	End Sem	Total
	Elective - I	2	1	2	4		30	20	50	100
	Elective - II	2	1	2	4		30	20	50	100
CS-6807B	Major Project Phase – II				12					

List of Electives for M.Tech (Executive) in Computer Science - Semester IV

Code	Subject	L	T	P	C	Type	Inter -nal	Practical/ Project	End Sem	Total
CS-5713	Data Analytics Using R	2	1	2	4	Core	30	20	50	100
CS-6733	Big Data Analytics	2	1	2	4	MOOC	30	20	50	100
CS-5242	Introduction to programming with MATLAB	2	1	2	4	MOOC	30	20	50	100
CS-6243	Image and Video Processing	2	1	2	4	MOOC	30	20	50	100

Important Note:

1. The course curriculum presented in the above Table is designed for 2 year (4 semester) programme. However candidates can opt for courses in a flexible manner (keeping minimum 12 credits per semester) spread over 4 years (8 semester).
2. Course Curriculum of the Programme is subject to revise by departmental Committee.
3. MOOC courses can be revised by departmental committee periodically.
4. Admitted students must inform the course coordinator about the chosen course and can opt for a particular MOOC course only after approval from departmental committee.

M. Tech . (Executive) in Computer Science
Course Curriculum

CS-6518 Cloud Computing

COURSE TOPICS:

- Enabling Technologies and System Models for Cloud Computing (2 Lectures)
- Introduction to Cloud Computing including benefits, challenges, and risks(2 Lectures)
- Cloud Computing Models including Infrastructure/Platform/Software as-a-service (4 Lectures)
- Public cloud, private cloud and hybrid clouds(2 Lectures)
- Cloud OS(4 Lectures)
- Cloud Architectures including Federated Clouds(4Lectures)
- Scalability, Performance, QoS (2 Lectures)
- Data centers for Cloud Computing(2 Lexctures)
- Principles of Virtualization platforms(2 Lectures)
- Security and Privacy issues in the Cloud(2 Lectures)
- Energy Efficient and Green Cloud Computing (4 Lectures)
- Capacity Planning (4 Lectures)
- Disaster Recovery in Cloud Computing(2 Lecurtres)
- Research Issues in Cloud Computing(2 Lectures)
- Case Study CloudSim Simulator(4 Lectures)
- Case Study Hadoop, HDFS and MapReduce(10 Lectures)

Recommended Books;

- Cloud Compute Bible: Barrie Sosinsky, Wiley India Pvt Ltd.,2010
- *Cloud Computing: Principles and Paradigms*, Editors: Rajkumar Buyya, James Broberg, Andrzej M. Goscinski, *Wile*, 2011
- *Cloud Computing: Principles, Systems and Applications, Editors:* Nikos Antonopoulos, Lee Gillam, *Springer*, 2012
- *Cloud Security: A Comprehensive Guide to Secure Cloud Computing,* Ronald L. Krutz, Russell Dean Vines, *Wiley-India*, 2011
- Distributed and Cloud Computing, 1st edition, Morgan Kaufmann, 2011.
- *Cloud Computing: Principles, Systems and Applications, Editors:* Nikos Antonopoulos, Lee Gillam, *Springer*, 2012

CS-6627 Web Technology and Java Security

UNIT-I

Introduction to HTTP, web Server and application Servers, Installation of Application servers, Config files, Web.xml. Java Servlet, Servlet Development Process, Deployment

Descriptors, Generic Servlet, Lifecycle of Servlet. Servlet Packages, Classes, Interfaces, and Methods, Handling Forms with Servlet, Various methods of Session Handling, various elements of deployment descriptors, Java Database Connectivity: various steps in process of connection to the database, Various type of JDBC Driver, Filters

UNIT -II

JSP Basics: JSP lifecycle, Directives, scripting elements, standard actions, implicit objects. Connection of JSP and Servlet with different database viz. Oracle, MS-SQL Server, MySQL. java.sql Package. Querying a database, adding records, deleting records, modifying records, types of Statement.

UNIT -III

Separating Business Logic and Presentation Logic, Building and using JavaBean. Session handling in JSP, Types of errors and exceptions handling. MVC Architecture, Introduction to Web Services.

UNIT -IV

Introduction to Enterprise Java Bean, Types of EJB, Creating and working with Session Bean, Enterprise Bean and Message-Driven Bean, Introduction to Remote Method Invocation, Naming Remote Objects and Java Naming and Directory Interface (JNDI) concept.

UNIT -V

Java SE Security : Platform Security, Java Cryptography Architecture(JCA), Authentication and Access Control, Java Security Architecture, Java Authentication and Authorization Service (JAAS) , Secure Communications, Public Key Infrastructure (PKI)

Text Book(s) :

1. K. Mukhar, “Beginning Java EE 5: From Novice to Professional” Wrox Press.
2. Ivan Bayross, Sharanam Shah, Cynthia Bayross and Vaishali Shah, “J2EE for Professionals”, First Edition, Shroff Publishers & Distributers pvt. Ltd.

Reference Books :

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 and JSP”, 2nd Edition, O'Reilly Media.

CS-6516: Advance Operating System

1. **Review of Operating System Concepts**: Process management, Synchronization, Interprocess Communication techniques, Processor Scheduling, Memory Management, Device Management, File System etc.
   Limitations of centralized and uniprocessor operating systems. Need of advance operating systems, Types of advance operating systems.
2. **Distributed Systems**: Difference between network and distributed operating systems, Design objectives and features of distributed operating systems, Distributed systems architectures, distributed system software, and distributed operating systems.
3. **Resource Management in distributed Computing:**
   (i) Distributed Scheduling, process management, process migration
   (ii) Distributed Shared Memory
   (iii) Distributed File System: File caching, replication management, Naming of resources, name resolution process.
4. **Process management in distributed operating systems**: Process synchronization and IPC, RPC, Clock synchronization, mutual exclusion, deadlock handling, security aspects, case studies.
5. **Multiprocessor systems**: Multiprocessor architecture, multiprocessor Operating systems, process synchronization and IPC, processor scheduling, memory management.
6. **Database Systems' support**: Need of OS support for databases, concurrency control in database systems.

Recommended Books:

[i] Distributed Operating Systems (Concept and Esign), II Edition, P. K. Sinha, PHI, 1997.
[ii] Advance Concepts in Operating Systems, Mukesh SInghal, Niranjan G. Shivratri, Mc GRaw Hills, 1994.
[iii] Modern Operating Systems(III Edition) , Andrew S. Tanenbomb, Pearson.
[iv] Distributed Systems (Concept and Design), II Edition, GEprge Couloris, Jean Dollimore and Tim Kindberg, Addison-Wesley, 1994.

CS-6221 Advanced Algorithm Design

Unit 1 Order Analysis: Objectives of time analysis of algorithms; Big-oh and Theta notations. Master Theorem and its proof, solution of divide and conquer recurrence relations. Searching, Sorting and Divide and Conquer Strategy: Linear Search, Binary Search

Unit 2: Searching, Sorting and Divide and Conquer Strategy: Merge - sort; Quick - sort with average case analysis. Heaps and heap - sort. Lower bound on comparison - based sorting and Counting sort. Dynamic Programming: methodology and examples (Fibonaci numbers, Knapsack problem and some other simple examples) Dynamic Programming: Longest integer subsequence, Longest common subsequence, Weighted interval scheduling.

Unit 3 Greedy Method: Methodology, examples (lecture Scheduling, process scheduling) and comparison with DP (more examples to come later in graph algorithms) Greedy Method: Knapsack problem and some other simple examples. Graph Algorithms: Basics of graphs and their representations. BFS. DFS. Topological sorting.

Unit 4 Minimum spanning trees (Kruskal and Prim'salgorithms and brief discussions of disjoint set and Fibonacci heap data structures). Shortest Paths (Dijkstra, Bellman - Ford, Floyd - Warshall). Hard problems and approximation algorithms. Problem classes P, NP, NP - hard and NP - complete, deterministic and nondeterministic polynomial - time algorithms, Approximation algorithms for some NP - complete problems

Unit 5 Backtracking, Branch and Bound technique, String Matching, Naive algorithm, KMP algorithm, Parallel Algorithms

Text Book: Cormen, Leiserson, and Rivest. Algorithms, MIT Press 2011

CS 6418 Advanced Database Management System

Unit I
Database: Overview of database design, introduction to Relational model and its queries, review of SQL, review of computer networks.
Unit II
Distributed Databases: features of distributed database, Study of reference architectures for DDBMS, Comparison of Homogeneous and Heterogeneous Databases, fragmentation, distribution transparency for read-only and update applications.
Unit III
Distributed database design: a framework for distributed database design, the design of database fragmentation, the allocation of fragmentation. Overview of Transaction processing and concurrency control
Unit IV
The management of distributed Transactions: a framework for transaction management, supporting atomicity of distributed transactions, concurrency control for distributed transactions, architectural aspects of distributed transactions. Concurrency control and reliability.
Unit V
Query processing, query optimization, database security: Security and integrity threats, Defence mechanisms, Statistical database auditing & control. Security issue based on granting/revoking of privileges, Introduction to statistical database security. PL/SQL Security – Locks – Implicit locking, types and levels of locks, explicit locking, Oracles' named Exception Handlers.

Recommended Books:

Date C. J., An Introduction to Database Systems, Addison Wesley Longman (8th Ed), 2003.

Silberschatz A., Korth H., and Sudarshan S., Database System Concepts, McGraw - Hill (6th Ed), 2010.

Stefano Ceri., Giuseppe Pelagatti., Distributed databases principles & systems, McGraw – Hill.

M. Tamer Ozsu., Patrick Valduriez., Principle Of Distributed Database System, Springer(3rd Ed.)

CS-5618 Network Security

Aim:

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.

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

Outcomes:

1. Develop strategies to protect organization information assets from common attacks.
2. Understand how security policies, standards and practices are developed.
3. Identify the major techniques, approaches and tools used to discover network and system vulnerabilities.
4. To be exposed to original research in Network Security.

References:

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, ISBN-13: 978-01323907744.
3. Ulysess Black, "Internet Security Protocols: Protecting IP Traffic", Prentice Hall PTR; 1st edition, 2000, ISBN-10: 0130142492, ISBN-13: 978-0130142498.
4. Amir Ranjbar 2007, CCNP ONT Official Exam Certification Guide, Cisco Press [ISBN: 978-1-58720-176-3].
5. Luc De Ghein 2006, MPLS Fundamentals, 1st Ed. Ed., Cisco Press [ISBN: 978-1-58705-197-5]
6. William Stallings, "Cryptography and Network Security", Pearson Education, 6th Edition, 2013,ISBN 10: 0133354695.

CS-6313 Software Testing & Quality Assurance

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

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

Configuration and Compatibility testing: Isolating configuration bugs, identifying requirements of hardware, software and network, Identifying platform and application versions, backward and forward compatibility, Data sharing compatibility
Foreign Language testing: Translation issues, ASCII, EBCDIC, Hotkeys and shortcuts, extended characters, computation on characters, localisation, compatibility and configurability issues

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 Winrunner and Rational ROBO. 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

Usability Engineering
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.
Capability Maturity Model

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.

Essential References:

1. Software testing Ron Patton SAMS Publishing
2. CMM Level 5 unleashed'

Recommended Book(s)

1. Effective methods of software testing' Wiley Publishers, William E. Perry

Electronic Materials, Web Sites:

1. CMM Level 5 and Carnegie Mellon University Site reference material on aspects of software quality

CS-5713 Data Analytics using R

UNIT I

Structured data Analytics, Data Warehouse, Evolution, Definition, Very large database, Application, Multidimensional Data Model, OLTP vs. Data Warehouse, Data Warehouse Architecture. Metadata, ETL and Data warehouse, Metadata, Components of metadata.
Dimension Tables, Fact Table, Warehouse Schema Design: Star Schema, Snowflake schema, Fact Constellation, Data Marts, PL/SQL. OLAP, Strengths of OLAP, OLTP vs OLAP, Multi-dimensional Data, Slicing and Dicing, Roll-up and Drill Down, Pivot. Data Warehouse Implementation.

UNIT II

Unstructured Data Analytics: Descriptive, diagnostic, predictive and prescriptive data Analytics. Introduction to R, Vectors, Matrices, Factors, Lists, Data Frames., Basic Graphics

UNIT III

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

UNIT IV

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

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

UNIT V

R and Hadoop, Overview of Hadoop, Hadoop Streaming, Packages for Parallel Computation with R: Segue, doMC.

Text:

[1] Data Mining Techniques, Arun K Pujari, University Press Second Edition.
[2] R in a Nutshell, Joseph Adler Second Edition O'REILLY.

CS-5701 Artificial Intelligence

UNIT I

Problem solving, search and control strategies: General issues and overview of AI, AI techniques, applications of AI, characteristics of AI applications, general problem solving, production systems, control strategies, forward and backward chaining, hill

climbing, branch and bound technique, best first search and A* algorithms, problem reduction and AO* algorithms, constraint satisfaction problems and means-end analysis.

UNIT II

Knowledge representation techniques: Representation, organization, manipulation, acquisitions and maintenance of knowledge. First order predicate calculus, skolemization, horn clauses, resolution principle, non-deductive inference methods, semantic networks, slot and filler structures, frame systems and value inheritance, conceptual dependencies and scripts.

UNIT III

Natural Language Processing and Pattern Recognition: Overview of linguistics, grammars and languages, parsing techniques, semantic analysis and representation structures, natural language generation, recognition and classification process, learning classification patterns, recognizing and understanding speech, statistical NLP.

UNIT IV

Machine Learning: Learning in problem solving, learning from examples, explanation based learning, regression models and feature selection, Bayesian learning, decision tree learning, Support Vector Machines, neural network learning, activation and synaptic dynamics, stability and convergence in neural networks, genetic learning, evaluation measures, hypothesis testing, ensemble methods, clustering , graphical models, reinforcement learning.

UNIT V

Intelligent systems: Fuzzy sets, fuzzy terminology, fuzzy logic control, fuzzy inference processing, alpha cut threshold, neuro fuzzy systems, rule based expert systems, representing and using domain knowledge, expert system shells, explanation, knowledge acquisition, nonproduction system architectures, genetic algorithms, significance of genetic operators, termination parameters, ant algorithms.

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.

3. D. Jurafsky and James H. Martin, Speech and Language Processing, Pearson Education, 2000.

4. Tom M. Mitchell, Machine learning, Indian edition, 2017.

STUDENT KIT

DOCTOR OF PHILOSOPHY

Course Work

Jan 2013 Onwards

Devi Ahilya Vishwavidyalaya

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Scheme-Jan 2013 Onwards

Subject	Credit
Research Methodology	5
Computer Applications	3
Literature Review	3
Comprehensive Viva	4
	15

Scheme-Jul 2017 Onwards

Subject	Credit
Research Methodology	4
Review of Published Research in the relevant field	3
Computer Applications	3
Advance course in the relevant subject	3
Comprehensive Viva	3
	16

Course Curriculum

Paper-I (Research Methodology)

1. Scientific Process: Meaning and Definition, a brief history of scientific process.

2. Introduction of Research Methodology: Meaning of research, objectives of research, types of research, significance of research, problems encountered by researchers in India.

3. Research Problem: Definition, necessity and techniques of defining research problem. Formulation of research problem. Objectives of research problem.

4. Research Design: Meaning, need and features of good research design. Types of Research Designs, Basic Principles of Experimental Designs. Design of experiments.

5. Sampling Designs: Census and Sample surveys, Different types of sample designs, characteristics of good sample design. Techniques of selecting a random sample.

6. Data Collection: Primary and secondary data. Methods of collecting primary and secondary data.

7. Hypothesis: Definition, testing of hypothesis, procedures of hypothesis testing, flow diagram for hypothesis testing, Parametric and non-parametric tests for testing of hypothesis, Limitations of tests of hypothesis.

8. Paper Writing and Report Generation: Basic concepts of paper writing and report generation, review of literature, Concepts of Bibliography and References, significance of report writing, steps of report writing, Types of Research reports, Methods of presentation of report.

References:

1. C.R.Kothari, Research Methodology Methods and Technique , Second Edition, New Delhi: New Age International publisher, 2004.
2. S.C. Gupta and V.K. Kapoor, Fundamentals of Mathematical Statistics, 10^{th} Edition, Sultan Chand and Sons, New Delhi.

Paper-II (Computer Applications)

The course on computer applications will include the computer applications helpful in the relevant subject

UNIT – I

Introduction to MATLAB

UNIT – II

Algorithm, Time & Space complexity, Sorting Techniques, Greedy & Dynamic programming, Randomized algorithms, Recursion, Divide-and-Conquer techniques

UNIT – III

Problem solving and program design techniques using the principles of object oriented programming practices.

UNIT – IV

Advanced Computer Architecture: instruction sets and the processor organizations, processing unit design, instruction pipelining and parallel processing, instruction level parallelism, the memory system, caches, virtual memory, IO organization, multiprocessor architectures

.

UNIT – V

a. Spreadsheet Tool: Introduction to spreadsheet application, features and functions, Using formulas and functions, Data storing, Features for Statistical data analysis, Generating charts/ graph and other features. Tools used may be Microsoft Excel, Open office or similar tool.
b. Presentation Tool: Introduction to presentation tool, features and functions, Creating presentation, Customizing presentation, Showing presentation. Tools used may be Microsoft Power Point, Open Office or similar tool.

References:

1. Montgomery, Douglas C. (2007), 5/e, Design and Analysis of Experiments, (Wiley India)
2. Montgomery, Douglas C. & Runger, George C. (2007), 3/e, Applied Statistics & Probability for Engineers (Wiley India)
3. Kothari C.K. (2004), 2/e, Research Methodology - Methods and Techniques (New Age International, New Delhi)
4. Krishnaswamy, K.N., Sivakumar, Appa Iyer and Mathiranjan M. (2006), Management Resarach Methodology; Integration of Principles, Methods and Techniques (Pearson Education, New Delhi)
5. The complete reference Office Xp – Stephan L. Nelson, Gujulia Kelly (TMH)
6. Basic Computer Science and Communication Engineering – R. Rajaram (SCITECH)
7. Computer Architecture & Organization, 2nd Edition by Nicholas Carter, Raj Kamal
8. Gurdy Leete, Ellen Finkelstein and Mary Leete, Open Office For Dummies
.

Paper-III (Literature Review)

The course on Review of Published Research in the relevant field will be undertaken under the supervisor or the regular teacher of the centre of course work and the candidate has to consult the library or other resources to carry out the literature review. At the end of the semester the candidate has to submit a brief report on the literature review for evaluation, which will be done by the two examiners.

Paper-IV (Advance course in the relevant subject)

Introduced in July 2017

The advanced course in the relevant field shall comprise the topics related to the subject of research. Following Courses are offered by School of Computer Science & IT in Ph.D. Course Work - Jan, 2018 (Student opt one out of them based on the subject of his/her research work):

Syllabus for Ph.D. Course Work - Jan, 2018

Artificial Intelligence and NLP

UNIT I

Problem solving, search and control strategies: General issues and overview of AI, AI techniques, applications of AI, characteristics of AI applications, general problem solving, production systems, control strategies, forward and backward chaining, hill climbing, branch and bound technique, best first search and A* algorithms, problem reduction and AO* algorithms, constraint satisfaction problems and means-end analysis.

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Knowledge representation techniques: Representation, organization, manipulation, acquisitions and maintenance of knowledge. First order predicate calculus, skolemization, horn clauses, resolution principle, non-deductive inference methods, semantic networks, slot and filler structures, frame systems and value inheritance, conceptual dependencies and scripts.

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convergence in neural networks, genetic learning, evaluation measures, hypothesis testing, ensemble methods, clustering , graphical models, reinforcement learning.

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2. Dan W. Patterson, Introduction to Artificial Intelligence and Expert Systems, 1st edition, Prentice Hall, 1990.
3. D. Jurafsky and James H. Martin, Speech and Language Processing, Pearson Education, 2000.
4. Tom M. Mitchell, Machine learning, Indian edition, 2017.

Data Mining and Analytics

UNIT I

Introduction to data mining,Data Mining Techniques, Application and trends in data mining. Descriptive Analytics, Predictive Analytics and Prescriptive Analytics.Data preprocessing, Data cleaningData transformation, Feature selection, Dimensionality reduction, Discretization and generating concept hierarchies, Mining frequent patterns, Association Rule Mining, A Priori algorithm, FP Tree Growth Algorithm, Incremental Algorithms for association rule mining,Prediction of quantitative variables, Regression, Regression trees, Logistic Regression, Multiple Linear Regression.

UNIT II

Supervised and unsupervised learning , Classification vs Prediction , CLASSIFICATION: Decision Tree Induction , Rule Based Classification, Support Vector Machines, Neural Networks, , K-Nearest Neighbors, Naïve Bayesian Classification, Classification & Regression Trees (CART), CLUSTERING: Clustering techniques, Partitioning methods, k- Means, Hierarchical Methods, Distance based

agglomerative and divisible clustering , Density, Based Methods, Expectation maximization , Grid Based Methods, Model- Based Clustering Methods, Constraint-Based Cluster Analysis, Outlier Analysis.

UNIT III

Mining complex data objects: Spatial databases, Temporal databases, Multimedia databases, Time series and Sequence Data Mining, Time Series Models.Text Mining, Graph mining, Web mining.

UNIT IV

Big Data Tools and Technology, Hadoop, HBase, NoSQL, Hive, Pig, Big Data and Cloud, Big Data and Web Services-SOA, Big Data and Internet of Things (IoT), Streaming Data Analysis.

UNIT V

Tools and technologies (Any One but in depth): Weka, RapidMiner, IBM SPSS Modeler, SAS Enterprise Miner, Apache Mahout, R Studio.
Big Data Case Study (Any one): Healthcare Data, Web Click Stream Data, Social Media Data.

References:

1.Jiawei Han and Micheline Kamber, "Data Mining: Concepts and Techniques", 3rd Edition, Morgan Kaufmann Publishers.
2.Zaki, Mohammed J., Wagner Meira Jr, and Wagner Meira. Data mining and analysis: fundamental concepts and algorithms. Cambridge University Press, 2014.
3.G. K. Gupta, "Introduction to Data Mining with Case Studies", 1st Edition, Easter Economy Edition, PHI, 2006Dunham,
4.Margaret H. Data mining: "Introductory and advanced topics". Pearson Education India, 2006.
5.Ledolter, Johannes. "Data mining and business analytics with R". John Wiley & Sons, 2013.
6.Maheshwari, Anil. "Data analytics made accessible." Seattle: Amazon Digital Services (2014).
7.Pyle, Dorian. "Data preparation for data mining". Vol. 1. Morgan Kaufmann, 1999.

Advanced Computer Networks

UNIT 1:

Building a Network

Requirements, Connectivity, Cost-Effective Resource Sharing, Support for Common Services, Network Architecture, Layering and Protocols,
OSI Architecture, Internet Architecture, Implementing Network Software,
Application Programming Interface (Sockets).

Concept of Network Application performance needs: Bandwidth, Latency, Delay, data rate, baud rate.

Knowledge of using network simulator.

Direct Link Networks

Framing (Byte-Oriented Protocols (PPP), Bit-Oriented Protocols (HDLC), Clock-Based Framing (SONET), Error Detection, Two-Dimensional Parity, Internet Checksum Algorithm, Cyclic Redundancy Check, Reliable Transmission.

Physical Properties, Access Protocol, Experience with Ethernet (802.3) and Token Rings (802.5, FDDI).

UNIT 2:

Packet Switching

Switching and Forwarding, Bridges and LAN Switches, Cell Switching (ATM), Virtual Paths

Internetworking

Simple Internetworking (IP), Routing(Network as a Graph, Distance Vector (RIP),Link State (OSPF), Metrics, Routing for Mobile Hosts, Subnetting, Classless Routing (CIDR), Inter-domain Routing (BGP), IP Version 6 (IPv6), Multicasting Multiprotocol Label Switching (MPLS), Destination-Based Forwarding, Explicit Routing, Virtual Private Networks and Tunnels.

UNIT 3:

End-to-End Protocols

UDP, TCP, Introduction to traffic Engineering, Requirement Definition for Traffic Engineering, Traffic Sizing, Traffic Characteristics, Protocols, Time and Delay Consideration, Connectivity, Availability, Reliability and Maintainability, Throughput Calculation.

Congestion Control and Resource Allocation

Issues in Resource Allocation (Network Model, Taxonomy, Evaluation Criteria, Queuing Disciplines, FIFO, Fair Queuing, TCP Congestion Control, Additive Increase/Multiplicative Decrease, Slow Start, Fast Retransmit and Fast Recovery, Congestion-Avoidance Mechanisms, DECbit, Random Early Detection (RED), Source-Based Congestion Avoidance .

UNIT 4:

Network Security

Content Filtering, Nature of the Threat: Malicious Threat, Vulnerabilities, Man-in-the-Middle Attacks, Phishing, Unintentional Threats, Firewall, IDS/IPS, Honeypot, Internet Threat Model, Defending against attacks on the Internet.

Information Security

Cryptography, Cryptanalysis, Feistel Cipher structure, Symmetric Block Encryption Algorithms (Data Encryption Standard, Triple DES, Advanced

Encryption Standard), Stream Ciphers and RC4 (Stream Cipher Structure, the RC4 Algorithm), Cipher Block Modes of Operation (Electronic Codebook Mode, Cipher Block Chaining Mode, Cipher Feedback Mode, Counter Mode)

UNIT 4:

Information Security

Secure Hash Functions (Hash Function Requirements, Security of Hash Functions, Simple Hash Functions, The SHA Secure Hash Function). Message Authentication Codes (HMAC, MACs Based on Block Ciphers). Public-Key Cryptography, RSA Algorithm, Diffie-Hellman Key Exchange, Digital Signatures, Secure sockets, Internet Security Protocols: Basic Concepts, Security Socket Layer (SSL), Secure Hyper Text Transfer Protocol(SHTTP)

Text Book(s):

- Andrew S. Tanenbaum, "Computer Networks", Fourth Edition, Pearson Education.
- Larry L. Peterson and Bruce S. Davies, "Computer Networks: A Systems Approach", Fourth Edition, (The Morgan Kaufmann Series in Networking)
- W. Richard Stevens, Bill Fenner, and Andrew M. Rudoff, "UNIX Network Programming, The Socket Networking API", Volume 1, Pearson Education.
- Teerawat Issariyakul and Ekram Hossain, "Introduction to Network Simulator NS2", Second Edition, Springer, 2012

Reference Book(s):

- J.F. Kurose and K.W. Ross, "Computer Networking, A Top-Down Approach Featuring the Internet", Third Edition, Addison Wesley.
- C.Huitema, "Routing in the Internet", Second Edition, Prentice Hall.
- R. Handel, M.Huber and S. Schroder, "ATM Networks - Concepts, Protocols, Applications", Second Edition, Addison Wesley.
- W. Stallings, "Local and Metropolitan Area Networks", Sixth Edition, Prentice-Hall.
- Charlie Kaufman, Radia Perlman, Mike Speciner, "Network Security", Second Edition, Prentice Hall, 2002, ISBN-10: 0130460192, ISBN-13: 978-0130460196.
- Charles Pfleeger," Security in Computing", Fourth Edition, Prentice Hall, 2006, ISBN-10: 0132390779, ISBN-13: 978-01323907744.
- Ulysess Black, "Internet Security Protocols: Protecting IP Traffic", First Edition, Prentice Hall PTR, 2000, ISBN-10: 0130142492, ISBN-13: 978-0130142498.
- Amir Ranjbar 2007, CCNP ONT Official Exam Certification Guide, Cisco Press [ISBN: 978-1-58720-176-3].
- Luc De Ghein 2006, MPLS Fundamentals, First Edition, Cisco Press [ISBN: 978-1- 58705-197-5].
- William Stallings, "Cryptography and Network Security", Sixth Edition, Pearson Education, 2013, ISBN 10: 0133354695.