Starex University, Gurugram

School of Computer Science

Course Structure & Syllabus Outline

Bachelor of Computer Application (BCA)

(Undergraduate Program Effective from Year 2020-21)

STAREX UNIVERSITY, GURUGRAM

SCHEME OF STUDIES AND EXAMINATION

Bachelor of Computer Applications

Scheme effective from 2020-21

SEMESTER 1st

S. No.	Course code	Course Title	Hours per week			Total Contact hrs/week	Credit	Examination Schedule (Marks)				Duration of Exam (Hours)
			L	T	P			Mark of Class work	Theory	Practical	Total	
1	0401104	Mathematics-1	3	1	0	4	4	25	75		100	3
2	0401105	Fundamentals of Computer and IT	3	1	0	4	4	25	75		100	3
3	0401106	Problem solving using C	3	1	0	4	4	25	75		100	3
4	0401107	English	2	0	0	2	2	10	40		50	2
5	0401191	Environmental Science	2	0	0	0	2	10	40		50	2
6	0401105	Fundamentals of Computer and IT Lab	0	0	4	4	2	25		25	50	3
7	0401106	Problem Solving using C Lab	0	0	4	4	2	25		25	50	3
8	0401107	English Lab	0	0	2	4	2	25		25	50	3
						Total Credits	22	170	305	75	550	

Semester 2nd

S. No.	Course code	Course Title	Hours per week			Total Contact hrs/week	Credit	Examination Schedule (Marks)				Duration of Exam (Hours)
			L	T	P			Mark of Classwork	Theory	Practical	Total	
1	0401204	Mathematics-II	3	1	0	4	4	25	75		100	3
2	0401205	Digital Logic and Circuit design	3	1	0	4	4	25	75		100	3
3	0401206	Operating System	3	1	0	4	4	25	75		100	3
4	0401207	Web Technologies	2	0	0	2	2	10	40		50	2
5	0401203	Database Management Systems	3	1	0	4	4	25	75		100	3
6	0401206	Operating System Lab	0	0	2	4	2	25		25	50	3
7	0401207	Web Technologies Lab	0	0	2	4	2	25		25	50	3
8	0401203	Database Management Systems Lab	0	0	2	4	2	25		25	50	3
						Total Credits	24	185	340	75	600	

SEMESTER 3rd

S. No.	Course code	Course Title	Hours per week			Total Contact hrs/week	Credit	Examination Schedule (Marks)				Duration of Exam (Hours)
			L	T	P			Mark of Class work	Theory	Practical	Total	
1	0401301	Computer Networks	3	1	0	4	4	25	75		100	3
2	0401302	OOPs using C++	3	1	0	4	4	25	75		100	3
3	0401303	Data Structures	3	1	0	4	4	25	75		100	3
4	0401304	E-commerce	2	0	0	2	2	10	40		50	2
5	0401305	Information Technology Trends	3	1	0	4	4	25	75		100	3
6	0401302	OOPs using C++ Lab	0	0	4	4	2	25		25	50	3
7	0401303	Data Structures Lab	0	0	4	4	2	25		25	50	3
						Total Credits	22	160	340	50	550	

SEMESTER 4th

S. No.	Course code	Course Title	Hours per week			Total Contact hrs/week	Credit	Examination Schedule (Marks)				Duration of Exam (Hours)
			L	T	P			Mark of Class work	Theory	Practical	Total	
1	0401403	Software Engineering	3	1	0	4	4	25	75		100	3
2	0401402	Programming using Python	3	1	0	4	4	25	75		100	3
3	0401405	Computer Organization and Architecture	3	1	0	4	4	25	75		100	3
4	0401406	Information Security	3	1	0	4	4	25	75		100	3
5	0401404	Management Information Systems	2	0	0	2	2	10	40		50	2
6	0401402	Programming using Python Lab	0	0	4	4	2	25		25	50	3
						Total Credits	20	135	340	25	500	

SEMESTER 5th

S. No.	Course code	Course Title	Hours per week			Total Contact hrs/week	Credit	Examination Schedule (Marks)				Duration of Exam (Hours)
			L	T	P			Mark of Class work	Theory	Practical	Total	
1	0401506	Computer Graphics	3	1	0	4	4	25	75		100	3
2	0401501	Programming using Java	3	1	0	4	4	25	75		100	3
3	0401502	Digital and Analog communication	3	1	0	4	4	25	75		100	3
4	0401507	Software Testing and Quality Assurance	3	1	0	4	4	25	75		100	3
5	0401504	Mobile Computing	2	0	0	2	2	10	40		50	2
6	0401506	Computer Graphics Lab	0	0	4	4	2	25		25	50	3
7	0401501	Programming using Java Lab	0	0	4	4	2	25		25	50	3
						Total Credits	22	160	340	50	550	

S. No.	Course code	Course Title	Hours per week			Total Contact hrs/week	Credit	Examination Schedule (Marks)				Duration of Exam (Hours)
			L	T	P			Mark of Class work	Theory	Practical	Total	
1	0401605	Data Warehouse and Data Mining	3	1	0	4	4	25	75		100	3
2	0401601	Java Script	3	1	0	4	4	25	75		100	3
3	0401603	Artificial Intelligence	3	1	0	4	4	25	75		100	3
4	0401606	Cloud Computing	3	1	0	4	4	25	75		100	3
5	0401601	Java script Lab	0	0	4	4	2	25		25	50	3
6	0401604	Major Project	0	0	4	4	4			100	100	3
						Total Credits	22	125	340	125	550	

SEMESTER 6th

Scheme of studies
Semester 1

Mathematics-1

Course code					
Category	Core Course				
Course title	**Mathematics I**				
Scheme and Credits	**L**	**T**	**P**	**Credits**	Semester-I
	3	**1**		**4**	
Class work	25 Marks				
Exam	75 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

UNIT – I:

DETERMINANTS: Definition, Minors, Cofactors, Properties of Determinants.

MATRICES: Definition, Types of Matrices, Addition, Subtraction, Scalar Multiplication and Multiplication of Matrices, Adjoint, Inverse, Cramers Rule, Rank of Matrix Dependence of Vectors, Eigen – Vectors of a Matrix, Caley-Hamilton Theorem (without proof)

UNIT – II:

LIMITS & CONTINUITY: Limit at a Point, Properties of Limit, Computation of Limits of Various Types of Functions, Continuity at a Point, Continuity Over an Interval, Intermediate Value Theorem, Type of Discontinuities.

UNIT-III:

DIFFERENTIATION: Derivative, Derivatives of Sum, Differences, Product & quotients, Chain Rule, Derivatives of Composite Functions, Logarithmic Differentiation, Rolle's Theorem, Mean Value Theorem, Expansion of Functions (Maclaurin's & Taylor's), Indeterminate Forms, L' Hospitals Rule, Maxima & Minima, Asymptote, Successive Differentiation & Liebnitz Theorem.

UNIT – IV:

INTEGRATION: Integral as Limit of Sum, Riemann Sum, Fundamental Theorem of Calculus, Indefinite Integrals, Methods of Integration Substitution, By Parts, Partial Fractions, Integration of Algebraic and 8ranscendental Functions, Reduction Formulae for Trigonometric Functions, Gamma and Beta Functions.

Suggested Readings:

1. Kresyig E., "Advanced Engineering Mathematics", 5th Edition, John Wiley & Sons,1999.

2. Babu Ram, "Engineering Mathematics", Pearson Education.

3. Apostol Tom M, Calculus, Vol I and II John Wiley (2003).

4. B.S. Grewal, "Elementary Engineering Mathematics", 34th Ed., 1998.

5. H.K. Dass, "Advanced Engineering Mathematics", S. Chand & Company, 9th Revised Edition, 2001.

6. Shanti Narayan, "Differential Calculas", S.Chand & Company, 1998.

Fundamentals of computer and IT

Course code					
Category	Core Course				
Course title	**Fundamentals of Computer and IT**				
Scheme and Credits	**L**	**T**	**P**	**Credits**	Semester-I
	3	**1**		**4**	
Class work	25 Marks				
Exam	75 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

UNIT-I:

Human Computer Interface Concepts of Hardware and Software; Data and Information.

Functional Units of Computer System: CPU, registers, system bus, main memory unit, cache memory, Inside a computer, SMPS, Motherboard, Ports and Interfaces, expansion cards, ribbon cables, memory chips, processors.

Devices: Input and output devices (with connections and practical demo), keyboard, mouse, joystick, scanner, OCR, OMR, bar code reader, web camera, monitor, printer, plotter. Memory: Primary, secondary, auxiliary memory, RAM, ROM, cache memory, hard disks, optical disks.

Data Representation: Bit, Byte, Binary, Decimal, Hexadecimal, and Octal Systems, Conversions and Binary Arithmetic (Addition/ Subtraction/ Multiplication) Applications of IT.

UNIT-II:

Concept of Computing, **Types of Languages**: Machine, assembly and High-level Language; Operating system as user interface, utility programs.

Word processing: Editing features, formatting features, saving, printing, table handling, page settings, spell-checking, macros, mail-merge, equation editors.

UNIT-III:

Spreadsheet: Workbook, worksheets, data types, operators, cell formats, freeze panes, editing features, formatting features, creating formulas, using formulas, cell references, replication, sorting, filtering, functions, Charts & Graphs.

Presentation Graphics Software: Templates, views, formatting slide, slides with graphs, animation, using special features, presenting slide shows.

UNIT-IV:

Electronic Payment System: Secure Electronic Transaction, Types of Payment System: Digital Cash, Electronic Cheque, Smart Card, Credit/Debit Card E-Money, Bit Coins and Crypto currency, Electronic Fund Transfer (EFT), Unified Payment Interface (UPI), Immediate Payment System (IMPS), Digital Signature and Certification Authority.

Introduction to Bluetooth, Cloud Computing, Big Data, Data Mining, Mobile Computing and Embedded Systems and Internet of Things (IoT).

Suggested Readings:

1. Introduction to Information Technology, ITL Education Solutions limited, Pearson Education

2. Computer Fundamentals, A. Goel, 2010, Pearson Education.

3. Fundamentals of Computers, P. K.Sinha & P. Sinha, 2007, BPB Publishers.

4. IT Tools, R.K. Jain, Khanna Publishing House

5. "Introduction to Information Technology", Satish Jain, Ambrish Rai & Shashi Singh, Paperback Edition, BPB Publications, 2014.

6. "Introduction to Computers", Peter Norton

7. Computers Today, D. H. Sanders, McGraw Hill.

8. "Computers", Larry long & Nancy long, Twelfth edition, Prentice Hall.

9. Problem Solving Cases in Microsoft Excel, Joseph Brady & Ellen F Monk, Thomson Learning

E Books/ Online learning material

1. www.sakshat.ac.in 2. https://swayam.gov.in/course/4067-computer-fundamentals

Fundamentals of computer and IT (Lab)

Course code					
Category	Core Course				
Course title	**Fundamentals of Computer and IT Lab**				
Scheme and Credits	**L**	**T**	**P**	**Credits**	Semester-I
	0	**0**	4	**2**	
Class work	25 Marks				
Exam	25 Marks				
Total	50 Marks				
Duration of Exam	03 Hours				

Word Orientation:

The instructor needs to give an overview of word processor. Details of the four tasks and features that would be covered Using word – Accessing, overview of toolbars, saving files, Using help and resources, rulers, format painter.

1. Using word to create Resume Features to be covered: - Formatting Fonts in word, Drop Cap in word, Applying Text effects, Using Character Spacing, Borders and Colors, Inserting Header and Footer, Using Date and Time option in Word.

2. Creating an Assignment Features to be covered: - Formatting Styles, Inserting table, Bullets and Numbering, Changing Text Direction, Cell alignment, Footnote, Hyperlink, Symbols, Spell Check, Track Changes.

3. Creating a Newsletter Features to be covered :- Table of Content, Newspaper columns, Images from files and clipart, Drawing toolbar and Word Art, Formatting Images, Textboxes and Paragraphs

4. Creating a Feedback form Features to be covered :- Forms, Text Fields, Inserting objects, Mail Merge in Word.

Excel Orientation:

The instructor needs to tell the importance of Excel as a Spreadsheet tool, give the details of the four tasks and features that would be covered Excel – Accessing, overview of toolbars, saving excel files,

1. Creating a Scheduler Features to be covered :- Gridlines, Format Cells, Summation, auto fill, Formatting Text

2. Calculations Features to be covered :- Cell Referencing, Formulae in excel – average, std.deviation, Charts, Renaming and Inserting worksheets, Hyper linking, Count function, LOOKUP/VLOOKUP

3. Performance Analysis Features to be covered :- Split cells, freeze panes, group and outline, Sorting, Boolean and logical operators, Conditional formatting

4. Game (like Cricket, badminton) Score Card Features to be covered :- Pivot Tables, Interactive Buttons, Importing Data, Data Protection, Data Validation.

Presentation Orientation:

1. Students will be working on basic power point utilities and tools which help them create basic power point presentation. Topic covered includes :- PPT Orientation, Slide Layouts, Inserting Text, Word Art, Formatting Text, Bullets and Numbering, Auto Shapes, Lines and Arrows

2. This session helps students in making their presentations interactive. Topics covered includes : Hyperlinks, Inserting –Images, Clip Art, Audio, Video, Objects, Tables and Charts

3. Concentrating on the in and out of Microsoft power point. Helps them learn best practices in designing and preparing power point presentation. Topics covered includes: - Master Layouts (slide, template, and notes), Types of views (basic, presentation, slide slotter, notes etc), Inserting – Background, textures, Design Templates, Hidden slides. Auto content wizard, Slide Transition, Custom Animation, Auto Rehearsing

4. Power point test would be conducted. Students will be given model power point presentation which needs to be replicated.

Internet and its Applications:

The instructor needs to tell the how to configure Web Browser and to use search engines by defining search criteria using Search Engines

1. To learn to setup an e-mail account and send and receive e-mails

2. To learn to subscribe/post on a blog and to use torrents for accelerated downloads

3. Hands on experience in online banking and Making an online payment for any domestic bill

Problem solving using C

Course code					
Category	Core Course				
Course title	**Problem solving using C**				
Scheme and Credits	**L**	**T**	**P**	**Credits**	Semester-I
	3	**1**		**4**	
Class work	25 Marks				
Exam	75 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

UNIT-I:

Logic Development: Data Representation, Flowcharts, Problem Analysis, Decision Trees/Tables, Pseudo code and algorithms.

Fundamentals: Character set, Identifiers and Key Words, Data types, Constants, Variables, Expressions, Statements, Symbolic Constants. Operations and **Expressions**: Arithmetic operators, Unary operators, Relational Operators, Logical Operators, Assignment and Conditional Operators, Library functions.

UNIT-II:

Data Input and Output: formatted & unformatted input output.

Control Statements: While, Do–while and For statements, Nested loops, If–else, Switch, Break – Continue statements.

UNIT-III:

Functions: Brief overview, defining, accessing functions, passing arguments to function, specifying argument data types, function prototypes, recursion.

Arrays: Defining, processing arrays, passing arrays to a function, multi– dimensional arrays.

Strings: String declaration, string functions and string manipulation Program Structure Storage Class: Automatic, external and static variables.

UNIT-IV:

Structures & Unions: Defining and processing a structure, user defined data types, structures and pointers, passing structures to functions, unions.

Pointers: Understanding Pointers, Accessing the Address of a Variable, Declaration and Initialization of Pointer Variables, Accessing a Variable through its Pointer, Pointers and Arrays

File Handling: File Operations, Processing a Data File.

Suggested Readings:

1. Programming in ANSI C, E. Balagurusami, Fourth Edition, Tata McGraw Hill.

2. Programming in C, Third Edition, Stephen G Kochan, Pearson.

3. The C Programming Language, Kernighan & Richie, Second Edition, PHI Publication.

4. Object Oriented Programming, Lafore R, Third Edition, Galgotia Publications

5. Let us C, Yashvant P Kanetkar, Seventh Edition, BPB Publications, New Delhi.

6. Programming in C, Byron S. Gottfried, Second Edition, McGraw Hills.

7. Problem Solving and Programming in C, R.S. Salaria, Second Edition

8. Programming in C, Atul Kahate.

Problem solving using C Lab

Course code					
Category	Core Course				
Course title	**Problem solving using C Lab**				
Scheme and Credits	**L**	**T**	**P**	**Credits**	Semester-I
	0	**0**	4	**2**	
Class work	25 Marks				
Exam	25 Marks				
Total	50 Marks				
Duration of Exam	03 Hours				

Assignments:

1. WRITE A PROGRAM to display your name. Write another program to print message with inputted name.

2. WRITE A PROGRAM to add two numbers.

3. WRITE A PROGRAM to find the square of a given number.

4. WRITE A PROGRAM to calculate the average of three real numbers.

5. Write a program to Find ASCII Value of a Character

6. WRITE A PROGRAM to Find the Size of int, float, double and char

7. WRITE A PROGRAM to Compute Quotient and Remainder

8. WRITE A PROGRAM to accept the values of two variables.

9. WRITE A PROGRAM to find the simple interest, inputs are amount, period in years and rate of interest.

10. Basic salary of an employee is input through the keyboard. The DA is 25% of the basic salary while the HRA is 15% of the basic salary. Provident Fund is deducted at the rate of 10% of the gross salary(BS+DA+HRA). WRITE A PROGRAM to calculate the net salary

11. WRITE A PROGRAM to find area of a circle using PI as constant

12. WRITE A PROGRAM to find volume of a cube using side as input from user

13. WRITE A PROGRAM using various unformatted Input Functions

14. WRITE A PROGRAM to find area of rectangle and print the result using unformatted output Functions

15. WRITE A PROGRAM to find the larger of two numbers.

16. WRITE A PROGRAM to find greater of three numbers using Nested If.

17. WRITE A PROGRAM to find whether the given number is even or odd.

18. WRITE A PROGRAM to Generate Multiplication Table Using for loop

19. WRITE A PROGRAM to Generate Multiplication Table Using while loop

20. WRITE A PROGRAM to Make a Simple Calculator Using switch...case

21. WRITE A PROGRAM to find whether the given number is a prime number.

22. WRITE A PROGRAM using function to find the largest of three numbers

23. WRITE A PROGRAM using function to print first 20 numbers and its squares.

24. WRITE A PROGRAM to find the factorial of a given number.

25. WRITE A PROGRAM to print the sum of two matrices

26. WRITE A PROGRAM to Find the Length of a String

27. WRITE A PROGRAM to Copy String using strcpy()

28. WRITE A PROGRAM to compare a string

29. WRITE A PROGRAM to reverse a string

30. WRITE A PROGRAM to reverse a string

31. WRITE A PROGRAM to multiply two numbers using pointers.

32. WRITE A PROGRAM to display address of variable using pointers

33. WRITE A PROGRAM to show the memory occupied by Structure and Union

34. WRITE A PROGRAM to create Student I-Card using a Structure

35. WRITE A PROGRAM to read data from a file from a file

36. WRITE A PROGRAM to save Employee details in a file using File Handling.

English

Course code					
Category					
Course title	**English**				
Scheme and Credits	**L**	**T**	**P**	**Credits**	Semester-I
	0	**0**	2	**2**	
Class work	10				
Exam	40 Marks				
Total	50 Marks				
Duration of Exam	02 Hours				

UNIT- I (Introduction)

• Theory of Communication

• Types and modes of Communication

UNIT- II (Language of Communication)

• Verbal and Non-verbal

• (Spoken and Written)

• Personal, Social and Business

• Barriers and Strategies

• Intra-personal, Inter-personal and Group communication

UNIT-III (Reading and Understanding)

• Close Reading

• Comprehension

• Summary Paraphrasing Analysis and Interpretation

• Translation(from Hindi/Punjabi to English and vice-versa) OR Precis writing /Paraphrasing (for International Students)

• Literary/Knowledge Texts

UNIT-IV (Writing Skills)

• Documenting

• Report Writing

• Making notes

• Letter writing

Suggested Readings:

1. Fluency in English – Part II, Oxford University Press, 2006.

2. Business English, Pearson, 2008.

3. Language, Literature and Creativity, Orient Blackswan, 2013.

4. Language through Literature (forthcoming) ed. Dr. Gauri Mishra, Dr Ranjana Kaul, Dr Brati Biswas

5. On Writing Well. William Zinsser. Harper Resource Book. 2001 6. Study Writing. Liz Hamp-Lyons and Ben Heasly. Cambridge University Press. 2006.

English Lab

Course code					
Category					
Course title	**English Lab**				
Scheme and Credits	**L**	**T**	**P**	**Credits**	Semester-I
	0	**0**	2	**2**	
Class work	25 Marks				
Exam	25 Marks				
Total	50 Marks				
Duration of Exam	03 Hours				

Interactive practice sessions in Language Lab on Oral Communication.

• Listening Comprehension

• Self Introduction, Group Discussion and Role Play

• Common Everyday Situations: Conversations and Dialogues

• Communication at Workplace

• Interviews

• Formal Presentations

• Monologue

• Effective Communication/ Mis- Communication

• Public Speaking

Suggested Readings:

1. Fluency in English – Part II, Oxford University Press, 2006.

2. Business English, Pearson, 2008.

3. Practical English Usage. Michael Swan. OUP. 1995.

4. Communication Skills. Sanjay Kumar and Pushp Lata. Oxford University Press. 2011.

5. Exercises in Spoken English. Parts. I-III. CIEFL, Hyderabad. Oxford University Press

Scheme of studies
Semester 2

Mathematics-II

Course code					
Category	Core Course				
Course title	**Mathematics-II**				
Scheme and Credits	**L**	**T**	**P**	**Credits**	Semester-II
	3	**1**		**4**	
Class work	25 Marks				
Exam	75 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

UNIT I

SETS: Sets, Subsets, Equal Sets Universal Sets, Finite and Infinite Sets, Operation on Sets, Union, Intersection and Complements of Sets, Cartesian Product, Cardinality of Set, Simple Applications.

RELATIONS AND FUNCTIONS: Properties of Relations, Equivalence Relation, Partial Order Relation Function: Domain and Range, Onto, Into and One to One Functions, Composite and Inverse Functions, Hashing functions, Recursive function.

UNIT – II

PARTIAL ORDER RELATIONS AND LATTICES:

Partial Order Sets, Representation of POSETS using Hasse diagram, Chains, Maximal and Minimal Point, Glb, lub, Lattices & Algebric Systems, Principle of Duality, Basic Properties, Sublattices, Distributed & Complemented Lattices.

UNIT-III

Graphs: types and operations(bipartite graph. Subgraph, distance of a graph, cut-edges & cut vertices, isomorphic and homomorphic graphs), degree of graphs, adjacent and incidence matrices, path circuit(Floyd's and Warshall algorithms), hamiltonian graph, graph colouring.

UNIT – IV

Propositional Logic: Proposition, First order logic, Basic logical operation, truth tables, tautologies, contradictions, Algebra of Proposition, logical implications, logical equivalence, predicates, Universal and existential quantifiers.

Suggested Readings:

1. Rosen, K.H., Discrete Mathematics and its Applications, McGraw Hill, (2006) 6 th ed.

2. Kolman, Busby and Ross, "Discrete Mathematical Structure", PHI, 1996.

3. Babu Ram, "Discrete Mathematics", Pearson Education

4. S.K. Sarkar, "Discrete Maths"; S. Chand & Co., 2000.

5. Tremblay, J.P. and Manohar, R., Discrete Mathematical Structures with Applications to Computer Science, Tata McGraw Hill, (2007)

Digital Logic and Circuit Design

Course code					
Category	Core Course				
Course title	**Digital Logic and Circuit Design**				
Scheme and Credits	**L**	**T**	**P**	**Credits**	Semester-II
	3	**1**		**4**	
Class work	25 Marks				
Exam	75 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

UNIT - I

Number system and codes: Binary, octal, hexadecimal and decimal Number systems and their inter conversion, BCD numbers (8421-2421), gray code, excess–3 code, cyclic code, code conversion, ASCII, EBCDIC codes. Binary addition and subtraction, signed and unsigned binary numbers, 1's and 2's complement representation.

UNIT - II

Boolean Algebra: Basic logic circuits: Logic gates (AND, OR, NOT, NAND, NOR, Ex-OR, ExNOR and their truth tables,), Universal Gates, Laws of Boolean algebra, De-Morgan's theorem, Min term, Max term, POS, SOP, KMap, Simplification by boolean theorems, don't care condition

UNIT – III

Combinational Logic: The Half adder, the full adder, subtractor circuit. Multiplxer demultiplexer, decorder, BCD to seven segment Decorder,encoders.

UNIT - IV

Flip flop and Timing circuit : set-reset laches, D-flipflop, R-S flip-flop, J-K Flip-flop, Master slave Flip flop, edge triggered flip-flop, T flip-flop.

6. Registers & Counters: Synchronous/Asynchronous counter operation,Up/down synchronous counter, application of counter, Serial in/Serial out shift register, Serial in/Serial out shift register, Serial in/parallel out shift register, parallel in/ parallel out shift register, parallel in/Serial out shift register, Bi-directional register.

Registers, shift registers, counters, synchronous and asynchronous counters, Johnson counter, Ring Counter.

Suggested Readings:

1. Gill, Nasib Singh and Dixit J.B.: Digital Design and Computer Organisation, University Science Press (Laxmi Publications), New Delhi.
2. M. Morris Mano, Digital Logic and Computer Design, Prentice Hall of India Pvt. Ltd.
3. V. Rajaraman, T. Radhakrishnan, An Introduction to Digital Computer Design, Prentice Hall of India Pvt. Ltd.
4. Andrew S. Tanenbaum, Structured Computer Organization, Prentice Hall of India Pvt. Ltd.
5. Nicholas Carter, Schaum's Outlines Computer Architecture, Tata McGraw-Hill

Operating system

Course code					
Category	Core Course				
Course title	**Operating system**				
Scheme and Credits	**L**	**T**	**P**	**Credits**	Semester-II
	3	**1**		**4**	
Class work	25 Marks				
Exam	75 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

UNIT I

Fundamentals of Operating system: Introduction to Operating system, Functions of an operating system. Operating system as a resource manager. Structure of operating system (Role of kernel and Shell). Views of operating system. Evolution and types of operating systems.

Process & Thread Management: Program vs. Process; PCB, State transition diagram, Scheduling Queues, Types of schedulers, Concept of Thread, Benefits, Types of threads.

UNIT II

CPU Scheduling: Need of CPU scheduling, CPU I/O Burst Cycle, Preemptive vs. Non-pre-emptive scheduling, Different scheduling criteria's, scheduling algorithms (FCSC, SJF, Round-Robin, Multilevel Queue).

Process Synchronization: Background, The Critical-Section Problem, Synchronization Hardware, Semaphores, Classical Problems of Synchronization.

UNIT-III

Memory Management: Background, Logical versus Physical Address space, address binding, relocation, swapping, Contiguous allocation, Paging, Segmentation.

Virtual Memory: Demand Paging, Page Replacement, Page-replacement Algorithms, Performance of Demand Paging, Allocation of Frames, Thrashing.

UNIT IV

Deadlocks: System Model, Deadlock Characterization, Methods for Handling Deadlocks, Deadlock Prevention, Deadlock Avoidance, Deadlock Detection, Recovery from Deadlock

Device Management: Techniques for Device Management, Dedicated Devices, Shared Devices, Virtual Devices; Input or Output Devices, Storage Devices, Buffering, Secondary Storage Structure: Disk Structure, Disk Scheduling, Disk Management, Swap-Space Management, Disk Reliability.

File Management: Basic concepts, file operations, access methods, directory structures and management, remote file systems; file protection.

Case study of Linux operating system.

Suggested Readings:

1. Abraham Silberschatz, Peter B. Galvin, " Operating System Concepts", Addison-Wesley publishing. Co., 7th.Ed., 2004.
2. Nutt Gary, "Operating Systems", Addison Wesley Publication, 2000.
3. Andrew S. Tannenbaum, "Modern Operating Systems", Pearson Education Asia, Second Edition, 2001.
4. William Stallings, "Operating Systems, "Internals and Design Principles", 4th Edition, PH,2001.
5. EktaWalia, "Operating Systems Concepts", Khanna Publishes, New Delhi, 2002

Operating System Lab

Course code					
Category	Core Course				
Course title	**Operating System Lab**				
Scheme and Credits	**L**	**T**	**P**	**Credits**	Semester-II
	0	**0**	4	**2**	
Class work	25 Marks				

Exam	25 Marks
Total	50 Marks
Duration of Exam	03 Hours

1. Vi Editor & its commands

2. Shell Commands

3. Shell Scripting- Using variables

4. Shell Scripting- Input & Output

5. Shell Scripting- Data types

6. Shell Scripting- Use of arithmetic operators

7. Shell Scripting- if control statement programs

8. Shell Scripting- while control statement

9. Shell Scripting- for control statement

Web Technologies

Course code					
Category	Core Course				
Course title	**Web Technologies**				
Scheme and Credits	**L**	**T**	**P**	**Credits**	Semester-II
	2	**0**		**2**	
Class work	10 Marks				
Exam	40 Marks				
Total	50 Marks				
Duration of Exam	02 Hours				

UNIT – I

History of the Internet and World Wide Web, Search Engines, News-group, E-mail and its Protocols, Web Portal, Browsers and their versions, Its functions, URLs, web sites, Domain names, Portals.

Web design: Concepts of effective web design, Web design issues including Browser, Bandwidth and Cache, Display resolution, Look and feel of website, Page layout and linking, Designing effective navigation.

Unit-II

HTML - Basics of HTML, formatting and fonts, commenting code, color, hyperlink, lists, tables, images, forms, XHTML, Meta tags, Character entities, frames and frame sets, Browser architecture and Web site structure. Overview and features of HTML5.

Style sheets : Need for CSS, introduction to CSS, basic syntax and structure, using CSS, background images, colors and properties, manipulating texts, using fonts, borders and boxes, margins, padding lists, positioning.

UNIT – III

Introduction to Java Script: Data Types, Control Statements, operators, Built in and User Defined Functions, Objects in Java Script, Handling Events.

DHTML : Introduction to DHTML, JavaScript & DHTML, Document Object Model, Filters and Transitions, DHTML Events, Dynamically change style to HTML Documents.

Unit-IV

Introduction to WYSIWYG Design tools, Introduction to Dreamweaver, Website Creation and maintenance, Web Hosting and Publishing Concepts, XML: Introduction to XML-Mark up languages, Features of Mark up languages, XML Naming rules, Building block of XML Document, Difference between HTML & XML Components of XML, XML Parser, DTD's Using XML with HTML and CSS.

Suggested Readings:

1. The complete reference HTML, by Thomas A powell, TMH publication.

2. Mastering HTML 4.0 by Deborah S. Ray and Erich J. Ray. BPB Publication.

3. Internet and World Wide Web Deitel HM, Deitel ,Goldberg , Third Edition

4. HTML Black Book , Stephen Holzner, Wiley Dreamtech.

5. Rajkamal, "Web Technology", Tata McGraw-Hill, 2001.

6. Jeffrey C. Jackson, "Web Technologies : A Computer Science Perspective", Pearson.

7. XML How to Program by Deitel Deitel Nieto.

Web Technologies Lab

Course code	

Category	Core Course				
Course title	**Web Technologies Lab**				
Scheme and Credits	**L**	**T**	**P**	**Credits**	Semester-II
	0	**0**	4	**2**	
Class work	25 Marks				
Exam	25 Marks				
Total	50 Marks				
Duration of Exam	03 Hours				

Practical list should be prepared based on the content of the subject with following guidelines in mind. 1. Entire syllabus should be covered.

2. Practical list should be designed with real life examples.

3. List should be prepared to cover individual concepts and integration of different concepts on real life problems.

Database Management Systems

Course code					
Category	Core Course				
Course title	**Database Management systems**				
Scheme and Credits	**L**	**T**	**P**	**Credits**	Semester-II
	3	**1**		**4**	
Class work	25 Marks				
Exam	75 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

UNIT-I

Introduction: An overview of database management system, database system Vs file system, Characteristics of database approach, DBMS architecture , data models, schema and instances, data independence.

Data Modeling using Entity Relationship Model: Entity, Entity types, entity set, notation for ER diagram, attributes and keys, Concepts of composite,derived and multivalued attributes, Super Key, candidate key, primary key, relationships, relation types, weak entities, enhanced E-R and object modeling, Sub Classes:, Super classes, inheritance, specialization and generalization.

UNIT-II

Introduction to SQL: Overview , Characteristics of SQL. Advantage of SQL, SQL data types and literals.

Types of SQL commands: DDL, DML, DCL. Basic SQL Queries.

Logical operators :BETWEEN, IN, AND, OR and NOT

Null Values: Disallowing Null Values, Comparisons Using Null Values Integrity constraints: Primary Key, Not NULL, Unique, Check, Referential key Introduction to Nested Queries, Correlated Nested Queries, Set-Comparison Operators, Aggregate Operators: The GROUP BY and HAVING Clauses,

Joins: Inner joins, Outer Joins, Left outer, Right outer, full outer joins. Overview of views and indexes.

UNIT III

Relational Data Model: Relational model terminology domains, Attributes, Tuples, Relations, characteristics of relations, relational constraints domain constraints, key constraints and constraints on null, relational DB schema.Codd's Rules

Relational algebra: Basic operations selection and projection, Set Theoretic operations Union, Intersection, set difference and division,

Data Normalization: Functional dependencies, Armstrong's inference rule, Normal forms.

UNIT IV

Transaction processing and Concurrency Control: Definition of Transaction, DesirableACID properties, overview of serializability, serializable and non serializable transactions

Concurrency Control: Definition of concurrency, lost update, dirty read and incorrect summary problems due to concurrency

Concurrency Control Techniques: Overview of Locking,2PL,Timstamp ordering, multiversioning, validation

Elementary concepts of Database security: system failure, Backup and Recovery Techniques, authorization and authentication.

Suggested Readings:

1. R. Elmarsi and SB Navathe, "Fundamentals of Database Systems", Pearson,5th Ed.

2. Singh S.K., "Database System Concepts, design and application", Pearson Education

3. Ramakrishnan and Gherke, "Database Management Systems", TMH.

4. Abraham Silberschatz, Henry Korth, S. Sudarshan, "Database Systems Concepts", 4th Edition, McGraw Hill, 1997.

5. Jim Melton, Alan Simon, "Understanding the new SQL: A complete Guide", Morgan Kaufmann Publishers, 1993.

6. A. K. Majumdar, P. Battacharya, "Data Base Management Systems', TMH, 1996.

7. Bipin Desai, "An Introduction to database Systems", Galgotia Publications, 1991

Data Base Management System Lab

Course code					
Category	Core Course				
Course title	**Database Management System Lab**				
Scheme and Credits	**L**	**T**	**P**	**Credits**	Semester-II
	0	**0**	4	**2**	
Class work	25 Marks				
Exam	25 Marks				
Total	50 Marks				
Duration of Exam	03 Hours				

My Access/MySQL may be used. The following concepts must be introduced to the students:

DDL Commands • Create table, alter table, drop table

DML Commands • Select , update, delete, insert statements • Condition specification using Boolean and comparison operators (and, or, not,=,<>,>,=,<=) • Arithmetic operators and aggregate functions(Count, sum, avg, Min, Max) • Multiple table queries (join on different and same tables) • Nested select statements • Set manipulation using (any, in, contains, all, not in, not contains, exists, not exists, union, intersect, minus, etc.) • Categorization using group by……..having • Arranging using order by

1. Create tables with relevant foreign key constraints

2. Populate the tables with data

3. Perform the following queries on the database: 1. Display all the details of all employees working in the company. 2. Display ssn, lname, fname, address of employees who work in department no 7. 3. Retrieve the birthdate and address of the employee whose name is 'Franklin T. Wong

4. Retrieve the name and salary of every employee

5. Retrieve all distinct salary values

6. Retrieve all employee names whose address is in ‘Bellaire’

7. Retrieve all employees who were born during the 1950s

8. Retrieve all employees in department 5 whose salary is between 50,000 and 60,000(inclusive)

9. Retrieve the names of all employees who do not have supervisors

10. Retrieve SSN and department name for all employees

11. Retrieve the name and address of all employees who work for the 'Research' department

12. For every project located in 'Stafford', list the project number, the controlling department number, and the department manager's last name, address, and birthdate.

13. For each employee, retrieve the employee's name, and the name of his or her immediate supervisor.

14. Retrieve all combinations of Employee Name and Department Name

15. Make a list of all project numbers for projects that involve an employee whose last name is 'Narayan' either as a worker or as a manager of the department that controls the project.

16. Increase the salary of all employees working on the 'ProductX' project by 15%. Retrieve employee name and increased salary of these employees.

17. Retrieve a list of employees and the project name each works in, ordered by the employee's department, and within each department ordered alphabetically by employee first name.

18. Select the names of employees whose salary does not match with salary of any employee in department

19. Retrieve the name of each employee who has a dependent with the same first name and same sex as the employee

20. Retrieve the employee numbers of all employees who work on project located in Bellaire, Houston, or Stafford.

Scheme of studies
Semester 3

Computer Networks

Course code					
Category	Core Course				
Course title	**Computer Networks**				
Scheme and Credits	**L**	**T**	**P**	**Credits**	Semester-III
	3	**1**	0	**4**	
Class work	25 Marks				
Exam	75 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

UNIT-I

Basic concepts: network definition, components of data communication, distributed processing, topology, transmission mode, categories of networks.

OSI and TCP/IP models: layers and their functions, comparison of models. Digital transmission: modems, cable modems. Analog and digital signal; data-rate and limits; digital to digital line encoding schemes; parallel and serial transmission; modulation scheme, multiplexing techniques FDM, TDM, transmission media.

UNIT-II

Networks switching techniques and access mechanisms, circuit switching; packet switching, message switching, connection-oriented virtual circuit switching; dial-up modems; digital subscriber, data link layer functions and protocol, error detection and error correction techniques, data -link control framing and flow control, error recovery protocols - stop and wait ARQ, go-back-n ARQ; point to point protocol.

UNIT-III

Multiple access protocol and networks, ALOHA, SLOTTED ALOHA, CSMA/CD, protocols; Ethernet LANS, Token Ring, Token Bus, back-bone networks, network adapters cards, repeaters, hubs, switches, bridges, types of bridges, router and gateways.

Networks layer functions and protocols, routing: routing algorithms distance vector routing; shortest path routing, network layer protocol, IP protocol, internet control protocols, Unicasting, multicasting, broadcasting, ISDN.

UNIT-IV

Transport layer functions and protocols, overview of TCP and UDP, transport services error and flow control, connection establishment and release, three way handshake, overview of session layer and presentation layer, overview of application layer protocol overview of DNS protocol, overview of internet, WWW, HTTP, FTP, SNMP protocol. Internet services, email services, www services, search service etc.

References:

1. B. A. Forouzan: Data Communications and Networking, Fourth edition, THM, °
2. A.S. Tanenbaum: Computer Networks, Fourth edition PHI. °
3. Ames Chews Charles Perkins, Matthew Strebe "Networking Essentials: Study Guide "MCSE BPB Publications. °
4. K.Basandra& S. Jaiswal "Local Area Network" Galgotia Publications °
5. William Stalling "Data and Computer Communication" Pearson Prentice Hall °

OOPs using C++

Course code					
Category	Core Course				
Course title	**OOPs using C++**				
Scheme and Credits	**L**	**T**	**P**	**Credits**	Semester-III
	3	**1**	0	**4**	
Class work	25 Marks				
Exam	75 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

UNIT-I

Concepts of OOP : Introduction OOP, Procedural Vs. Object Oriented Programming, Principles of OOP, Benefits and applications of OOP.

C++ Basics : Overview, Program structure, namespace, identifiers, variables, constants, enum, operators, typecasting, control structures.

UNIT-II

C++ Functions : Simple functions, Call and Return by reference, Inline functions, Macro Vs. Inline functions, Overloading of functions, default arguments, friend functions, virtual functions.

Objects and Classes : Basics of object and class in C++, Private and public members, static data and function members, constructors and their types, destructors, operator overloading, type conversion.

UNIT-III

Inheritance : Concept of Inheritance, types of inheritance: single, multiple, multilevel, hierarchical, hybrid, protected members, overriding, virtual base class.

Polymorphism : Pointers in C++, Pointes and Objects, this pointer, virtual and pure virtual functions, Implementing polymorphism.

UNIT-IV

I/O and File Management : Concept of streams, cin and cout objects, C++ stream classes, Unformatted and formatted I/O, manipulators, File stream, C++ File stream classes, File management functions, File modes, Binary and random Files.

Templates, Exceptions and STL : What is template? function templates and class templates, Introduction to exception, try-catch-throw, multiple catch, catch all, rethrowing exception, implementing user defined exceptions, Overview and use of Standard Template Library.

References:

1. Object Oriented Programming With C++, E Balagurusamy, TMH

2. C++ Programming, Black Book, Steven Holzner, dreamtech

3. Object Oriented Programming in Turbo C++, Robert Lafore, Galgotia

4. Object Oriented Programming with ANSI and Turbo C++, Ashok Kamthane, Pearson

5. The Compete Reference C++, Herbert Schlitz, TMH

OOPs using C++ Lab

Course code					
Category	Core Course				
Course title	**OOPs using C++ Lab**				
Scheme and Credits	**L**	**T**	**P**	**Credits**	Semester-III
	0	**0**	4	**2**	
Class work	25 Marks				
Exam	25 Marks				
Total	50 Marks				
Duration of Exam	03 Hours				

1. Write a C++ program to find the sum of individual digits of a positive integer.
2. Write a C++ program to generate the first n terms of the sequence.
3. Write a C++ program to generate all the prime numbers between 1 and n, where n is a value supplied by the user.
4. Write a C++ program to find both the largest and smallest number in a list of integers.

5. Write a program Illustrating Class Declarations, Definition, and Accessing Class Members.
6. Program to illustrate default constructor, parameterized constructor and copy constructors
7. Write a Program to Demonstrate the i) Operator Overloading. ii) Function Overloading.
8. Write a Program to Demonstrate Friend Function and Friend Class.
9. Write a Program to Access Members of a STUDENT Class Using Pointer to Object Members
10. Write C++ programs that illustrate how the following forms of inheritance are supported: a)Single inheritance b)Multiple inheritance c)Multi level inheritance d)Hierarchical inheritance.
11. Write a C++ program that illustrates the order of execution of constructors and destructors when new class is derived from more than one base class.
12. Write a Template Based Program to Sort the Given List of Elements.
13. Write a C++ program that uses function templates to find the largest and smallest number in a list of integers and to sort a list of numbers in ascending order.
14. Write a Program Containing a Possible Exception. Use a Try Block to Throw it and a Catch Block to Handle it Properly.
15. Write a Program to Demonstrate the Catching of All Exceptions.

Data Structures

Course code					
Category	Core Course				
Course title	**Data Structures**				
Scheme and Credits	**L**	**T**	**P**	**Credits**	Semester-III
	3	**1**	0	**4**	
Class work	25 Marks				
Exam	75 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

UNIT – I

Introduction: Elementary data organization, Data Structure definition, Data type vs. data structure, Categories of data structures, Data structure operations, Algorithms complexity and time-space tradeoff, Big-oh notation.

Strings: Introduction, Storing strings, String operations.

UNIT – II

Arrays: Linear arrays, Representation of linear array in memory, traversal, Insertions, Deletion in an array, Multidimensional arrays, Parallel arrays, Sparse arrays.

Linked List:Array vs. linked list, Representation of linked lists in memory, Traversal, Insertion, Deletion, Searching in a linked list, Header linked list, Circular linked list, Two-way linked list, Threaded lists, Garbage collection, Applications of linked lists.

UNIT – III

Stack: Introduction, Array and linked representation of stacks, Operations on stacks, Applications of stacks: Polish notation, Recursion.

Queues: Introduction, Array and linked representation of queues, Operations on queues, Deques, Priority Queues, Applications of queues.

UNIT – IV

Tree: Definition, Representing Binary tree in memory,Header nodes, Traversing binary trees, Threads, Binary search trees, m-way search tree, B-trees, B+tree.

Graph: Graph theory terminology, Sequential and linked representation of graphs. Dijkstra algorithm for shortest path. Sorting: Internal & external sorting, Radix sort, Quick sort, Heap sort, Merge sort.

References:

1. Seymour Lipschutz, "Data Structure", Tata-McGraw-Hill
2. Horowitz, Sahni& Anderson-Freed, "Fundamentals of Data Structures in C", Orientlongman.
3. Trembley, J.P. And Sorenson P.G., "An Introduction to Data Structures With Applications", Mcgrraw- Hill International Student Edition, New York.
4. Mark Allen Weiss, "Data Structures and Algorithm Analysis in C", Addison- Wesley, (An Imprint Of Pearson Education), Mexico City.Prentice- Hall Of India Pvt. Ltd.,New delhi.

Data Structures Lab

Course code					
Category	Core Course				
Course title	**Data Structures Lab**				
Scheme and Credits	**L**	**T**	**P**	**Credits**	Semester-III
	0	**0**	4	**2**	
Class work	25 Marks				
Exam	25 Marks				
Total	50 Marks				
Duration of Exam	03 Hours				

1. Program to maintain a Linked List.

2. Program to add a new node to the ascending order Linked List.

3. Program to maintain a Doubly Linked List.

4. Program to implement Stack as an Array.

5. Program to implement Stack as a Linked List.

6. Program to convert an A.E. from Infix form to Postfix form.

7. Program to evaluate an Expression entered in Postfix form.

8. Program to Implement Non-Recursive function for Factorial of a Number.

9. Program to Implement Recursive function for Factorial of a Number.

10. Program to implement a Queue as an Array.

11. Program to implement a Queue as a Linked List.

12. Program to implement a Circular Queue as an Array.

13. Program to implement a Circular Queue as a Linked List.

14. Program to implement a Deque using an Array.

15. Program to implement Linear Search in an unsorted Array.

16. Program to implement Binary Search in a sorted Array.

17. Program to implement Selection Sort.

18. Program to implement Insertion Sort (The program should report the number of comparisons).

19. Program to implement Bubble Sort.

20. Program to implement Quick Sort.

E-commerce

Course code					
Category	Skill enhancement Course				
Course title	**E-commerce**				
Scheme and Credits	**L**	**T**	**P**	**Credits**	Semester-III
	2	**0**	0	**2**	
Class work	10 Marks				
Exam	40 Marks				
Total	50 Marks				
Duration of Exam	02 Hours				

UNIT – I

Introduction to E-Commerce: Defining Commerce; Main Activities of Electronic Commerce; Benefits of E-Commerce; Broad Goals of Electronic Commerce; Main Components of E-Commerce; Functions of Electronic Commerce – Communication, Process Management, Service Management, Transaction Capabilities; Process of E-Commerce; Types of E-Commerce; Role of Internet and Web in E-Commerce; Technologies Used; E-Commerce Systems; Pre-requisites of E-Commerce; Scope of E-Commerce; E-Business Models.

UNIT-II

E-Commerce Activities: Various Activities of E-Commerce; Various Modes of Operation Associated with E-Commerce; Matrix of E-Commerce Types; Elements and Resources Impacting E-Commerce and Changes; Types of E-Commerce Providers and Vendors; Man Power Associated with E-Commerce Activities; Opportunity Development for E-Commerce Stages; Development of E-Commerce Business Case; Components and Factors for the Development of the Business Case; Steps to Design and Develop an E-Commerce Website.

UNIT-III

E-Security: Security on the Internet; Network and Website Security Risks – Denial-of-Service attacks, Viruses, Unauthorized access to a computer network; Vulnerability of Internet Sites; Network and Website Security – Transaction security and data protection, Security audits and penetration testing; E-Business Risk Management Issues;

UNIT – IV

M-Commerce: The Origin of M-Commerce, The Application of M-Commerce, Difference between E-commerce and M-Commerce

Electronic Payment System: Electronic Cash, Electronic Wallets, Smart Card, Credit and Change Card.

E-Payment Systems: Electronic Funds Transfer; Digital Token Based E-Payment Systems; Modern Payment Systems; Steps for Electronic Payment; Payment Security; Net Banking.

References:

1. Suhila Madan,E-Commerce,Mayur paperbacks.
2. Renu Gupta ,E-Commerce ,Shree Mahavir book depot publications
3. P.T.Joseph,S.J.E-COMMERCE an Indian perspective,PHI Learing private limited.
4. David whitely, E-commerce Strategy, Technology and application, Tata McGraw Hill.

Information Technology Trends

Course code					
Category	Core Course				
Course title	**Information Technology Trends**				
Scheme and Credits	**L**	**T**	**P**	**Credits**	Semester-III
	3	**1**	0	**4**	
Class work	25 Marks				
Exam	75 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

UNIT–I

E-governance, e-democracy, Government efforts to encourage citizen participation, PPP model, E-governance websites & services, MPONLINE services, UIDI & Aadhar, E-governance mobile apps like UMANG, digital locker, digital library. various site for e-governance. National E-Governance Plan (NeGP).

Introduction to cyber crime, types of attacks like Spyware, Malware, Spam Mail, Logic bombs, Denial of Service, Types of Cyber Crime : Email Fraud, Phishing, Spoofing, Hacking, Identity Theft.

UNIT–II

E-Commerce- Introductions, Concepts, Advantages and Disadvantages, Technology in ECommerce, Benefits and Impact of E-Commerce

Electronic Payment Systems: Introduction, Types of Electronic Payment Systems, RTGS, IMPS, NEFT, Payment Gateway, Debit & Credit Card, Internet Banking, Mobile Wallet, UPI, BHIM, PAYTM app, Online Shopping, Online Marketing.

UNIT–III

Introduction to Wireless Communication, Blue Tooth, WiFi, WiMax, LiFi, Mobile Technology, 2G, 3G, 4G, 5G services, IMEI, SIM, IP Telephony, Soft Phone, Voice Mail, Adhoc & Sensor Networks, GIS, ISP, Mobile Computing, Cellular System Cell, Mobile Switching Office, Hands off, Base Station. Mobile OS (Symbian/Blackberry/Windows/Android/iPhone), Features and limitations, Types of Mobile apps.

UNIT-IV

Artificial Intelligence and Expert system-Concepts of AI & Expert Systems, Merits and Demerits of Expert system, Application of Expert system and AI. Cloud Computing– Introduction, Types, Application, Services, Google Play Store, Apple Store, Need of Cloud Computing, Concept of Virtualization, Cloud Types, Cloud Services IOT– Introduction, Application & Use, Machine Learning: Introduction and Uses. Big data– Introduction, Application & Use.

References:

1. Fundamentals of Information Technology by Alex Leon & Mleon, Vikas Publications. °
2. Frontiers of Electronic Commerce, by- Kalakota, Ravi; Stone, Tom. °
3. E-Commerce an Indian Perspective (Second Edition) by Pt Joseph, S.J. Prentice-Hall Of India. °
4. Recent Magazines of Computers and Communication. °
5. System Analysis & Design by V K Jam, Dreamtech Press. °
6. Modern System Analysis & Design by A Hoffer, F George, S Valaciah, Low Priced Edn. Pearson Education. °

7. Information Technology & Computer Applications by V K. Kapoor, Sultan Chand & Sons, New Delhi. °
8. IT Trends &Technologiesby Narendra Tiwari Publisher: Narendra Publication °

Scheme of studies
Semester 4

Software Engineering

Course code					
Category	Core Course				
Course title	**Software Engineering**				
Scheme and Credits	**L**	**T**	**P**	**Credits**	Semester-III
	3	**1**	0	**4**	
Class work	25 Marks				
Exam	75 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

UNIT – I

Introduction: The process, software products, emergence of software engineering, evolving role of software, software life cycle models, Software Characteristics, Applications, Software crisis.

Software project management: Project management concepts, software process and project metrics Project planning, project size estimation metrics, project estimation Techniques, empirical estimation techniques, COCOMO- A Heuristic estimation techniques, staffing level estimation, team structures, staffing, risk analysis and management, project scheduling and tracking

UNIT – II

Requirements Analysis and specification requirements engineering, system modeling and simulation Analysis principles modeling, partitioning Software, prototyping: , Prototyping methods and tools; Specification principles, Representation, the software requirements specification and reviews Analysis Modeling: Data Modeling, Functional modeling and information flow: Data flow diagrams, Behavioral Modeling; The mechanics of structured analysis: Creating entity/ relationship diagram, data flow model, control flow model, the control and process specification; The data dictionary; Other classical analysis methods.

System Design: Design concepts and principles: the design process: Design and software quality, design principles; Design concepts: Abstraction, refinement, modularity, software architecture, control hierarchy, structural partitioning, data structure, software procedure, information hiding; Effective modular design: Functional independence, Cohesion, Coupling;

UNIT - III

Architectural Design: Software architecture, Data Design: Data modeling, data structures, databases and the data warehouse, Analyzing alternative Architectural Designs, architectural complexity; Mapping requirements into a software architecture; Transform flow, Transaction flow; Transform mapping: Refining the architectural design.

Testing and maintenance: Software Testing Techniques, software testing fundamentals: objectives, principles, testability; Test case design, white box testing, basis path testing: Control structure testing: Black box testing, testing for specialized environments, architectures and applications. Software Testing Strategies: Verification and validation, Unit testing, Integration testing, Validation testing, alpha and beta testing; System testing: Recovery testing, security testing, stress testing, performance testing; The art of debugging, the debugging process debugging approaches. Software re-engineering, reverse engineering, restructuring, forward engineering.

UNIT - IV

Software Reliability and Quality Assurance :Quality concepts, Software quality assurance , SQA activities; Software reviews: cost impact of software defects, defect amplification and removal; formal technical reviews: The review meeting, review reporting and record keeping, review guidelines; Formal approaches to SQA; Statistical software quality assurance; software reliability: Measures of reliability and availability ,The ISO 9000 Quality standards: The ISO approach to quality assurance systems, The ISO 9001 standard, Software Configuration Management. Computer Aided software Engineering: CASE, building blocks, integrated case environments and architecture, repository.

References:

1. Gill, NasibSingh : Software Engineering, Khanna Book Publishing Co. (P) Ltd. N. Delhi.
2. Pressman : Software Engineering, TMH.
3. Jalote, Pankaj : An Integrated Approach to Software Engineering, Narosa Publications.
4. ChhillarRajenderSingh : Software Engineering : Testing, Faults, Metrics, Excel Books, New Delhi.
5. Ghezzi, Carlo : Fundaments of Software Engineering, PHI.

Programming using Python

Course code					
Category	Core Course				
Course title	**Software Engineering**				
Scheme and Credits	**L**	**T**	**P**	**Credits**	Semester-III
	3	**1**	0	**4**	
Class work	25 Marks				
Exam	75 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

UNIT - I

Introduction to Python: History and Features of Python Programming, Python Interpreter. Variable, identifiers and literal. Token, keywords. Data Types. Arithmetic operators, Relational operators, Logical operators, Bitwise operators, Assignment operators, Membership operators, Identity operators. Operator precedence. Comment, Indentation, Need for indentation

Built-in Functions: input, eval, composition, print, type, round, min and max, pow. Type Conversion, Random Number Generation. Mathematical Functions. Getting help on a function, Assert Statement.

UNIT - II

Control Statements: if Conditional Statement, for and while Statements. break, continue and pass statements.

Functions: Function Definition and Call, Function Arguments-Variable Function Arguments, Default Arguments, Keyword Arguments, Arbitrary Arguments. Command Line Arguments. Global and local Variables. Accessing local variables outside the scope, Using Global and Local variables in same code, Using Global variable and Local variable with same Name.

UNIT - III

Strings: String as a compound data type. String operations- Concatenation, Repetition, Membership operation, Slicing operation. String methods-count, find, rfind, capitalize, title, lower, upper, swapcase, islower, isupperistitle, replace, isalpha, isdigit, isalnum. String Processing examples.

Lists: List operations-multiplication, concatenation, length, indexing, slicing, min, max, sum, membership operator; List functions-append, extend, remove, pop, count, index, insert, sort, reverse.

UNIT - IV

Object Oriented Programming: Introduction to Classes, Method, Class object, Instance object, Method object. Class as abstract data type, Date Class. Access attributes using functions-getattr, hasattr, setattr, delattr. Built-In Class Attributes of Class object (__dict__, __doc__ , __name__, module__).

References:

1. Sheetal Taneja and Naveen Kumar, Python Programming A modular Approach, Pearson, 2017.

2. ReemaThareja, Python Programming Using Problem Solving Approach, Oxford Publications.

3. Y. Daniel Liang, Introduction to Programming Using Python, Pearson, 2013

4. Python by Jeeva Josh.

Programming using Python Lab

Course code					
Category	Core Course				
Course title	**Programming using Python Lab**				
Scheme and Credits	**L**	**T**	**P**	**Credits**	Semester-III
	0	**0**	4	**2**	
Class work	25 Marks				
Exam	25 Marks				
Total	50 Marks				
Duration of Exam	03 Hours				

Students are given eight to ten laboratory assignments based on BCA-PC(L)-351. The lab assignments are evenly spread over the semester. Every student is required to prepare a file of laboratory experiments done.

Computer Organization and Architecture

Course code					
Category	Core Course				
Course title	**Computer Organization and Architecture**				
Scheme and Credits	**L**	**T**	**P**	**Credits**	Semester-III
	3	**1**	0	**4**	
Class work	25 Marks				
Exam	75 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

UNIT I

Data representation: Data Types, Complements, Fixed-Point Representation, Conversion of Fractions, Floating-Point Representation, Gray codes, BCD codes, Excess-3 code, Error Detection Codes.

Register Transfer and Microoperations : Register Transfer Language, Register, Bus and Memory Transfers, Shift Microoperations,.

UNIT II

Basic Computer Organization and Design : Instruction Codes, Computer Registers, Computer Instructions, Timing and Control, Instruction Cycle, Memory-Reference Instruction, Input-Output Instruction.

Central Processing Unit : General Register Organization, Stack organization, Instruction Format, Addressing Modes, Data Transfer and Manipulation, Program Control, RISC, CISC.

UNIT III

Pipelining: Basic Concepts of Pipelining, Throughput and Speedup, Pipeline Hazards.

Parallel Processors: Introduction to Parallel Processors, Locality of reference principle

UNIT IV

Input-output Organization : I/O device interface, I/O transfers–program controlled, interrupt driven and DMA, Software Interrupts.

Memory organization: Memory Hierarchy, Main Memory, **Auxiliary** Memory, Associative Memory, Cache Memory, Associative Mapping, Direct Mapping, Set-Associative Mapping, Virtual Memory.

References:

1) "Computer System Architecture", 3rd Edition by M.Morris Mano, Pearson.
2) "Computer Organization and Design: The Hardware/Software Interface", 5th Edition by David A. Patterson and John L. Hennessy, Elsevier.
3) "Computer Organization and Embedded Systems", 6th Edition by CarlHamacher, McGraw Hill Higher Education.

Information Security

Course code					
Category	Core Course				
Course title	**Information Security**				
Scheme and Credits	**L**	**T**	**P**	**Credits**	Semester-III
	3	**1**	0	**4**	
Class work	25 Marks				

Exam	75 Marks
Total	100 Marks
Duration of Exam	03 Hours

UNIT I

Cryptography: Overview of Information Security, Basic Concepts, Cryptosystems, Cryptanalysis, Ciphers & Cipher modes, Symmetric Key Cryptography DES, AES. Asymmetric Key Cryptography, RSA algorithm, Diffie Hellman Algorithm. Digital Signature-Digital Signatures.

UNIT II

System Security: Program Security, Malicious Logic, Protection. Database Security-Access Controls, Security & Integrity Threats, Defence Mechanisms. OS Security-Protection of System Resources.

UNIT III

Ethics in Cyber Security: Privacy, Intellectual Property in cyberspace, Professional Ethics, Freedom of Speech, Fair User and Ethical Hacking, Trademarks, Internet Fraud, Electronic Evidence, forensic Technologies, Digital Evidence collections.

Tools and Methods Used in Cybercrime: Introduction, Proxy Servers and Anonymizers, Phishing, Password Cracking.

UNIT IV

Cybercrimes and Cybersecurity: Cybercrime and Legal Landscape around the world, Cyberlaws, The Indian IT Act, Challenges, Digital Signatures and Indian IT Act, Amendments to the Indian IT Act, Cybercrime and punishment, Cost of Cybercrimes and IPR Issues, Web threats for Organizations, Social Computing and associated Challenges for Organizations.

References:

1. Cryptography and Network security-Principles and Practices, Pearson Education, 9th Indian Reprint, 2005

2. Charlie Kaufman , Network Security : Private communication in Public World, Prentice-Hall International, Inc. April 2008

3. Nina Godhole and Sunit Belapure, Cyber Security, Wiley India, 2011.

4. James Graham and Ryan Olson, Cyber Security Essentials, Rick Howard CRC Press, Taylor & Francis, 2011.

Management Information System

Course code					
Category	Skill Enhancement Course				
Course title	**Management Information System**				
Scheme and Credits	**L**	**T**	**P**	**Credits**	Semester-IV
	2	**0**	0	**2**	
Class work	10 Marks				
Exam	40 Marks				
Total	50 Marks				
Duration of Exam	2 Hours				

UNIT – I

Introduction to system and Basic System Concepts, Types of Systems
Information System: Definition & Characteristics, Types of information, Role of Information in Decision-Making**.** (8hrs)

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UNIT –II

An overview of Management Information System: Definition & Characteristics, Components of MIS.
Frame Work for Understanding MIS: Information requirements & Levels of Management, Structured Vs Un-structured decisions, Formal vs. Informal systems. (8hrs)

UNIT – III

Developing Information Systems, Analysis & Design of Information Systems: Implementation & Evaluation, Pitfalls in MIS Development. (8hrs)

UNIT – IV

Functional MIS: A Study of Personnel, Financial and production MIS
Decision support systems –support systems for planning, control and decision-making (8hrs)

Suggested Readings:

1. J. Kanter, "Management/Information Systems", PHI.
2. Gordon B. Davis, M. H. Olson, "Management Information Systems – Conceptual foundations, structure and Development", McGraw Hill.
3. James A. O'Brien, "Management Information Systems", Tata McGraw-Hill.
4. James A. Senn, "Analysis & Design of Information Systems", Second edition, McGraw Hill

Scheme of studies
Semester 5

Computer Graphics

Course code					
Category	Core Course				
Course title	**Computer Graphics**				
Scheme and Credits	**L**	**T**	**P**	**Credits**	Semester-V
	3	**1**	0	**4**	
Class work	25 Marks				
Exam	75 Marks				
Total	100 Marks				
Duration of Exam	3 Hours				

UNIT-I

Graphics Primitives: Introduction to computer graphics, Basics of Graphics systems, Application areas of Computer Graphics, overview of graphics systems, video-display devices, and raster-scan systems, random scan systems, graphics monitors and workstations and input devices.

Output Primitives: Points and lines, line drawing algorithms, mid-point circle and ellipse algorithms. Filled area primitives: Scan line polygon fill algorithm, boundary fill and flood fill algorithms.

UNIT-II

2-D Geometrical Transforms: Translation, scaling, rotation, reflection and shear transformations, matrix representations and homogeneous coordinates, composite transforms, transformations between coordinate systems.

2-D Viewing: The viewing pipeline, viewing coordinate reference frame, window to viewport coordinate transformation, viewing functions, Cohen-Sutherland and Cyrus-beck line clipping algorithms, Sutherland–Hodgeman polygon clipping algorithm.

UNIT-III

3-D Object Representation: Polygon surfaces, quadric surfaces, spline representation, Hermite curve, Bezier curve and B-Spline curves, Bezier and B-Spline surfaces. Basic illumination models, polygon rendering methods.

UNIT-IV

3-D Geometric Transformations: Translation, rotation, scaling, reflection and shear transformations, composite transformations. 3-D Viewing: Viewing pipeline, viewing coordinates, view volume and general projection transforms and clipping.

References:

1. Donald Hearn and M. Pauline Baker, Computer Graphics, PHI Publications, 1997.

2. Plastock, Theory & Problem of Computer Gaphics, Schaum Series, 1986.

3. Foley and Van Dam, Fundamentals of Interactive Computer Graphics, Addison-Wesley, 1982.

Computer Graphics Lab

Course code					
Category	Core Course				
Course title	**Computer Graphics Lab**				
Scheme and Credits	**L**	**T**	**P**	**Credits**	Semester-V
	0	**0**	4	**2**	
Class work	25 Marks				
Exam	25 Marks				
Total	50 Marks				
Duration of Exam	3 Hours				

Students are given eight to ten laboratory assignments based on computer graphics. The lab assignments are evenly spread over the semester. Every student is required to prepare a file of laboratory experiments done.

Programming using Java

Course code					
Category	Core Course				
Course title	**Programming using Java**				
Scheme and Credits	**L**	**T**	**P**	**Credits**	Semester-V
	3	**1**	0	**4**	
Class work	25 Marks				
Exam	75 Marks				
Total	100 Marks				

Duration of Exam	3 Hours

UNIT-I

Introduction to JAVA & Principles of Object Oriented Programming: Basic Concepts of OOPs and its Benefits; Applications of OOPs; The Creation of JAVA; Importance of JAVA for the Internet; JAVA's Magic: The Byte-code; Features of Java.

Data Type, Array & Strings: Data types & Operators available in JAVA; Control Structures: if, while, do while, for, switch; Break & Continue Statement; Array and Strings: Arrays, Arrays of Characters, String handling Using String Class; Operations of String Handling; String Buffer Class.

UNIT-II

Object Oriented:Object Oriented Programming in JAVA, JAVA Program Structure. Defining of a Class, Definition of Methods, Constructors, Creating Objects of a Class, Assigning Object Reference Variables, The keyword "this", Defining and Using a Class, Automatic Garbage Collection. Extending Class and Inheritance: Using Existing Classes, **Classes Inheritance**, Choosing Base Class, Access Attributes, Polymorphism, Multiple Levels of Inheritance, Abstraction through Abstract Classes, Using Final Modifier, the Universal Super class-Object Class.

UNIT-III

Package & Exception Handling: Understanding Packages, Defining Package, Packaging up your Classes, Adding Classes from a Package to your Program, Understanding CLASSPATH, Standard Packages, Access Protection in Package.

Exception Handling: The Idea behind Exceptions , Types of Exceptions, Dealing with Exceptions, Exception Objects, Defining your own Exception, Checked and Unchecked Exceptions.

UNIT-IV

Creating Applets in JAVA: Applet basics, Applets architecture, Applets life cycle, simple Applet display methods; requesting repainting; using the status window; the html applet tag; passing parameters to applets.

Multithreading Programming: The JAVA Thread Model, Understanding Threads, The Main Thread, Creating a Thread: extending Thread and implementing Runnable Interface, Creating multiple Threads, Threads Priorities, Synchronization, Deadlocks Inter-thread Communication, Deadlocks.

Input/Output in JAVA : I/O Basics, Byte and Character Structure, I/O classes, Reading Console Input, Writing to Console, Reading and Writing on Files, Random Access Files, Storing and Retrieving Objects from File, Stream Benefits.

References:

1. E. Balagurusamy, Programming with JAVA, Tata McGraw Hill, 2014.

2. Herbert Schildt, The Complete Reference JAVA, TMH Publication, 2017.

3. Ivor Horton, Beginning JAVA, WROX Public, 2005.

4. JAVA 2 UNLEASHED, Tech Media Publications / Jamie Jaworski, Java 2 Platform Unleashed, SAMS, 1999.

5. Patrick Naughton and Herbertz Schildt, Java-2 The Complete Reference, TMH, 1999.

Programming using Java Lab

Course code					
Category	Core Course				
Course title	**Programming using Java**				
Scheme and Credits	**L**	**T**	**P**	**Credits**	Semester-V
	3	**1**	0	**4**	
Class work	25 Marks				
Exam	75 Marks				
Total	100 Marks				
Duration of Exam	3 Hours				

Students are given eight to ten laboratory assignments based on Programming using Java. The lab assignments are evenly spread over the semester. Every student is required to prepare a file of laboratory experiments done.

Digital and Analog communication

Course code					
Category	Core Course				
Course title	**Digital and Analog Communication**				
Scheme and Credits	**L**	**T**	**P**	**Credits**	Semester-V
	3	**1**	0	**4**	
Class work	25 Marks				
Exam	75 Marks				
Total	100 Marks				
Duration of Exam	3 Hours				

UNIT I

ANALOG COMMUNICATION Introduction to Communication Systems: Modulation – Types - Need for Modulation, Theory of Amplitude Modulation - Evolution and Description of SSB Techniques, Theory of Frequency and Phase Modulation, Noise:Source of Noise - External Noise- Internal Noise- Noise Calculation,Comparison of Various Analog Communication System (AM – FM – PM).

UNIT II

DIGITAL COMMUNICATION: Amplitude Shift Keying (ASK), Frequency Shift Keying (FSK), Minimum Shift Keying (MSK) Phase Shift Keying (PSK): BPSK – QPSK – 8 PSK, Quadrature Amplitude Modulation (QAM): 8 QAM, Bandwidth Efficiency, Comparison of Various Digital Communication System (ASK – FSK – PSK – QAM).

UNIT III

DATA AND PULSE COMMUNICATION: Data Communication: History of Data Communication - Data Communication Circuits - DataCommunication Codes - Error Detection and Correction Techniques. Pulse Communication: Pulse Amplitude Modulation (PAM) – Pulse Time Modulation (PTM) –Pulse Code Modulation (PCM), Comparison of Various Pulse Communication Systems (PAM – PTM – PCM).

UNIT IV

SOURCE AND ERROR CONTROL CODING Entropy, Source Encoding Theorem - Shannon Fanon Coding - Huffman Coding, Mutual Information - Channel Capacity, Channel Coding Theorem, Error Control Coding - Linear Block Codes - Cyclic Codes - Convolution Codes.

References:

1. Data Communications, Computer Networks and Open Systems Halsall Fred, (4th
2. editon) 2000, Addison Wesley, Low Price edition
3. Business Data Communications, Fitzgerald Jerry, 7th Ed. New York, 2001, JW&S,
4. Communication Systems, 4th Edi, by A. Bruce Carlson, Paul B. Crilly, Janet C.
5. Rutledge, 2002, TMH.

Software Testing and Quality Assurance

Course code					
Category	Core Course				
Course title	**Digital and Analog Communication**				
Scheme and Credits	**L**	**T**	**P**	**Credits**	Semester-V
	3	**1**	0	**4**	
Class work	25 Marks				
Exam	75 Marks				
Total	100 Marks				
Duration of Exam	3 Hours				

UNIT I

Introduction: Some Terminologies, Failures, Testing Process, Limitations of Testing and V-Shaped Software Life-Cycle Model.

Functional Testing: Boundary Value Analysis, Equivalence Class Testing, Decision Table Based Testing, and Cause Effect Graphing Technique.

Structural Testing: Control Flow Testing, Data Flow Testing, Slice Based Testing and Mutation Testing. Software Verification: Verification Methods, Software Requirement Specification Document Verification, Software Design Description Document Verification.

UNIT II

Selection, Minimization and Prioritization of Test Cases for Regression Testing: Regression Testing, regression Test Case Selection, Reducing the Number of Test Cases, Risk Analysis and Code Coverage Prioritization Techniques. Software Testing Activities Levels of Testing, Debugging, Software Testing Tools, Software Test Plan.

Object Oriented Testing: Object Orientation, Object Oriented Testing, Path Testing, State Based Testing and class testing.

Metrics in Software Testing: Software Metrics, Categories of Metrics, Object Oriented Metrics in Testing.

UNIT - III

Software Quality concepts: Meaning and scope, software quality factors, software quality metrics, relationship between quality factors and quality metrics, quality management system, Concepts of Quality Control, Quality Assurance, Quality Management - Total Quality Management; Cost of Quality; QC tools, Business Process Re-engineering - Zero Defect, Six Sigma, Quality Function Deployment, Benchmarking, Statistical process control.

Software measurement: Fundamentals of measurement, Measurements in Software Engineering, Measurement of internal product attributes - size and structure, External product attributes - measurement of quality, Software quality metrics - Software Process, Project and Product Metrics, metrics for software maintenance.

UNIT - IV

Quality assurance models: ISO-9000 Series and SEI-CMM standards of software quality assurance. People Capability Maturity Model, Capability Maturity Model Integration, Malcolm Baldrige Award, FCMM.

Software Quality Assurance related topics Software Process - Definition and implementation; internal Auditing and Assessments; Software testing - Concepts, Tools, software reviews, formal technical reviews, Inspections & Walkthroughs; correctness proof, statistical quality assurance, clean room software engineering.

References:

1. Software Testing, Yogesh Singh, Cambridge University Press, 2012.

2. Effective Methods for Software Testing, William E. Perry, John Wiley and Sons, 2002.

3. Software Testing: Principle, Techniques and Tools, M. G. Limaye, Tata McGraw Hill, 2009.

4. Software Engineering, K. K. Aggarwal and Yogesh Singh, New Age International Publishers, Third Edition, 2008.

5. The Art of Software Testing, Glenford J.Myers, Tom Badgett and Corey Sandler, Wiley & Sons, Third Edition, 2012.

6. Metrics and Models in Software Quality Engineering, Stefan H Khan, Addison-Wesley; 2nd edition, 2014.

7. Software Quality: Theory and Management, Alan Gillies, lulu.com; Third Edition, 2011.

Mobile Computing

Course code					
Category	Skill enhancement Course				
Course title	**Mobile computing**				
Scheme and Credits	**L**	**T**	**P**	**Credits**	Semester-V
	2	**0**	0	**2**	
Class work	10 Marks				
Exam	40 Marks				
Total	50 Marks				
Duration of Exam	2 Hours				

UNIT I

INTRODUCTION: Introduction to Mobile Computing – Applications of Mobile Computing- Generations of Mobile Communication Technologies- Multiplexing – Spread spectrum -MAC Protocols –SDMA- TDMA- FDMA- CDMA

UNIT II

MOBILE TELECOMMUNICATION SYSTEM: Introduction to Cellular Systems – GSM – Services & Architecture – Protocols – Connection
Establishment – Frequency Allocation – Routing – Mobility Management – Security – GPRSUMTS – Architecture – Handover – Security

UNIT III

MOBILE NETWORK LAYER: Mobile IP – DHCP – AdHoc– Proactive protocol-DSDV, Reactive Routing Protocols – DSR, AODV , Hybrid routing –ZRP, Multicast Routing- ODMRP, Vehicular Ad Hoc networks(VANET) –MANET Vs VANET – Security.

UNIT IV

MOBILE TRANSPORT AND APPLICATION LAYER
Mobile TCP– WAP – Architecture – WDP – WTLS – WTP –WSP – WAE – WTA Architecture – WML
MOBILE DEVICE OPERATING SYSTEMS – Special Constraints & Requirements – Commercial Mobile Operating Systems – Software Development Kit: iOS, Android,

BlackBerry, Windows Phone – MCommerce – Structure – Pros & Cons – Mobile Payment System – Security Issues

TEXT BOOK:

1. Prasant Kumar Pattnaik, Rajib Mall, "Fundamentals of Mobile Computing", PHI Learning Pvt. Ltd, New Delhi – 2012.

References:

1. Jochen H. Schller, "Mobile Communications", Second Edition, Pearson Education, New Delhi, 2007.
2. Dharma Prakash Agarval, Qing and An Zeng, "Introduction to Wireless and Mobile systems", Thomson Asia Pvt Ltd, 2005.

Scheme of studies
Semester 6

Data Warehouse and Data Mining

Course code					
Category	Core Course				
Course title	**Data warehouse and data mining**				
Scheme and Credits	**L**	**T**	**P**	**Credits**	Semester-VI
	3	**1**	0	**4**	
Class work	25 Marks				
Exam	75 Marks				
Total	100 Marks				
Duration of Exam	3 Hours				

UNIT I

Data Mining: Introduction, Kind of data to be mined, Data Mining Functionalities, Technologies used in Data Mining, Applications of data Mining, Major Issues in Data Mining.

UNIT II

Data Pre-Processing: Introduction, Need of preprocessing, Data Objects and Attribute type, Statistical description of data, Data Visualization, Measuring similarity and dissimilarity of data, Data Cleaning, Data Integration, Data Reduction, Data Transformation and Data Discretization

UNIT III

Data warehouse: introduction, data warehouse and database systems, data warehouse architecture, data warehouse models, data cube and olap, multidimensional data model, concept hierarchies, olap operations, data warehouse implementation

UNIT IV

Mining Frequent Patterns, Associations and Correlations: Introduction, Frequent Itemset Mining using Apriori Algorithm ,Generating Association Rule from Frequent Itemsets. Improving efficiency of Apriori, Pattern Growth Approach for Mining Frequent Itemsets, Pattern evaluation Methods.

References:

1. Jiawei Han, MichelineKamber and Jian Pei, Data Mining Concepts and Techniques, 3rd Edition, Morgan Kaufmann Publishers, July 2011

2. AlexBerson And Stephen J. Smith, Data Warehousing, Data Mining & Olap, TataMcgraw – Hill Edition, 2004.

3. Michael Steinbach and Vipin Kumar, Introduction To Data Mining, Pang-Ning Tan, Pearson Education, 2014.

4. K.P. Soman, Shyam Diwakar and V. Ajay, Insight Into Data Mining Theory And Practice, Easter Economy Edition, Prentice Hall Of India, 2009.

5. G. K. Gupta, Introduction To Data Mining With Case Studies, Easter Economy Edition, Prentice Hall Of India, 2006

Java Script

Course code					
Category	Core Course				
Course title	**Java script**				
Scheme and Credits	**L**	**T**	**P**	**Credits**	Semester-VI
	3	**1**	0	**4**	
Class work	25 Marks				
Exam	75 Marks				
Total	100 Marks				
Duration of Exam	3 Hours				

UNIT 1:

Introduction To Java Script, Difference between Java and Java script, Client server model, Working with Java Script and basics of JavaScript , Embed JavaScript code into a HTML document.

Understanding Java Script variables, comments ,literals and identifiers, declare and use of variables, use variables and literals in expressions.

UNIT 2:

Java Script basic Operators and expressions: Arithmetic operators, Assignment, Relational, logical and concatenation operators and special operators. Operator precedence.

Java Script Data Types, Declaring and using Numeric data types, Using string data type and Boolean, arrays , Describe different data types and values.

UNIT 3:

Java Script objects: Document objects, Date object, Math object. Java Script pop up boxes: Alert box, confirm box and prompt box.
Java Script Program Flow Control, Conditional blocks using if, else. Switch statement, Simple for loops, while loop, do while loop in Java Script. Break and continue the loops

UNIT 4:

Java Script Functions, Built In Function , defining the function, Using the parameters , calling of function, Returning value from function, Number methods, Boolean methods, object manipulation statements: in and with.

References

- JavaScript: The Good Part by Crock ford and Douglas
- Head First JavaScript Programming, by Flanagan David
- JavaScript: The Definitive Guide by Freeman E.T |

Java Script Lab

Course code					
Category	Core Course				
Course title	**Java script Lab**				
Scheme and Credits	**L**	**T**	**P**	**Credits**	Semester-VI
	0	**0**	4	**2**	
Class work	25 Marks				
Exam	25 Marks				
Total	50 Marks				
Duration of Exam	3 Hours				

Students are given eight to ten laboratory assignments based on Java Script. The lab assignments are evenly spread over the semester. Every student is required to prepare a file of laboratory experiments done.

Artificial Intelligence

Course code	
Category	Core Course
Course title	**Artificial Intelligence**

Scheme and Credits	L	T	P	Credits	Semester-VI
	3	1	0	4	
Class work	25 Marks				
Exam	75 Marks				
Total	100 Marks				
Duration of Exam	3 Hours				

UNIT-I

Foundational issues in intelligent systems, Foundation and history of AI, AI problems and techniques – AI programming languages, introduction to PROLOG- problem spaces and searches, blind search strategies,

Breadth first- Depth first- heuristic search techniques Hill climbing: best first- A * algorithm AO* algorithm-game tree, Min max algorithms, game playing- alpha beta pruning.

UNIT-II

Knowledge representation issues, predicate logic- logic programming, semantic nets- frames and inheritance, constraint propagation, representing knowledge using rules, rules based deduction systems.

Reasoning under uncertainty, review of probability, Bayes probabilistic interferences and Dempster shafer theory, Heuristic methods

UNIT-III

Symbolic reasoning under uncertainty, Statistical reasoning, Fuzzy reasoning, Temporal reasoning, Non monotonic reasoning.
Planning, planning in situational calculus, representation for planning, partial order planning algorithm

UNIT-IV

Learning from examples, discovery as learning, I earning by analogy, explanation based learning, neural nets, genetic algorithms.
Principles of Natural language processing, rule based systems architecture, Expert systems, knowledge acquisition concepts, AI application to robotics, and current trends in intelligent systems

References:

1. Artificial Intelligence: A Modern Approach,. Russell & Norvig. 1995, Prentice Hall.

2. Artificial Intelligence, Elain Rich and Kevin Knight, 1991, TMH.

3. Artificial Intelligence-A modern approach, Staurt Russel and peter norvig, 1998, PHI. rd
4. Artificial intelligence, Patrick Henry Winston:, 1992, Addition Wesley 3 Ed.

Cloud computing

Course code					
Category	Core Course				
Course title	**Cloud Computing**				
Scheme and Credits	**L**	**T**	**P**	**Credits**	Semester-VI
	3	**1**	0	**4**	
Class work	25 Marks				
Exam	75 Marks				
Total	100 Marks				
Duration of Exam	3 Hours				

UNIT -I

Cloud Computing: Introduction to client server computing, Peer to Peer computing, Distributed computing, collaborative computing and cloud computing, Importance of cloud computing in current era, Characteristics, advantages and disadvantages of cloud computing.

UNIT -II

Cloud Services: Functioning of cloud computing, Classification of cloud on the basis of services: Software as a Service (SaaS), Platform as a Service (PaaS), and Infrastructure as a Service (Iaas): Definition, characteristics and their benefits.

UNIT- III

Cloud Architecture: Cloud computing Logical and service architecture, Types of clouds: Private cloud, Public cloud and Hybrid cloud, Comparison of a Private, public and hybrid clouds, Migrating to a cloud, Seven step model to migrate.

UNIT -1V

Applications: Business opportunities using cloud, Managing Desktop and devices in cloud, cloud as a type of distributed infrastructure, Application of cloud computing for centralizing Email communication, collaboration on schedules, calendars. Overview of major cloud service providers - Amazon Ec2, Google App Engine.

References:

1. Srinivasan, A. Cloud Computing: A Practical Approach for Learning and Implementation, Pearson Education India, 2014.

2. Velte, Anthony T., Toby J. Velte, Robert C. Elsenpeter, and Robert C. Elsenpeter, Cloud computing: a practical approach, New York: McGraw-Hill, 2010.

Major Project

Course code					
Category	Core Course				
Course title	**Major Project**				
Scheme and Credits	**L**	**T**	**P**	**Credits**	Semester-VI
	0	**0**	4	**4**	
Class work					
Exam					
Total	100 Marks				
Duration of Exam	3 Hours				

Project work will be carried out under supervision of official / Engineer / teacher of industry/company/institute/College. Evaluation & viva-voce to be done jointly by internal and external examiners.