B.Sc in Gaming & Mobile Application Development

Semester	Sl. No	Paper Code	Subjects	Credits		
			Theory Papers			
				T	P	Total
First	1	ENG101	English	3	0	3
	2	EMA102	Engineering Math	4	0	4
	3	CMA103	Computer Architecture	4	0	4
	4	ENV104	Environmental Science	3	0	3
	5	FPR105	Fundamentals of Programming	4	0	4
			Practical Papers			
	6	CPR106	C Programming	0	2	2
	7	LPR107	Introduction to Linux Programming	0	2	2
Second	1	AEM201	Advanced Engineering Math	4	0	4
	2	FDB202	Fundamentals of DBMS	4	0	4
	3	NWF203	Network Fundamentals	4	0	4
	4	OOP204	Object Oriented Programming	3	0	3
	5	OSC205	Operating System Concepts	3	0	3
			Practical Papers			
	6	OPR206	OOP through C++/JAVA	0	2	2
	7	ALP207	Advanced Linux Programming & Networking	0	2	2

Third	1	DSP301	Fundamentals of Data Structure	4	0	4
	2	NAS302	Fundamentals of Game Physics	4	0	4
	3	DAA303	Design & Analysis of Algorithm	4	0	4
	4	SAD304	System Analysis & Design	3	0	3
	5	DCM305	Computer Graphics & Animation	3	0	3
Semester	Sl. No	Paper Code	Subject	T	P	Total
			Practical Papers			
	6	DSC306	Data Structure through C	0	2	2
	7	PHP307	Graphics Programming using OpenGL & others	0	2	2
Fourth	1	ADS401	Advanced Data Structure	4	0	4
	2	DTM402	Introduction to Game Development	3	0	3
	3	CGA403	Mobile Application Development	3	0	3
	4	AIB404	AI Basics (Problem Solving, Planning, Uncertain Knowledge & Reasoning, Learning)	4	0	4
	5	ISO405	Searching & Optimization	4	0	4
			Practical Papers			
	6	ADP406	Advanced Data Structure	2	0	2

			Programming			
	7	GMD407	Game & Mobile Application Development-1	0	2	2
Fifth	1	CVP501	Computer Vision & Pattern Recognition (Image Processing)	4	0	4
	2	NLU502	Natural Language Understanding	3	0	3
	3	RBP503	Robotics & Perception	3	0	4
	4	KAI504	Knowledge based AI	3	0	3
	5	GAI505	Game AI	4	0	4
			Practical Papers			
	6	MAP506	Matlab Programming	0	2	2
	7	GMD507	Game & Mobile Application Development-2	0	2	2
Sixth	1	PRO601	Project		22	22

101 ENGLISH

UNIT I

Vocabulary Enhancement –Synonyms**,** Antonyms, Prefixes and suffixes. Understanding the proper way of letter writing. Comprehension, Passage reading and question answer handling. Noun, Verb, Adjective. Construction of sentences and passages with proper grammar.

UNIT II

Spelling and Punctuation/ Spelling Pitfalls, Grammar Revisited - Review of parts of speech. Proper pronunciation from language lab. Hearing fluent English and identifying and answering questions. Understanding the proper way to utilize punctuation and spelling Pitfalls.

UNIT III

Functional English - Language functions: descriptive, expressive and social**,** Types of language functions: to inform, enquire, attract, influence, regulate and entertain. Understanding the importance of communication. Communication in an organization. Types of communication

UNIT IV

Reading Skills - Strategies for developing reading skills**,** Skimming and scanning**,** Predicting**,** Inferring**,** Reading critically. Reading passages , comprehension and letters. Reading with proper pronunciation. Book reading , Shakespearian Literature reading. Reading silently, sub-vocalization, Reading at speeds of at least 250 words per minute, Inferring meaning or content after reading the heading , Guessing meaning of unfamiliar words from context, Identifying the central idea as well as supporting ideas, Spelling pitfalls, Preparing notes in diagrammatic form after reading a text, showing the central idea and supporting ideas and the relationships between them.

Reference Book**:**

1. Scot Ober, Contemporarybusiness communication, fifth edition, biztantra.
2. Lesiler &Flat lay,BasicBusiness communication. Tata McGraw Hill.

102 ENGINEERING MATH

UNIT I

COMPLEX NUMBERS AND INFINITE SERIES:
De Moivre's theorem and roots of complex numbers. Euler's theorem, Logarithmic Functions, Circular, Hyperbolic Functions and their Inverses. Convergence and Divergence of Infinite series, Comparison test d'Alembert's ratio test. Higher ratio test, Cauchy's root test. Alternating series, Lebnitz test, Absolute and conditional convergence.

UNIT II

CALCULUS OF ONE VARIABLE:
Successive differentiation. Leibnitz theorem (without proof) McLaurin's and Taylor's expansion of functions, errors and approximation. Asymptotes of Cartesian curves. Curveture of curves in Cartesian, parametric and polar coordinates, Tracing of curves in Cartesian, parametric and polar coordinates (like conics, astroid, hypocycloid, Folium of Descartes, Cycloid, Circle, Cardiode, Lemniscate of Bernoulli, equiangular spiral). Reduction Formulae for evaluating. Finding area under the curves, Length of the curves, volume and surface of solids of revolution.

UNIT III

LINEAR ALGEBRA – MATERICES:
Rank of matrix, Linear transformations, Hermitian and skeew – Hermitian forms, Inverse of matrix by elementary operations. Consistency of linear simultaneous equations, Diagonalisation of a matrix, Eigen values and eigen vectors. Caley – Hamilton theorem (without proof).

UNIT IV

ORDINARY DIFFERENTIAL EQUATIONS:
First order differential equations – exact and reducible to exact form. Linear differential equations of higher order with constant coefficients. Solution of simultaneous differential equations. Variation of parameters, Solution of homogeneous differential equations – Canchy and Legendre forms.

References books:

1. Kresyzig, E., "Advanced Engineering Mathematics", John Wiley and Sons. (Latest edition).
2. Jain, R. K. and Iyengar, S. R. K., "Advanced Engineering Mathematics", Narosa, 2003 (2nd Ed.).
3. "Advanced Engineering Mathematics", Dr. A. B. Mathur, V. P. Jaggi (Khanna publications)
4. Mitin, V. V.; Polis, M. P. and Romanov, D. A., "Modern Advanced Mathematics for Engineers", John Wiley and Sons, 2001.
5. Wylie, R., "Advanced Engineering Mathematics", McGraw-Hill, 1995.

103 COMPUTER ARCHITECTURE

UNIT – I

Introduction: Review of basic computer architecture (Revisited), Quantitative techniques in computer design, measuring and reporting performance. Pipelining: Basic concepts, instruction and arithmetic pipeline, data hazards, control hazards and structural hazards, techniques for handling hazards. Exception handling. Pipeline optimization techniques; Compiler techniques for improving performance.

UNIT – II

Hierarchical memory technology: Inclusion, Coherence and locality properties; Cache memory organizations, Techniques for reducing cache misses; Virtual memory organization, mapping and management techniques, memory replacement policies.

UNIT – III

Instruction-level parallelism: basic concepts, techniques for increasing ILP, superscalar, super pipelined and VLIW processor architectures. Array and vector processors.

UNIT – IV

Multiprocessor architecture: taxonomy of parallel architectures; Centralized shared- memory architecture: synchronization, memory consistency, interconnection networks. Distributed shared-memory architecture. Cluster computers. Non von Neumann architectures: data flow computers, reduction computer architectures, systolic architectures.

Reference Book:

1. Hayes J. P., "Computer Architecture & Organisation", McGraw Hill,
2. Mano, M.M., "Computer System Architecture", PHI.
3. Behrooz Parhami " Computer Architecture", Oxford University Press

104 ENVIRONMENTAL SCIENCE

UNIT I

Introduction: Nature and type of environmental management - Overview of the course, economy and environment, basics of natural resource management, Ecology, different ecosystems, biodiversity-sustainable utilization and conservation, Intellectual Property Rights, TRIPS, Role of WTO

UNIT II

Natural resource management - Natural Resource Management, Sustainable development, Externalities, Market failure, Green crisis management - Climate changes, global warming, natural disasters and disaster management

UNIT III

Air pollution, noise pollution, Environmental law, Soil pollution, water pollution, Water treatment technology, Waste management, waste water treatment technology, solid waste treatment technology, Biomedical Waste Management

UNIT IV

Energy costing and pricing, energy audits, energy management, Environmental management system, Environmental standards, EIA/EIS, Cost benefit analysis. Pharmaceutical waste management and control. Biodiversity of flora and fauna, etc. Green Marketing, green costing, green accounting, greet audits, green supply chain management, ISO 14001, Occupational safety and health, ISO 18000 and safety inspection, Business ethics and business dynamics .Laws related to pollution and violation of government rules and regulation.

Reference Books:

1. Environmental Management - N.K.Uberoi. 2nd ed. Excel Books.

2. Environmental Management - Swapan C Deb. Jaico Books.

3. Environmental Science and Engineering - J.G.Henry & G.W.Heinke. Prentice- Hall of Indian. 2nd ed.

105 FUNDAMENTALS OF PROGRAMMING

UNIT I

Introduction to Programming:

Concept of algorithms, Flow Charts, Data Flow diagrams etc., Introduction to the Editing tools such as vi or MS-VC editors, Concepts of the finite storage, bits bytes, kilo, mega and gigabytes. Concepts of character representation, Number Systems & Binary Arithmetic.

UNIT II

Programming using C

The emphasis should be more on programming techniques rather than the language itself. The C Programming language is being chosen mainly because of the availability of the compilers, books and other reference materials.

Example of some simple C program. Concept of variables, program statements and function calls from the library.

C data types, int, char, float etc., C expressions, arithmetic operation, relational and logic operations, C assignment statements, extension of assignment of the operations. C primitive input output using getchar and putchar, exposure to the scanf and printf functions, C Statements, conditional executing using if, else. Optionally switch and break statements may be mentioned.

UNIT III

Iterations and Subprograms - Concept of loops, example of loops in C using for, while and do-while. Optionally continue may be mentioned. One dimensional arrays and example of iterative programs using arrays, 2-d arrays Use in matrix computations. Concept of Sub-programming, functions Example of functions. Argument passing mainly for the simple variables.

UNIT IV

Pointers and Strings Pointers, relationship between arrays and pointers Argument passing using pointers Array of pointers. Passing arrays as arguments. Strings and C string library.Structure and Unions. Defining C structures, passing strings as arguments Programming examples.

Reference Book:

1. Yashwant Kanetkar, “Let us C”, BPB Publications, 2nd Edition, 2001.

2. Herbert Schildt, “C:The complete reference”, Osbourne Mcgraw Hill, 4th Edition, 2002.

3. Raja Raman, “Computer Programming in C”, Prentice Hall of India, 1995.

4. Kernighan & Ritchie, “C Programming Language”, The (Ansi C Version), PHI, 2nd Edition.

106 C PROGRAMMING

1.Write a program to produce ASCII equivalent of given number
2. Write a program to find divisor or factorial of a given number.
3. Write a program to evaluate the following algebraic expressions
4. Write a program to find sum of a geometric series
5. Write a program to cipher a string
6. Write a program to check whether a given string follows English capitalization rules
7. Write a program to find sum of the following series
   1+ ½ + 1/3 +_____+1/20
8. Write a program to search whether a given substring exist in an input string or not and then delete this string from input string.
9. Write a recursive program for tower of Hanoi problem
10. The fibonacci sequence of numbers is 1,1,2,3,5,8..... Based on the recurrence relation
    F(n)=F(n-1)+F(n-2)for n>2
    Write a recursive program to print the first m Fibonacci number
11. Write a menu driven program for matrices to do the following operation depending on whether the operation requires one or two matrices
    a) Addition of two matrices
    b) Subtraction of two matrices
    c) Finding upper and lower triangular matrices
    d) Trace of a matrix
    e) Transpose of a matrix
    f) Check of matrix symmetry
    g) Product of two matrices.

12. Write a program that takes two operands and one operator from the user perform the operation and then print the answer

13. Write functions to add, subtract, multiply and divide two complex numbers (x+iy) and (a+ib) Also write the main program.
14. Write a menu driven program for searching an sorting with following options:-
    a) Searching (1) Linear searching
       (2) Binary searching
    b) Sorting (1) Insersection sort
       (2) Selection sorting
15. Write a program to copy one file to other, use command line arguments.
16. Write a program to mask some bit of a number (using bit operations)
17. An array of record contains information of managers and workers of a company. Print all the data of managers and workers in separate files.

Reference Books

The C Programming Language
2015
by Brian W. Kernighan

107 INTRODUCTION TO LINUX PROGRAMMING

List of sample problems:

Note: Use Bash for Shell scripts.

1. Write a shell script that accepts a file name, starting and ending line numbers as arguments and displays all the lines between the given line numbers.
2. Write a shell script that deletes all lines containing a specified word in one or more files supplied as arguments to it.
3. Write a shell script that displays a list of all the files in the current directory to which the user has read, write and execute permissions.
4. Write a shell script that accepts a list of file names as its arguments, counts and reports the occurrence of each word that is present in the first argument file on other argument files.
5. Write a shell script to find factorial of a given integer.
6. Write an awk script to count the number of lines in a file that do not contain vowels.
7. Write a C program that makes a copy of a file using standard I/O and system calls.
8. Write a C program to create a child process and allow the parent to display "parent" and the child to display "child" on the screen.
9. Write C programs that illustrate communication between two unrelated processes using named pipe.
10. Write a C program in which a parent writes a message to a pipe and the child reads the message. MCA-R13 Regulations 56
11. Write a C programs to transfer a large amount of data between processes, using a) a pipe b)a FIFO c)a message queue.

Reference Books

1.Advanced Unix Programming, N.B.Venkateswarulu, BS Publications.
2.Unix and Shell programming, B.A.Forouzan and R.F.Gilberg, Cengage Learning.
3.Unix and Shell Programming, M.G. Venkatesh Murthy, Pearson Education, 2005.
4.Unix Shells by Example, 4th Edition, Elllie Quigley, Pearson Education.
5.Sed and Awk, O.Dougherty&A.Robbins,2nd

201 ADVANCED ENGINEERING MATH

UNIT I

CALCULUS OF SEVERAL VARIABLES:

Partial differentiation, ordinary derivatives of first and second order in terms of partial derivaties, Euler's theorem on homogeneous functions, change of variables, Taylor's theorem of two variables and its application to approximate errors. Maxima and Minima of two variables, Langranges method of undermined multipliers and Jacobians.

UNIT II

FUNCTIONS OF COMPLEX VARIABLES:

Derivatives of complex functions, Analytic functions, Cauchy-Riemann equations, Harmonic Conjugates, Conformal mapping, Standard mappings – linear, square, inverse and bilinear. Complex line integral, Cauchy's integral theorem, Cauchy's integral formula, Zeros and Singularities / Taylor series, Laurents series, Calculation of residues. Residue theorem, Evaluation and real integrals.

UNIT III

VECTOR CALCULUS:

Scalar and Vector point functions, Gradient, Divergence, Curl with geometrical physical interpretations, Directional: derivatives, Properties.

Line integrals and application to work done, Green's Lemma, Surface integrals and Volume integrals, Stoke's theorem and Gauss divergence theorem (both without proof).

UNIT IV

LAPLACE TRANSFORMATION:

Existence condition, Laplace transform of standard functions, Properties, Inverse Laplace transform of functions using partial fractions, Convolution and coinvolution theorem. Solving linear differential equations using Laplace transform. Unit step function, Impulse function and Periodic function and their transforms.

References Books:

1. Kresyzig, E., “Advanced Engineering Mathematics”, John Wiley and Sons. (Latest edition).

2. Jain, R. K. and Iyengar, S. R. K. “Advanced Engineering Mathematics”, Narosa, 2003 (2nd Ed.).

3. “Advanced Engineering Mathematics”, Dr. A. B. Mathur, V. P. Jaggi (Khanna Publishers)

4. Mitin, V. V.; Polis, M. P. and Romanov, D. A. “Modern Advanced Mathematics for Engineers”, John Wiley and Sons, 2001.

5. Wylie, R., “Advanced Engineering Mathematics”, McGraw-Hill, 1995.

202 FUNDAMENTALS OF DBMS

UNIT I

Introduction - Concept & Overview of DBMS, Data Models, Database Languages, Database Administrator, Database Users, Three Schema architecture of DBMS. Entity-Relationship

Model Basic concepts, Design Issues, Mapping Constraints, Keys, Entity-Relationship Diagram, Weak Entity Sets, Extended E-R features. Relational

UNIT II

Model Structure of relational Databases, Relational Algebra, Relational Calculus, Extended Relational Algebra Operations, Views, Modifications Of the Database. SQL and Integrity Constraints [8L] Concept of DDL, DML, DCL. Basic Structure, Set operations, Aggregate Functions, Null Values, Domain Constraints, Referential Integrity Constraints, assertions, views, Nested Subqueries, Database security application development using SQL, Stored procedures and triggers. Relational Database Design

UNIT III

Functional Dependency, Different anamolies in designing a Database., Normalization using funtional dependencies, Decomposition, Boyce-Codd Normal Form, 3NF, Nomalization using multi-valued depedencies, 4NF, 5NF Internals of RDBMS.Physical data structures, Query optimization : join algorithm, statistics and cost bas optimization. Transaction processing, Concurrency control and Recovery Management : transaction model properties, state serializability, lock base protocols, two phase locking. File Organization & Index Structures

UNIT-IV

File & Record Concept, Placing file records on Disk, Fixed and Variable sized Records, Types of Single-Level Index (primary, secondary, clustering), Multilevel Indexes, Dynamic Multilevel Indexes using B tree and B+ tree .

Reference Books:

1. Henry F. Korth and Silberschatz Abraham, “Database System Concepts”, Mc.Graw Hill.

2. Elmasri Ramez and Novathe Shamkant, “Fundamentals of Database Systems”, Benjamin Cummings Publishing. Company.

3. Ramakrishnan: Database Management System , McGraw-Hill

203 NETWORK FUNDAMENTALS

UNIT I

Introduction to Networking
Overview, Objectives, Introduction, Networking Connectivity, Network Extension, Network Topologies, Protocols, Programs and Processes, Protocol Layering Concepts, Encapsulation and Decapsulation, Summary, Assessments

The OSI Model Layers
Overview, Objectives, Introduction, The Physical Layer, The Data Link Layer, The Network Layer, The Transport Layer, Summary, Assessments

UNIT II

The OSI Model Layers
Overview, Objectives, Introduction, The Session Layer, The Presentation Layer, The Application Layer, Summary, Assessments

LAN Architecture
Overview, Objectives, Introduction, History of LANs, Transmission Methods and Media, LAN Protocols Introduction, Ethernet, Token Ring, Token Bus, Fiber Distributed Data Interface (FDDI), Wireless LANs, LAN Protocols, Summary, Assessments

UNIT III

Computing Platforms
Overview, Objectives, Introduction, Personal Computers, Workstations, Midrange Computers, Mainframe Computers, Summary, Assessments

Network Operating Systems
Overview, Objectives, Introduction, The Client/Server Model, Remote Procedure Call (RPC), PC LAN Architectures and the OSI Model, Network Operating System, Xerox Network Systems (XNS) and the OSI Model, Novell NetWare and the OSI Model, AppleTalk and the OSI Model, Banyan Vines and the OSI Model, IBM PC LANs and the OSI Model, Windows NT and the OSI Model, UNIX and the OSI Model, LANtastic and the OSI Model, Summary, Assessments

UNIT IV

System Architectures
Overview, Objectives, Introduction, TCP/IP Naming and Addressing, TCP/IP Applications and Application Services, TCP/IP Protocol Details, System Architectures, Summary, Assessments

Internetworking
Overview, Objectives, Introduction, Relays and Repeaters, Bridges, Routers, Gateways, Hubs, Switches, Network Management and SNMP, Summary, Assessments

Telecommunications Overview
Overview, Objectives, Introduction, Sample Telecommunications Services and ComponentsWAN Link, Options, Summary, Assessments

Reference Books

Fundamentals of Network Security
26 August 2010
by Eric Maiwald

204 OBJECT ORIENTED PROGRAMMING

UNIT I

Object oriented thinking

Need for oop paradigm, A way of viewing world – Agents, responsibility, messages, methods, classes and instances, class hierarchies (Inheritance), method binding, overriding and exceptions, summary of oop concepts, coping with complexity, abstraction mechanisms.

Java Basics

History of Java, Java buzzwords, data types, variables, scope and life time of variables, arrays, operators, expressions, control statements, type conversion and casting, simple java program, concepts of classes, objects, constructors, methods, access control, this keyword, garbage collection, overloading methods and constructors, parameter passing, recursion, nested and inner classes, exploring string class.

UNIT II

Inheritance

Hierarchical abstractions, Base class object, subclass, subtype, substitutability, forms of inheritance-specialization, specification, construction, extension, limitation, combination, benefits of inheritance, costs of inheritance. Member access rules, super uses, using final with inheritance, polymorphism-method overriding, abstract classes, the Object class.

Packages and Interfaces

Defining, Creating and Accessing a Package, Understanding CLASSPATH, importing packages, differences between classes and interfaces, defining an interface, implementing interface, applying interfaces, variables in interface and extending interfaces. Exploring java.io.

UNIT III

Exception handling

Concepts of exception handling, benefits of exception handling, Termination or resumptive models, exception hierarchy, usage of try, catch, throw, throws and finally, built in exceptions, creating own exception sub classes. String handling,Exploring java.util

Multithreading

Differences between multi threading and multitasking, thread life cycle, creating threads, thread priorities, synchronizing threads, interthread communication, thread groups, daemon threads. Enumerations, autoboxing, annotations ,generics.

UNIT IV

Event Handling

Events, Event sources, Event classes, Event Listeners, Delegation event model, handling mouse and keyboard events, Adapter classes. The AWT class hierarchy, user interface components- labels, button, canvas, scrollbars, text components, check box, check box groups, choices, lists panels – scrollpane, dialogs, menubar, graphics, layout manager – layout manager types – border, grid, flow, card and grid bag.

Applets

Concepts of Applets, differences between applets and applications, life cycle of an applet, types of applets, creating applets, passing parameters to applets.
Swing – Introduction, limitations of AWT, MVC architecture, components, containers, exploring swing-JApplet, JFrame and JComponent, Icons and Labels, text fields, buttons – The JButton class, Check boxes, Radio buttons, Combo boxes, Tabbed Panes, Scroll Panes, Trees, and Tables.

Reference Books:

1. Java; the complete reference, 7th editon, Herbert schildt, TMH.
2. Understanding OOP with Java, updated edition, T. Budd, pearson eduction.
3. An Introduction to programming and OO design using Java, J.Nino and F.A. Hosch, John wiley & sons.
4. An Introduction to OOP, third edition, T. Budd, pearson education.
5. Introduction to Java programming , Y. Daniel Liang, pearson education.
6. An introduction to Java programming and object oriented application development, R.A. Johnson-Thomson.

205 OPERATING SYSTEM CONCEPTS

UNIT – I

Introduction : Operating system and functions, Classification of Operating systems- Batch, Interactive, Time sharing, Real Time System, Multiprocessor Systems, Multiuser Systems, Multiprocess Systems, Multithreaded Systems, Operating System Structure- Layered structure, System Components, Operating System services, Reentrant Kernels, Monolithic and Microkernel Systems.

UNIT – II

Concurrent Processes: Process Concept, Principle ofConcurrency, Producer / Consumer Problem, Mutual Exclusion, Critical Section Problem, Dekker's solution, Peterson's solution, Semaphores, Test and Set operation; Classical Problem in Concurrency- Dining Philosopher Problem, Sleeping Barber Problem; Inter Process Communication models and Schemes, Process generation.

UNIT – III

CPU Scheduling: Scheduling Concepts, Performance Criteria, Process States, Process Transition Diagram, Schedulers, Process Control Block (PCB), Process address space, Process identification information, Threads and their management, Scheduling Algorithms, Multiprocessor Scheduling. Deadlock: System model, Deadlock characterization, Prevention, Avoidance and detection, Recovery from deadlock.

UNIT – IV

Memory Management: Basic bare machine, Resident monitor, Multiprogramming with fixed partitions, Multiprogramming with variable partitions, Protection schemes, Paging, Segmentation, Paged segmentation, Virtual memory concepts, Demand paging, Performance of demand paging, Page replacement algorithms, Thrashing, Cache memory organization, Locality of reference.

I/O Management and Disk Scheduling: I/O devices, and I/O subsystems, I/O buffering, Disk storage and disk scheduling, RAID. File System: File concept, File organization and access mechanism, File directories, and File sharing, Filesystem implementation issues, File system protection and security.

Reference Books :

1. Silberschatz, Galvin and Gagne, "Operating Systems Concepts", Wiley
2. SibsankarHalder and Alex A Aravind, "Operating Systems", Pearson Education
3. Harvey M Dietel, " An Introduction to Operating System", Pearson Education
4. D M Dhamdhere, "Operating Systems : A Concept basedApproach", McGraw Hill.
5. Charles Crowley, "Operating Systems: A Design-Oriented Approach", Tata McGraw Hill Education".
6. Stuart E. Madnick & John J. Donovan. Operating Systems. McGraw Hill.

206 OOP through C++/JAVA

UNIT I

Object oriented thinking

Need for oop paradigm, A way of viewing world – Agents, responsibility, messages, methods, classes and instances, class hierarchies (Inheritance), method binding, overriding and exceptions, summary of oop concepts, coping with complexity, abstraction mechanisms.

Java Basics

History of Java, Java buzzwords, data types, variables, scope and life time of variables, arrays, operators, expressions, control statements, type conversion and casting, simple java program, concepts of classes, objects, constructors, methods, access control, this keyword, garbage collection, overloading methods and constructors, parameter passing, recursion, nested and inner classes, exploring string class.

UNIT II

Inheritance

Hierarchical abstractions, Base class object, subclass, subtype, substitutability, forms of inheritance-specialization, specification, construction, extension, limitation, combination, benefits of inheritance, costs of inheritance. Member access rules, super uses, using final with inheritance, polymorphism-method overriding, abstract classes, the Object class.

Packages and Interfaces

Defining, Creating and Accessing a Package, Understanding CLASSPATH, importing packages, differences between classes and interfaces, defining an interface, implementing interface, applying interfaces, variables in interface and extending interfaces. Exploring java.io.

UNIT III

Exception handling

Concepts of exception handling, benefits of exception handling, Termination or resumptive models, exception hierarchy, usage of try, catch, throw, throws and finally, built in exceptions, creating own exception sub classes. String handling,Exploring java.util

Multithreading

Differences between multi threading and multitasking, thread life cycle, creating threads, thread priorities, synchronizing threads, interthread communication, thread groups, daemon threads. Enumerations, autoboxing, annotations ,generics.

UNIT IV

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Concepts of Applets, differences between applets and applications, life cycle of an applet, types of applets, creating applets, passing parameters to applets.
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Reference Books:

1. An Introduction to programming and OO design using Java, J.Nino and F.A. Hosch, John wiley & sons.
2. An Introduction to OOP, third edition, T. Budd, pearson education.
3. Introduction to Java programming , Y. Daniel Liang, pearson education.
4. An introduction to Java programming and object oriented application development, R.A. Johnson-Thomson.

207 ADVANCED LINUX PROGRAMMING & NETWORKING

UNIT – I

Linux Utilities-File handling utilities, Security by file permissions, Process utilities, Disk utilities, Networking commands, Filters, Text processing utilities and Backup utilities.
Sed-Scripts, Operation, Addresses, Commands, awk-Execution, Fields and Records,
Scripts, Operation, Patterns, Actions, Associative Arrays, String and Mathematical functions, System commands in awk, Applications.
Shell programming with Bourne again shell(bash)- Introduction, shell responsibilities, pipes and Redirection, here documents, running a shell script, the shell as a programming language, shell meta characters, file name substitution, shell variables, command substitution, shell commands, the environment, quoting, test command, control structures, arithmetic in shell, shell script examples, interrupt processing, functions, debugging shell scripts.

UNIT – II

Files and Directories- File Concept, File types, File System Structure, file metadata-Inodes, kernel support for files, system calls for file I/O operations- open, create, read, write, close, lseek, dup2, file status information-stat family, file and record locking- fcntl function, file permissions - chmod, fchmod, file ownership-chown, lchown, links-soft and hard links - symlink, link, unlink.
Directories-Creating, removing and changing Directories-mkdir, rmdir, chdir, obtaining current working directory-getcwd, Directory contents, Scanning Directories-opendir, readdir, closedir, rewinddir functions.

UNIT – III

Process - Process concept, Layout of a C program image in main memory. Process environment-environment list, environment variables, getenv, setenv, Kernel support for process, process identification, process control - process creation, replacing a process image, waiting for a process, process termination, zombie process, orphan process, system call interface for process management-fork, vfork, exit, wait, waitpid, exec family, Process Groups, Sessions and Controlling Terminal, Differences between threads and processes.
Signals - Introduction to signals, Signal generation and handling, Kernel support for signals, Signal function, unreliable signals, reliable signals, kill, raise, alarm, pause, abort, sleep functions.

UNIT – IV

Interprocess Communication - Introduction to IPC, IPC between processes on a single computer system, IPC between processes on different systems, pies-creation, IPC between related processes using unnamed pipes, FIFOs- creation, IPC between unrelated processes using FIFOs(Named pipes), differences between unnamed and named pipes,popen and pclose library functions.
Message Queues- Kernel support for messages, APIs for message queues, client/server example.
Semaphores-Kernel support for semaphores, APIs for semaphores, file locking with semaphores.
Shared Memory- Kernel support for shared memory, APIs for shared memory, shared memory example.
Sockets- Introduction to Berkeley Sockets, IPC over a network, Client-Server model, Socket address structures (unix domain and Internet domain), Socket system calls for connection oriented protocol and connectionless protocol, example-client/server programs-Single Server-Client connection, Multiple simultaneous clients, Socket options-setsockopt and fcntl system calls, Comparison of IPC mechanisms.

Reference Books:

1 Unix System Programming using C++, T. Chan, PHI.
2 Unix Concepts and Applications, 4th Edition, Sumitabha Das, TMH.
3 Unix Network Programming, W. R. Stevens, PHI.

301 FUNDAMENTALS OF DATA STRUCTURE

UNIT -I.

Linear Data Structure Introduction : Why we need data structure? Concepts of data structures: a) Data and data structure b) Abstract Data Type and Data Type. Algorithms and programs, basic idea of pseudo-code. Algorithm efficiency and analysis, time and space analysis of algorithms – order notations. Syllabus for B.Tech(Computer Science & Engineering) Second Year Revised Syllabus of B.Tech CSE Array : Different representations – row major, column major. Sparse matrix - its implementation and usage. Array representation of polynomials. Linked List: Singly linked list, circular linked list, doubly linked list, linked list representation of polynomial and applications.

UNIT -II

Linear Data Structure [Stack and Queue: Stack and its implementations (using array, using linked list), applications. Queue, circular queue, dequeue. Implementation of queue- both linear and circular (using array, using linked list), applications. Recursion: Principles of recursion – use of stack, differences between recursion and iteration, tail recursion. Applications - The Tower of Hanoi, Eight Queens Puzzle.

UNIT -III

Nonlinear Data structures Trees : Basic terminologies, forest, tree representation (using array, using linked list). Binary trees - binary tree traversal (pre-, in-, post- order), threaded binary tree (left, right, full) - non-recursive traversal algorithms using threaded binary tree, expression tree. Binary search tree- operations (creation, insertion, deletion, searching). Height balanced binary tree – AVL tree (insertion, deletion with examples only). B- Trees – operations (insertion, deletion with examples only). Graphs : Graph definitions and concepts (directed/undirected graph, weighted/un-weighted edges, sub-graph, degree, cutvertex/articulation point, pendant node, clique, complete graph, connected components – strongly connected component, weakly connected component, path, shortest path, isomorphism). Graph representations/storage implementations – adjacency matrix, adjacency list, adjacency multi-list. Graph traversal and connectivity – Depth-first search (DFS), Breadth-first search (BFS) – concepts of edges used in DFS and BFS (tree-edge, back-edge, cross-edge, forward-edge), applications. Minimal spanning tree – Prim's algorithm (basic idea of greedy methods).

UNIT- IV

Searching, Sorting: Sorting Algorithms : Bubble sort and its optimizations, insertion sort, shell sort, selection sort, merge sort, quick sort, heap sort (concept of max heap, application – priority queue), radix sort. Searching : Sequential search, binary search, interpolation search. Hashing : Hashing functions, collision resolution techniques.

Reference Books:

1. “Data Structures And Program Design In C”, 2/E by Robert L. Kruse, Bruce P. Leung.

2. “Fundamentals of Data Structures of C” by Ellis Horowitz, Sartaj Sahni, Susan Anderson-freed.

3. “Data Structures in C” by Aaron M. Tenenbaum.

4. “Data Structures” by S. Lipschutz.

5. “Data Structures Using C” by Reema Thareja.

6. “Data Structure Using C”, 2/e by A.K. Rath, A. K. Jagadev.

7. “Introduction to Algorithms” by Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, Clifford Stein.

302 FUNDAMENTALS OF GAME PHYSICS

UNIT- I

1. Demonstrate knowledge of linear algebra applied to computer games and graphics.

2. Demonstrate knowledge of geometry applied to computer games and graphics.

UNIT- II

1. Demonstrate a basic understanding of mechanics sufficient to understand and solve problems involving bodies in motion.

UNIT- III

1. Construct discrete implementations from continuous mathematical models demonstrating knowledge of numerical methods and programming paradigms.

UNIT- IV

1. Demonstrate competency in the writing and testing of math and physics-related code for computer games.

Reference Book:

Fundamentals of Math and Physics for Game Programmers
28 July 2005
by Wendy Stahler

303 DESIGN & ANALYSIS OF ALGORITHM

UNIT- I

Introduction to algorithms and its importance,

UNIT- II

mathematical foundations: growth functions, complexity analysis of algorithms, summations, recurrences, sorting algorithms design and analysis: Insertion sort, divide and conquer, merge sort, heap sort, radix sorting.

UNIT- III

Hash table, B trees, Binomial Heaps, Fibonacci Heaps.
Dynamic Programming: Introduction, Matrx chain multiplication, Greedy Algorithms.
Elementary Graph algorithms: Minimum spanning trees, Single source shortest path, all pair shortest path.

UNIT- IV

String matching: Robin – Karp algorithm, Knuth – Morris Pratt algorithm, Algorithm for parallel computers, parallelism, the PRAM models, simple PRAM algorithms.
P and NP Class, some NP – complete problems.

Reference Books:

1 Thomas H. Cormen, Charles E. Leiserson, R.L. Rivest.. Algorithms, Prentice Hall of India Publications, New-Delhi.
2 Sara Baase and Allen Van Gelder.. Computer Algorithms: Introduction to Design and Analysis , Pearson education (Singapore) Pte. Ltd, New Delhi.
3 Alfred V. Aho, John E. Hopcroft, Jeffrey D. Ullman.. The Design and Analysis of Computer Algorithms, Pearson Education (Singapore) Pte. Ltd New Delhi.

304 SYSTEM ANALYSIS & DESIGN

UNIT- I

- Knowledge and understanding

- Understand the principles and tools of systems analysis and design

- Understand the application of computing in different context

- Understand the professional and ethical responsibilities of practicing the computer professional including understanding the need for quality

UNIT- II

• Cognitive skills (thinking and analysis).

- Solve a wide range of problems related to the analysis, design and construction of information systems

- Analysis and Design of systems of small sizes

UNIT- III

• Communication skills (personal and academic).

- Be able to present projects

UNIT- IV

• Practical and subject specific skills (Transferable Skills).

- Plan and undertake a major individual project, prepare and deliver coherent and structured verbal and written technical reports

Reference Books:

Title: Systems Analysis and Design

Author(s): Kenneth E. Kendall and Julie E. Kendall Publisher: Prentice Hall PTR, 5th Edition, 2001

305 COMPUTER GRAPHICS & ANIMATION

UNIT I

BASICS OF COMPUTER GRAPHICS Introduction. What is computer Graphics? Area of Computer Graphics Design and Drawing Animation Multimedia applications Simulation How are pictures actually stored and displayed Difficulties for displaying pictures Block Summary Review Question and Answers.

UNIT II

GRAPHIC DEVICES Introduction Cathode Ray Tube Quality of Phosphors CRTs for Color Display Beam Penetration CRT The Shadow - Mask CRT Direct View Storage Tube Tablets The light Pen Three Dimensional Devices

C Graphics Introduction Introduction 'C' GRAPHICS FUNCTIONS C Graphics Programming Examples COMPUTER GRAPHICS

SIMPLE LINE DRAWING METHODS Introduction Point Plotting Techniques Qualities of good line drawing algorithms The Digital Differential Analyzer (DDA) Bresenham's Algorithm Generation of Circles

UNIT III

TWO DIMENSIONAL TRANSFORMATIONS Introduction What is transformation? Matrix representation of points Basic transformation Translation Rotation Scaling

CLIPPING AND WINDOWING Introduction Need for Clipping and Windowing Line Clipping Algorithms The midpoint subdivision Method Other Clipping Methods Sutherland - Hodgeman Algorithm Viewing Transformations

GRAPHICAL INPUT TECHNIQUES Introduction Graphical Input Techniques Positioning Techniques Positional Constraints Rubber band Techniques

UNIT IV

THREE DIMENSIONAL GRAPHICS INTRODUCTION Need for 3-Dimensional Imaging Techniques for 3-Dimesional displaying COMPUTER GRAPHICS Parallel Projections Perspective projection Intensity cues Stereoscope effect Kinetic depth effect Shading

SOLID AREA SCAN CONVERSION Introduction Solid Area Scan Conversion Scan Conversion of Polygons Algorithm Singularity

Three Dimensional Transformations Introduction Three-Dimensional transformation Translations Scaling Rotation Viewing Transformation The Perspective Algorithms Three Dimensional Clipping Perspective view of Cube

HIDDEN SURFACE REMOVAL Introduction Need for hidden surface removal The Depth - Buffer Algorithm Properties that help in reducing efforts Scan Line coherence algorithm Span - Coherence algorithm Area-Coherence Algorithms Warnock's Algorithm Priority Algorithms

Reference Book

Computer Graphics, Multimedia and Animation
2010
by Pakhira Malay K.

306 DATA STRUCTURE THROUGH C

UNIT - I

Introduction: Basic Terminology, Elementary Data Organization, Structure operations, Algorithm Complexity and Time-Space trade-off. Arrays: Array Definition, Representation and Analysis, Single and Multidimensional Arrays, address calculation, application of arrays, Character String in C, Character string operation, Array as Parameters, Ordered List, Sparse Matrices and Vectors. Stacks: Array Representation and Implementation of stack, Operations on Stacks: Push & Pop, Array Representation of Stack, Linked Representation of Stack, Operations Associated with Stacks, Application of stack: Conversion of Infix to Prefix and Postfix Expressions, Evaluation of postfix expression using stack., Applications of recursion in problems like 'Tower of Hanoi'.

UNIT - II

Queues: Array and linked representation and implementation of queues, Operations on Queue: Create, Add, Delete, Full and Empty, Circular queues, D-queues and Priority Queues. Linked list: Representation and Implementation of Singly Linked Lists, Two-way Header List, Traversing and Searching of Linked List, Overflow and Underflow, Insertion and deletion to/from Linked Lists, Insertion and deletion Algorithms, Doubly linked list, Linked List in Array, Polynomial representation and addition, Generalized linked list, Garbage Collection and Compaction.

UNIT – III

Trees: Basic terminology, Binary Trees, Binary tree representation, algebraic Expressions, Complete Binary Tree, Extended Binary Trees, Array and Linked Representation of Binary trees, Traversing Binary trees, Threaded Binary trees, Traversing Threaded Binary trees, Huffman algorithm. Searching and Hashing: Sequential search, binary search, comparison and analysis, Hash Table, Hash Functions, Collision Resolution Strategies, Hash Table Implementation.

UNIT – IV

Sorting: Insertion Sort, Bubble Sorting, Quick Sort, Two Way Merge Sort, Heap Sort, Sorting on Different Keys, Practical consideration for Internal Sorting. Binary Search Trees: Binary Search Tree

(BST), Insertion and Deletion in BST, Complexity of Search Algorithm, Path Length, AVL Trees, B-trees.

Graphs: Terminology & Representations, Graphs & Multi-graphs, Directed Graphs, Sequential Representations of Graphs, Adjacency Matrices, Traversal, Connected Component and Spanning Trees, Minimum Cost Spanning Trees. File Structures: Physical Storage Media File Organization, Organization of records into Blocks, Sequential Files, Indexing and Hashing, Primary indices, Secondary indices, B+ Tree index Files, B Tree index Files, Indexing and Hashing Comparisons.

Reference Books:

1. Horowitz and Sahani, “Fundamentals of data Structures”, Galgotia Publication Pvt. Ltd., New Delhi.

2. R. Kruse etal, “Data Structures and Program Design in C”, Pearson Education Asia, Delhi- 2002

3. A. M. Tenenbaum, “Data Structures using C & C++”, Prentice-Hall of India Pvt. Ltd., New Delhi.

4. K Loudon, “Mastering Algorithms with C”, Shroff Publisher & Distributors Pvt. Ltd.

5. Bruno R Preiss, “Data Structures and Algorithms with Object Oriented Design Pattern in C++”, Jhon Wiley & Sons, Inc.

6. Adam Drozdek, “Data Structures and Algorithms in C++”, Thomson Asia Pvt. Ltd.(Singapore)

307 GRAPHICS PROGRAMMING USING OPENGL & OTHERS

UNIT- I

- Introduction, Motivation, Uses, History
- Graphics Systems and Models
- Graphics Programming : Getting started with OpenGL
- Input and Interaction in OpenGL

UNIT- II

- Geometrical Objects and Transformations in 2D and 3D, homogeneous coordinates, matrix representation, windows and viewports
- Viewing in 3D, projections, hidden surface removal
- Light, shading and materials. Illumination and Shading, light sources, (surface detail, ray tracing, radiosity)

UNIT- III

- From Vertices to Fragments : modeling, geometry processing, rasterization, fragment processing. Clipping, hidden surface removal, antialiasing.
- Discrete techniques: buffers, bit and pixel operations, texture mapping, compositing.
- Programmable shaders : OpenGL shading language, fragment shaders, cub and bump maps.

UNIT- IV

- Modelling Techniques, trees, scene graphs.
- Curve and surface representation
- Advanced rendering techniques: ray tracing, radiosity, image based rendering.

Reference Books:

Edward Angel, Interactive Computer Graphics: A Top-Down Approach with OpenGL, 4th edition, Addison-Wesley, 2005.
Additional References:

- Edward Angel, OpenGL : A primer, 2nd edition, Addison-Wesley, 2005
- The OpenGL Programmer's Guide (the Redbook), Addison-Wesley
- The OpenGL Reference Manual (the Bluebook), Addison-Wesley
- James D. Foley, Andries van Dam, Steven K. Feiner, John F. Hughes, Computer Graphics : Principles & Practices, Addison Wesley Longman, 2nd edition in C, 1994, 1296 Pages, ISBN 0201848406, $69.95/$74.75
- Donald Hearn, M. Pauline Baker, Computer Graphics, 2nd edition, C version, Prentice Hall, 1996.

401 ADVANCED DATA STRUCTURE

UNIT I :
C++ Class Overview- Class Definition, Objects, Class Members, Access Control, Class Scope, Constructors and destructors, parameter passing methods, Inline functions, static class members, this pointer, friend functions, dynamic memory allocation and deallocation (new and delete), exception handling.

UNIT II :
Function Over Loading, Operator Overloading, Generic Programming- Function and class templates, Inheritance basics, base and derived classes, inheritance types, base class access control, runtime polymorphism using virtual functions, abstract classes, streams I/O.

UNIT III :
Algorithms, performance analysis- time complexity and space complexity. Review of basic data structures- The list ADT, Stack ADT, Queue ADT, Implementation using template classes in C++. Dictionaries, linear list representation, skip list representation, operations insertion, deletion and searching, hash table representation, hash functions, collision resolution-separate chaining, open addressing-linear probing, quadratic probing, double hashing, rehashing, extendible hashing, comparison of hashing and skip lists.

UNIT IV :
Priority Queues – Definition, ADT, Realizing a Priority Queue using Heaps, Definition, insertion, Deletion, External Sorting- Model for external sorting, Multiway merge, Polyphase merge.
Search Trees (Part1):-
Binary Search Trees, Definition, ADT, Implementation, Operations- Searching, Insertion and Deletion, AVL Trees, Definition, Height of an AVL Tree, Operations – Insertion, Deletion and Searching
Search trees (prt II) : Introduction to Red –Black and Splay Trees, B-Trees, B-Tree of order m, height of a B-Tree, insertion, deletion and searching, Comparison of Search Trees
Pattern matching and Tries : Pattern matching algorithms-Brute force, the Boyer –Moore algorithm, the Knuth-Morris-Pratt algorithm, Standard Tries, Compressed Tries, Suffix tries.

References Books :

1. Data structures, Algorithms and Applications in C++, S.Sahni, University Press (India) Pvt.Ltd, 2nd edition, Universities Press Orient Longman Pvt. Ltd.
2. Data structures and Algorithms in C++, Michael T.Goodrich, R.Tamassia and .Mount, Wiley student edition, John Wiley and Sons.
3. Data structures and Algorithm Analysis in C++, Mark Allen Weiss, Pearson Education. Ltd., Second Edition.
4. Data structures and algorithms in C++, 3rd Edition, Adam Drozdek, Thomson
5. Data structures using C and C++, Langsam, Augenstein and Tanenbaum, PHI.
6. Problem solving with C++, The OOP, Fourth edition, W.Savitch, Pearson education.

402 INTRODUCTION TO GAME DEVELOPMENT

UNIT I
Introduction to Unity and C#
Structure: Throughout this part of the semester, students will be instructed in various aspects of game prototyping using C# and Unity. We will go over general syntax and code structures in C#, how to use the Unity editor, and how to work with Unity objects through code.
Assignments: Individual assignments each week. There will be frequent, small “quizzes” reviewing concepts and syntax, as well as exercises in Unity itself. All assignments are completion.
Homework

UNIT II
Classic Game Project
Structure: Students will work in pairs to create a game prototype which mimics the mechanics and "game feel" of a classic game from the 8-bit era.

UNIT III
Assignments: Pair assignment. Students will recreate a game from the 8-bit era. For this assignment, it is not at all necessary that the graphics look like the original game; rather it is much more important that the game mimic the mechanics of the original as exactly as possible. For instance, if a pair were to recreate Super Mario Bros. for the NES, it would be fine if Mario were visually just a box or capsule as long as the way in which Mario jumped felt exactly like the jump in the original game (i.e. pressing the jump button for the same amount of time produces the same upward acceleration, jump height, and downward deceleration as seen in the original game).

UNIT IV
Final Game Project
Structure: Students will work in pairs to create an original game prototype.
Assignments: Pair assignment due during the final exam period. Students will create a new, unique game prototype. This will be based on their work throughout the semester and should both showcase all of the skills that they've learned throughout the semester and express a unique game design vision.

Reference Book:

Introduction to Game Programming with C++
September 2007
by Alan Thorn

403 MOBILE APPLICATION DEVELOPMENT

UNIT I

Introduction

a. Introduction to Mobile Computing

b. Introduction to

c. Android Development Environment

2. Factors in Developing Mobile Applications

a. Mobile Software Engineering

b. Frameworks and Tools

c. Generic UI Development

d. Android User

UNIT II

Intents on UIs VUIs and Mobile Apps

Text-to-Speech Techniques Designing the Right UI Multichannel and Multimodial UIs and Services

a. Android Intents and Services

b. Characteristics of Mobile Applications

c. Successful Mobile Development

Storing and Retrieving Data

a. Synchronization and Replication of Mobile Data

b. Getting the Model Right

c. Android Storing and Retrieving Data

d. Working with a Content Provider

UNIT III

Communications Via Network and the Web

a. State Machine

b. Correct Communications Model

c. Android Networking and Web

Telephony

a. Deciding Scope of an App

b. Wireless Connectivity and Mobile Apps

c. Android Telephony

8. Notifications and Alarms

a. Performance

b. Performance and Memory Management

c. Android Notifications and Alarms

UNIT IV

Graphics

a. Performance and Multithreading

b. Graphics and UI Performance

c. Android Graphics and

Multimedia

a. Mobile Agents and Peer-to-Peer Architecture

b. Android Multimedia

Location

a. Mobility and Location Based Services
b. Android

Putting It All Together (as time allows)
a. Packaging and Deploying
b. Performance Best Practices
c. Android Field Service App
Security and Hacking (as time allows)
a. Active Transactions
b. More on Security
c. Hacking Android
Platforms and Additional Issues (as time allows)
a. Development Process
b. Architecture, Design, Technology Selection
c. Mobile App Development Hurdles
d. Testing

Reference Book:

Professional Mobile Application Development
11 October 2012
by Jeff Mcherter and Scott Gowell

404 AI BASICS (PROBLEM SOLVING, PLANNING, UNCERTAIN KNOWLEDGE & REASONING, LEARNING)

UNIT I

Introduction, Basic Search We will begin with a discussion of what Artificial Intelligence is, and what disciplines it encompasses. The scope, goals, and policies of the course will also be introduced. Basic Search State-space search, including both problem mapping and algorithms. Breadth first search, depth first search, A* search.
Playing Games We will discuss the problem of state-space search in a multi-agent system such as a two-player game. We will also cover introductory game theory, and how it can be used to solve the optimal play problem.

UNIT II

Logic Introduction to logic-based problem solving. We will begin with simple Boolean logic, and then cover first order logic. We will also discuss unifi- cation and resolution for performing logical inference, and give a very basic overview 6 of other logic systems, including higher-order logic, fuzzy logic, and probabilistic logic (which we will come back to later).

UNIT III

Local Search We introduce local search algorithms, and discuss their advantages and drawbacks. We will cover classic local search techniques, as well as some evolutionary computing techniques, focusing on the Genetic Algorithm for search.
Concept Learning We introduce the field of machine learning with the basic concept-learning, or classification, problem. We will discuss the basics of supervised learning and decision trees.
SVMs & ANNs We will discuss Support Vector Machines (SVMs) and Artificial Neural Networks (ANNs), and their application to the concept learning problem.
Science Writing We will discuss science writing, and do in-class reading and critique of example papers.

UNIT IV

Unsupervised Learning We will discuss unsupervised and minimally supervised learning, as well as starting to discuss Reinforcement Learning.
Reinforcement Learning We will cover the topic of Reinforcement learning, including both model-based and model-free approaches.
Uncertainty & Probabilistic Reasoning We will introduce the concepts of reasoning under uncertainty using probabilistic models, including Bayesian Networks.
Probabilistic Models We will continue our discussion of prob- abilistic models, including how such models can be induced.

Reference Books:

Machine Learning,Tom Mitchell, McGraw Hill, 1997, ISBN: 978-0-070-42807-2

Introduction to Machine Learning, Ethem Alpaydin, MIT Press, 2010 ISBN: 978-0-262-01243-0

Probabilistic Graphical Models, Principles and Techniques, Daphne Koller & Nir Friedman, MIT Press, 2009 ISBN: 978-0-262-01319-2

Probabilistic Reasoning in Intelligent Systems, Judea Pearl, Morgan Kaufmann, 1988 ISBN: 978-1-558-60479-7

405 SEARCHING & OPTIMIZATION

UNIT I

Basics for SEO

What is Domain
Basic Knowledge of World Wide Web
Difference between Portal and Search Engines
What is SEO
Types of SEO Techniques
Black hat techniques
White Hat techniques
How Search Engine works

SEO Research & Analysis

Market Research
Keyword Research and Analysis
Keyword opportunity
Competitors Website Analysis
SWOT Analysis of Website
How to Choose Best Keywords
Tools available for Keyword Research

UNIT II

Website Design SEO Guidelines

Content Research
Content Guidelines
Content Optimization
Design & Layout
XML Sitemap / URL List Sitemap

On-page Optimization

The Page Title
Meta Descriptions & Meta Keywords
Headings
Bold Text
Domain Names & Suggestions
Canonical Tag
Meta Tags
Images and Alt Text
Internal Link Building
The Sitemap
Invisible Text
Server and Hosting Check
Robots Meta Tag

Doorway Pages
301 Redirects
404 Error
Duplicate content

UNIT- III

Off-page Optimization

Page Rank
Link Popularity
Link Building in Detail
Directory Submission
Social Bookmark Submission
Blog Submission
Articles
Links Exchange
Reciprocal Linking
Posting to Forums
Submission to Search Engine
RSS Feeds Submissions
Press Release Submissions
Forum Link Building
Competitor Link Analysis

Analytics

Google Analytics
Installing Google Analytics
How to Study Google Analytics
Interpreting Bars & Figures
How Google Analytics can Help SEO
Advanced Reporting
Webmaster Central & Bing/Yahoo
Open Site Explorer
Website Analysis using various SEO Tools available

UNIT IV

SEO Tools

Keyword Density Analyzer Tools
Google Tools
Yahoo / Bing Tools
Rich Snippet Text Tools
Comparison Tools
Link Popularity Tools
Search Engines Tools
Site Tools
Miscellaneous Tools

SEO Reporting

Google analysis
Tracking and Reporting
Reports Submission
Securing Rank

Reference Book:

An Introduction to Optimization: Second Edition
14 July 2010
by Edwin K.P. Chong and Stanislaw H. Zak

406 ADVANCED DATA STRUCTURE PROGRAMMING

UNIT I

• Data structures:

Abstract data types (ADTs), vector, list, deque, stack, queue, graph, digraph, table, map (associative array), priority queue, sets, trees. Etc.

UNIT II

• Algorithms:

Efficient program design requires good matching of data structures (which determine how the data can be easily accessed and manipulated) and algorithms (strategies for processing the data to achieve the desired program goals). Algorithm design, complexity analysis and correctness proof form important components in study of algorithms.

UNIT III

• Generic programming:

Generic programming is a software engineering philosophy to create programs that use data structures from their high-level functionality for data access and manipulation, without looking at the details of how that data structure is implemented as a program. Generic programming permits component re-use and leads to more maintainable code. This course teaches coding for re-use of both data structures and algorithms in C++. Provide a description and rationale for the course indicating where it fits into the overall intellectual area.

Reference Books:

Data Structures and Algorithm Analysis in C++ (3rd edition), by M. A. Weiss. Addison-Wesley, ISBN-10: 032144146X & ISBN-13: 9780321441461

C++ How to Program (5th Edition), by (Harvey & Paul) Deitel & Associates. Prentice Hall, ISBN-10: 0131857576 & ISBN-13: 9780131857575

407 GAME & MOBILE APPLICATION DEVELOPMENT-1

UNIT I

- Introduction and Course Overview
- Mobile game development overview
- Play some selected mobile games
- Team setup
- Design Document Overview (Premise, Pitch,Story, Gameplay Breakdown, Critical Functions of play, Level walkthrough, Resources, Asset List)
- Project Plan/Design finalization
- Design Presentation - each team must present their team's proposal
- Getting started with development tools
- Quick walk through Unity3D, Cocos2D
- Selection of development tools
- Game Application creation

UNIT II

- Studio Sessions (In studio sessions, student game development teams will develop and implement their game designs.)
- Studio Sessions (In studio sessions, student game development teams will develop and implement their game designs.)
- Basic wireless Networking walk through
- Studio Sessions (In studio sessions, student game development teams will develop and implement their game designs.)
- Game demos preparation for Mid-term presentation
- Studio Sessions (In studio sessions, student game development teams will develop and implement their game designs.)

UNIT III

- Mid-term demo of developed games - all students in all teams must be present for the in-class demonstration
- FTUE (First time User Experience)
- Studio Sessions (In studio sessions, student game development teams will develop and implement their game designs.)
- CUE (Continued User Experience)
- Studio Sessions (In studio sessions, student game development teams will develop and implement their game designs.)
- Review of class games, playtesting setup and feedback

UNIT IV

- Reasonable hours of gameplay to be expected from game
- Studio Sessions (In studio sessions, student game development teams will develop and implement their game designs.)
- Studio Sessions (In studio sessions, student game development teams will develop and implement their game designs.)
- Final Game Evaluation
- Bug Fixes
- Final In-Class Game demo
- Video demo turned in for semester DVD
- Source code & art assets placed into GamePipe SVN

Reference Book:

Beginning Android 4 Games Development (Beginning Apress)
15 December 2011
by Mario Zechner and Robert Green

501 COMPUTER VISION & PATTERN RECOGNITION (IMAGE PROCESSING)

UNIT I

- Filtering, Image Representations, and Texture Models
- Color Vision
- Multi-view Geometry

UNIT II

- Projective Reconstruction
- Bayesian Vision; Statistical Classifiers
- Clustering & Segmentation; Voting Methods

UNIT III

- Tracking and Density Propagation
- Visual Surveillance and Activity Monitoring

UNIT IV

- Medical Imaging
- Image Databases
- Image-Based Rendering

Reference Books:

1. E. H. Adelson, E. P. Simoncelli, and W. T. Freeman, **Pyramids and Multiscale Representations**. In Representations of Vision , pp. 3-16, 1991.

2. K. Mikolajczyk and C. Schmid, **A performance evaluation of local descriptors**. In IEEE Conference on Computer Vision and Pattern Recognition, pp. 257-263, 2003.

3. J. Shi and C. Tomasi, **Good Features to Track**. In IEEE Conference on Computer Vision and Pattern Recognition, 1994.

4. D. G. Lowe, Distinctive Image Features from Scale-Invariant Keypoints. In International Journal of Computer Vision , 2004.

5. D. Comaniciu and P.Meer, Robust analysis of feature spaces: Color image segmentation.IEEE Conference on Computer Vision and Pattern Recognition, June 1997

502 NATURAL LANGUAGE UNDERSTANDING

UNIT I

- Introduction (1 Lecture)
- Estimation Techniques, and Language Modeling (1 Lecture)
- Parsing and Syntax (5 Lectures)

UNIT II

- The EM Algorithm in NLP (1 Lecture)
- Stochastic Tagging, and Log-Linear Models (2 Lectures)
- Probabilistic Similarity Measures and Clustering (2 Lectures)

UNIT III

- Machine Translation (2 Lectures)
- Discourse Processing: Segmentation, Anaphora Resolution (3 Lectures)
- Dialogue Systems (1 Lecture)

UNIT IV

- Natural Language Generation/Summarization (1 Lecture)
- Unsupervised Methods in NLP (1 Lecture)

Reference Books:

Jurafsky, David, and James H. Martin. Speech and Language Processing: An Introduction to Natural Language Processing, Computational Linguistics and Speech Recognition. Upper Saddle River, NJ: Prentice-Hall, 2000. ISBN: 0130950696

503 ROBOTICS & PERCEPTION

The desired learning outcomes for the students are

-Remembering basic concepts in robotics and perception

-Understanding the most common techniques used in the field

-Applying them on a variety of robotic platforms and gain experience

-Interacting with your peers about the material, polls, quizzes, and assignments

- Evaluating your own progress in the course on a regular basis

Reference Books:

Introduction To Autonomous Mobile Robots, Second Edition
“Introduction to Autonomous Mobile Robots, second edition” by Roland Siegwart, Illah Nourbakhsh, and Davide Scaramuzza (ISBN-10: 0262015358 | ISBN-13: 978-0262015356).

504 KNOWLEDGE BASED AI

UNIT I

Introduction to KBAI and Cognitive Systems.

- Where Knowledge-Based AI fits into AI as a whole
- Cognitive systems: what are they?
- AI and cognition: how are they connected?

Fundamentals

- Semantic Networks
- Generate & Test
- Means-Ends Analysis
- Problem Reduction
- Production Systems

UNIT II

Common Sense Reasoning

- Frames
- Understanding
- Common Sense Reasoning
- Scripts

Planning

- Logic
- Planning

UNIT III

Learning

- Learning by Recording Cases
- Incremental Concept Learning
- Classification
- Version Spaces & Discrimination Trees

Analogical Reasoning

- Case-Based Reasoning
- Explanation-Based Learning
- Analogical Reasoning

UNIT IV

Visuospatial Reasoning

- Constraint Propagation
- Visuospatial Reasoning

Design & Creativity

- Configuration
- Diagnosis
- Design

- Creativity

Metacognition

- Learning by Correcting Mistakes
- Meta-Reasoning
- AI Ethics

Reference Book:

Knowledge-based Systems: Techniques and Applications
11 July 2000
by Cornelius T. Leondes

505 GAME AI

Identify aspects of computer games that can benefit from the use of artificial intelligence.
• Evaluate the relative benefits and drawbacks of different artificial intelligence techniques that can be used to solve similar computer game problems.
• Implement a variety of artificial intelligence and machine learning techniques for traditional and modern computer games.

Reference Books: Millington's Artificial Intelligence for Games and Buckland's Programming Game AI

506 MATLAB PROGRAMMING

MA TLAB as a calculator V ariables and Functions Branching Statements Loops
Recursion and Plotting
Review and Midterm Exam
Representation of Numbers and Complexity
Linear Algebra
Least Squares Regression
Spring Break
Interpolation and Series
Root Finding
Numerical Differentiation and Integration
Numerical Solutions to Ordinary Differential Equations Course Evaluation, Robot Tournament Awards Ceremony

Reference Book:

MATLAB PROGRAMMING
30 April 2010
by Singh, Y. Kiranichaudhuri, B. B.

507 GAME & MOBILE APPLICATION DEVELOPMENT-2

- Describe the basic components of an Android application
- Define the lifecycle methods of Android application components
- Describe the basics of event handling in Android
- Describe the basics of graphics and multimedia support in Android
- Demonstrate basic skills of using an integrated development environment (Android Studio) and Android Software Development Kit (SDK) for implementing Android applications
- Demonstrate through a simple application the understanding of the basic concepts of Android

Reference Book

Professional Android 4 Application Development (Wrox)
8 June 2012
by Reto Meier

601PROJECT