Scheme of Examination
(w.e.f. 2012-13)
B.Sc (Honours) Computer Science

Paper Code	Title of Paper	Periods per week	Max Marks	Internal Assessment	Exam Duration
First Semester with effect from : 2012-2013					
B.Sc-101	Computer Fundamentals and Programming in C	6	80	20	3 Hours
B.Sc-102	Mathematics-I	6	80	20	3 Hours
B.Sc-103	Data and File Structure	6	80	20	3 Hours
B.Sc-104	Analog Electronics	6	80	20	3 Hours
B.Sc-105	Software Lab-I	6	80	20	3 Hours
B.Sc-106	Software Lab-II	6	80	20	3 Hours
Second Semester					
B.Sc-201	System Analysis and Design	6	80	20	3 Hours
B.Sc-202	Mathematics-II	6	80	20	3 Hours
B.Sc-203	Algorithms and Advanced Data Structures	6	80	20	3 Hours
B.Sc-204	Digital Electronics	6	80	20	3 Hours
B.Sc-205	Software Lab-III	6	80	20	3 Hours
B.Sc-206	Software Lab-IV	6	80	20	3 Hours
Third Semester with effect from : 2013-2014					
B.Sc-301	Software Engineering	6	80	20	3 Hours
B.Sc-302	Mathematical Foundations of Computer Science	6	80	20	3 Hours
B.Sc-303	Object Oriented Programming and Design	6	80	20	3 Hours
B.Sc-304	Computer System Architecture	6	80	20	3 Hours
B.Sc-305	Software Lab-V	6	80	20	3 Hours
B.Sc-306	Software Lab-VI	6	80	20	3 Hours
Fourth Semester					
B.Sc-401	Data Base Systems	6	80	20	3 Hours
B.Sc-402	Scientific and Statistical Computing	6	80	20	3 Hours
B.Sc-403	Operating Systems and UNIX	6	80	20	3 Hours
B.Sc-404	Microprocessor-I	6	80	20	3 Hours
B.Sc-405	Software Lab-VII	6	80	20	3 Hours

B.Sc-406	Software Lab-VIII	6	80	20	3 Hours
B.Sc-407	Summer Training/Project	-	80	20	-
Fifth Semester with effect from : 2014-2015					
B.Sc-501	Data Communication and Computer Networks	6	80	20	3 Hours
B.Sc-502	Computer Graphics	6	80	20	3 Hours
B.Sc-503	Principles of Visual and Windows Programming	6	80	20	3 Hours
B.Sc-504	Microprocessor-II	6	80	20	3 Hours
B.Sc-505	Software Lab-IX	6	80	20	3 Hours
B.Sc-506	Software Lab-X	6	80	20	3 Hours
B.Sc-507	Essential Entrepreneurship Skills	6	80	20	3 Hours
Sixth Semester					
B.Sc-601	Internet Technologies	6	80	20	3 Hours
B.Sc-602	Multimedia	6	80	20	3 Hours
B.Sc-603	Programming in JAVA	6	80	20	3 Hours
B.Sc-604	Theory of Computation	6	80	20	3 Hours
B.Sc-605	Software Lab-XI	6	80	20	3 Hours
B.Sc-606	Software Lab-XII	6	80	20	3 Hours
B.Sc-607	Behavioural and Communication Skills	6	80	20	3 Hours

First Semester with effect from : 2012-2013

B.Sc-101 : Computer Fundamentals and Programming in C **Max. Marks (External): 80**
Internal (Theory): 20
Time Allowed: 3 Hrs

Note: Examiner will be required to set NINE questions in all. Question Number 1 will consist of total 8 parts (short-answer type questions) covering the entire syllabus and will carry 16 marks. In addition to the compulsory question there will be four units i.e. Unit-I to Unit-IV. Examiner will set two questions from each Unit of the syllabus and each question will carry 16 marks. Student will be required to attempt FIVE questions in all. Question Number 1 will be compulsory. In addition to compulsory question, student will have to attempt four more questions selecting one question from each Unit.

Unit-I (Computer Fundamentals)

Computer: Definition, features, advantages and applications; History of Computers; Software v/s Hardware; Generation of Computers; Classification of Computers; PC: History, significance, impact and classification; Analog v/s Digital Computer;

Block Diagram of a Computer; Components/Functional units of a Computer; Input devices; Output devices; CPU; Computer Memory: Primary v/s Secondary, Internal v/s External, RAM v/s ROM, Why Cache Memory, Volatile v/s Non Volatile Memory.

Unit-II (Programming Fundamentals)

Number system: decimal, octal, binary and hexadecimal; Importance of binary numbers to Computers; Representation of integers, Fixed and Floating point representations; Character representation: significance, ASCII (7 & 8 bits), BCD and EBCDIC, Unicode.

Type of Computer Softwares: System v/s Application Software; Need of Programming Languages; Classification of Programming Languages: High Level Languages v/s Low Level Languages; Concept of Procedural and Structured programming;

Algorithm: definition and importance; Steps in Problem Solving with Computers; Pseudo codes; Algorithm Development; Flowchart v/s algorithm; top-down v/s bottom-up approach; step wise refinement; Algorithms for searching (Linear and Binary), Sorting: concept, types, algorithms for Bubble sort, Insertion sort and Merge sort.

Unit-III (Programming in C-I)

C: history, why named as C, importance, features and portability of C programs; Why C is called as middle level language; Development of efficient programs in C; Compiling and running C programs; Program Correctness: debugging and testing of programs

Character set of C; Data types in C; Representation of constants and variables; Keywords and Reserve words in C; Operators in C: arithmetic, relational, logical, assignment, shorthand, bitwise and conditional; Expressions in C: arithmetic expressions, assignment statements, logical expressions,

relational; Evaluation of expressions: operator precedence rules and associatively.

Unit-IV (Programming in C-II)

C as a structured programming language; Control structures in C: sequencing, alteration and iteration; break v/s continue; if-else v/s switch statement.

Other feature of C Language: arrays and string processing, functions, recursion, Files and Pointers in C.

Simple program in C like linear and binary search, sorting, matrix addition and multiplication, string length and concatenation.

References:

1. Gill Nasib Singh: Computing Fundamentals and Programming in C, Khanna Books Publishing Co., New Delhi.
2. Sinha, P.K. & Sinha, Priti, Computer Fundamentals, BPB
3. Dromey, R.G., How to Solve it By Computer, PHI
4. Balagurusamy E, Computing Fundamentals and C Programming, Tata McGraw Hill.
5. Norton, Peter, Introduction to Computer, McGraw-Hill
6. Leon, Alexis & Leon, Mathews, Introduction to Computers, Leon Tech World
7. Rajaraman, V., Fundamentals of Computers, PHI
8. Ram, B., Computer Fundamentals, Architecture & Organization, New Age International (P) Ltd.

Note : Latest and additional good books may be suggested and added from time to time.

B.Sc-102 :Mathematics-I **Max. Marks (External): 80**
Internal (Theory): 20
Time Allowed: 3 Hrs

Note: Examiner will be required to set NINE questions in all. Question Number 1 will consist of total 8 parts (short-answer type questions) covering the entire syllabus and will carry 16 marks. In addition to the compulsory question there will be four units i.e. Unit-I to Unit-IV. Examiner will set two questions from each Unit of the syllabus and each question will carry 16 marks. Student will be required to attempt FIVE questions in all. Question Number 1 will be compulsory. In addition to compulsory question, student will have to attempt four more questions selecting one question from each Unit.

Unit-I
Differentiation and partial differentiation of vector functions; Derivative of sum; Dot product and cross product of two vectors; Gradient, divergence and curl system of circles.

Unit-II
Standard equations and properties of parabola, ellipse and hyperbola.
Successive differentiation; Leibnitz theorem; Partial differentiation; Curvature; Asymptotes.

Unit-III

Singular points concavity; Points of inflexion and tracing of Cartesian curves; Integration of irrational functions.

Unit-IV

Reduction formulae; Rectification; Quadrature volume and surfaces or revolution; Differential equation of first order; Groups; Rings; Fields; Vector spaces.

References:

1. D.A. Murray: Introductory course in differential equations, Orient Lengaman(India) 1967.
2. H.T.H. Piaggio: Elementary Treatise on differential equation and their applications C.B.S. publishers of distributors.
3. S.L. Ross : Ordinary differential equations.
4. Babu Ram: Discrete Mathematics.
5. Shanti Narayana : Differential & Integral calculus.

Note : Latest and additional good books may be suggested and added from time to time.

B.Sc-103: Data and File Structure **Max. Marks (External): 80**
Internal (Theory): 20
Time Allowed: 3 Hrs

Note: Examiner will be required to set NINE questions in all. Question Number 1 will consist of total 8 parts (short-answer type questions) covering the entire syllabus and will carry 16 marks. In addition to the compulsory question there will be four units i.e. Unit-I to Unit-IV. Examiner will set two questions from each Unit of the syllabus and each question will carry 16 marks. Student will be required to attempt FIVE questions in all. Question Number 1 will be compulsory. In addition to compulsory question, student will have to attempt four more questions selecting one question from each Unit.

Unit-I (Data Structures)

Definition and usage; Data type v/s Data Structures; Classification of Data Structures;

Arrays: Definition, classification, purpose; Memory allocation: sequential allocation, address calculation; I/O of arrays in C; Various operations on arrays including traversal, insertion, deletion, searching and sorting; Sparse arrays: implementation in C.

Linked List: Definition, classification, memory allocation and operations;

Implementation of and operations on doubly linked lists, circular list, Inverted list and threaded lists;

Unit-II (Linear Data Structures)

Stack: Definition, purpose; Memory allocation; Operations including push, pop and peek; Importance of Stacks in valuation of arithmetic expressions; Implementation of stack in C.

Queue: Definition, classification, purpose; Memory allocation; Operations on queues; Implementation

of queue in C.

Simple lists: Operation on all these structures and applications.

Unit-III (Non-linear Data Structures)

Trees: definition, purpose and memory allocation; Binary Trees; Operations including insertion and deletion; Tree traversal: in-order, pre-order and post-order; Searching a Tree: breadth v/s depth first search;

Threaded trees; Binary search trees; Trees in search algorithms; B- tree; B+ tree and applications.

Unit-IV (Files)

Physical storage devices and their characteristics.

File structure: constituents of a file viz. fields, records; Fixed and variables length records; Primary and secondary keys; File operation.

File organization: Serial sequential, Indexed sequential, Direct, Inverted, Multi-list.

Hashing function and collision handling methods.

References:

1. Seymour Lipschutz, "Data Structure", Tata-McGraw-Hill.
2. Horowitz, Sahni & Anderson-Freed, "Fundamentals of Data Structures in C", Orient Longman.
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, Mexico City.Prentice- Hall Of India Pvt. Ltd., New Delhi.
5. Yedidyan Langsam, Moshe J. Augenstein, and Aaron M. Tenenbaum, "Data Structures Using C", Prentice- Hall of India Pvt. Ltd., New Delhi.

Note : Latest and additional good books may be suggested and added from time to time.

B.Sc-104:Analog Electronics **Max. Marks (External): 80**
Internal (Theory): 20
Time Allowed: 3 Hrs

Note: Examiner will be required to set NINE questions in all. Question Number 1 will consist of total 8 parts (short-answer type questions) covering the entire syllabus and will carry 16 marks. In addition to the compulsory question there will be four units i.e. Unit-I to Unit-IV. Examiner will set two questions from each Unit of the syllabus and each question will carry 16 marks. Student will be required to attempt FIVE questions in all. Question Number 1 will be compulsory. In addition to compulsory question, student will have to attempt four more questions selecting one question from each Unit.

Unit-I (Basic Electronic Devices)

Diode: diode characteristics; Junction-diode; breakdown diode, semiconductor photodiode, tunnel diode, characteristics; photovoltaic effect, Light Emitting Diode (LED).

Unit-II (Diode circuits)
Clipping circuits; components; sampling gates; rectifiers; capacitors filters.

Unit-III (Transistor circuits)
Bipolar transistor; Field Effect Transistor; Transistor biasing and thermal stabilizing; Transistor amplifier at low frequencies; Transistor amplifier at high frequencies; Multistage amplifier; Feedback amplifier; Stability and circulation; Operational amplifier.

Unit-IV (Analog circuits)
Linear analog circuits: Analog Integration and Differentiation; Electronic analog computation; Active filters; Integrated circuit; Tuned amplifier; Video amplifier.
Nonlinear analog system: Comparator; Sample hold circuits; Precision AC/DC converter; Logarithmtic amplifier; wave from generator; Schmitt trigger.

References:

1. Electronics for Scientist and Engineers by Vishwanathan, Mehta and Rajaraman (Prentic-Hall, India).
2. Electronics Fundamentals and Applications (5th addition) by John, D. Ryder (Prentice-Hall, India).
3. Introduction to Electronics by L.K.Brauson (Prentice-hall, India).
4. Digital Principles and Application by Malvine and Leach (Tata MC Graw hill).
5. Electronic Devices and Circuits by Motershed.
6. Electronic Devices and Circuit-Discrete and Integrated by Y.N. Bapat.
7. Semiconductor Electronics by A.K.Sharma (New Age Internationals Pvt. Ltd., India).

Note : Latest and additional good books may be suggested and added from time to time.

B.Sc-105 : Software Lab-I

Max. Marks (External): 80
Internal (Theory): 20
Time Allowed: 3 Hrs

Based on paper B.Sc-101 a minimum of 15 software/programs covering the whole syllabus may be developed as per rules of structured program design using C language.

B.Sc-106: Software Lab-II

Max. Marks (External): 80
Internal (Theory): 20
Time Allowed: 3 Hrs

Based on paper B.Sc-103 a minimum of 15 software/programs on Data structures covering the whole

syllabus may be developed using programming language C.

Second Semester

B.Sc-201:System Analysis and Design **Max. Marks (External): 80**
Internal (Theory): 20
Time Allowed: 3 Hrs

Note: Examiner will be required to set NINE questions in all. Question Number 1 will consist of total 8 parts (short-answer type questions) covering the entire syllabus and will carry 16 marks. In addition to the compulsory question there will be four units i.e. Unit-I to Unit-IV. Examiner will set two questions from each Unit of the syllabus and each question will carry 16 marks. Student will be required to attempt FIVE questions in all. Question Number 1 will be compulsory. In addition to compulsory question, student will have to attempt four more questions selecting one question from each Unit.

Unit-I (Introduction to Systems)
Contemporary System Analysis; Basic concept of System and its characteristics; System Components and environment; Classification of systems with suitable examples/case studies.

Planning a new system: dimensions of planning; Design considerations; Systems feasibility; Planning alternatives: Evaluating the alternatives, selection of a system plan, proposing the new system; User and management involvement; Project Management and Control; Gantt charts, PERT and CPM.

Unit-II (Requirement Specification and Preliminary Considerations)
System Development Life Cycle (SDLC) and its phases; Preliminary investigation and its objectives; Problem definition; Requirement determination and specification.

Concept of feasibility study and its objectives; Types of feasibility study; System cost determination; Cost and benefit analysis; Comparative cost analysis; Data processing costs.

Unit-III (System Analysis and Design)
Introduction of "Structured System Analysis and Design" and its importance.
Concept of System Analysis and its objectives; System analyst and its role; Requisite qualities of a system analyst; Effective communication in system analysis; Tools of the system analysis; Primary v/s secondary data; Data collection and analysis.

Concept of system design and its objectives; A Structured Approach to System Design; Top-down design; logical v/s physical design; Input-output and form design; Database design; Data administration; Data dictionaries; Programs specification and Coding.

Unit-IV (Post Design Considerations)
Concept of system testing; Objectives of testing; Planning the testing and testing techniques; Structured walk through.
System implementation and its types; Systems Conversation: Planning consideration, Conversion methods.
Systems follow- up; Concept of system maintenance and its importance.

Concept of Quality Assurance and its goals; levels of quality assurance; auditable systems.

References:

1. Awad M. Elias, "System Analysis and Design", Galgotia Publication.
2. Igor Hawryszkiewyez, "Introduction to System Analysis and Design", 4th edition, Prentice-Hall.
3. Jeffrey L. Whitten, and Lonnie D. Bentey, "Systems analysis and Design Methods", 4th edition, Tata McGraw-Hill.
4. Mark Lejk, and David Deeks, "An Introduction to System Analysis Techniques", Prentice Hall.
5. Don Yeates, Maura Shields and David Helmy, "System Analysis and Design", Longman group limited, 1994.

Note : Latest and additional good books may be suggested and added from time to time.

B.Sc-202: Mathematics-II **Max. Marks (External): 80**
Internal (Theory): 20
Time Allowed: 3 Hrs

Note: Examiner will be required to set NINE questions in all. Question Number 1 will consist of total 8 parts (short-answer type questions) covering the entire syllabus and will carry 16 marks. In addition to the compulsory question there will be four units i.e. Unit-I to Unit-IV. Examiner will set two questions from each Unit of the syllabus and each question will carry 16 marks. Student will be required to attempt FIVE questions in all. Question Number 1 will be compulsory. In addition to compulsory question, student will have to attempt four more questions selecting one question from each Unit.

Unit-I

The real number system as a complete ordered field; Neighborhood; Open and closed sets; Limit points of sets; Bolzwnoweierstrass theorem.

Unit-II

Limits continuity; Sequential continuity; Algebra of continuous functions; Continuity of composite function; Continuity on (a,b) implying boundedness; Intermediate value theorem; Inverse function theorem; Uniform continuity.

Unit-III

Sequence, convergent sequence; Cauchy sequence; Monotonic sequence; Subsequence; Limit superior and limit inferior of sequence.

Infinite series convergence of series; Positive term series; Comparison test; Cauchy's nth root test.

Unit-IV

Dalemberth's ratio test; Raabes tests; Cauchy's integral test; Alternating series; Absolute and conditional convergence; Taylor's series and Maclaurin's series (for SinX. COSX ,Log(1+X)m); Application of mean value theorem to monotone function and inequalities; Maxima and minima; Indeterminate forms.

References:

1. R.R. Goldberg : Real Analysis, Oxford & I.B.H. Publishing Co., New Delhi, 1970

2. S.C. Malik : Mathematical Analysis, Wiley Eastern Ltd., Allahabad.
3. Shanti Narayan : A Course in Mathematical Analysis, S.Chand and company, New Delhi
4. Murray, R. Spiegel : Theory and Problems of Advanced Calculus, Schaum Publishing co., New York
5. T.M. Apostol: Mathematical Analysis, Narosa Publishing House, New Delhi, 1985
6. Earl D. Rainville, Infinite Series, The Macmillan Co., New York

Note : Latest and additional good books may be suggested and added from time to time.

B.Sc-203:Algorithms and Advanced Data Structures **Max. Marks (External): 80**
Internal (Theory): 20
Time Allowed: 3 Hrs

Note: Examiner will be required to set NINE questions in all. Question Number 1 will consist of total 8 parts (short-answer type questions) covering the entire syllabus and will carry 16 marks. In addition to the compulsory question there will be four units i.e. Unit-I to Unit-IV. Examiner will set two questions from each Unit of the syllabus and each question will carry 16 marks. Student will be required to attempt FIVE questions in all. Question Number 1 will be compulsory. In addition to compulsory question, student will have to attempt four more questions selecting one question from each Unit.

Unit-I (Algorithm Evaluation and Sorting Techniques)
Complexity of an algorithm: time v/s space complexity; Specifying an algorithm complexity in terms of Big-Oh notation etc; Finding the complexity of simple algorithms like sum of 'N' numbers, GCD, searching.
Internal v/s external sorting and their relevance Sorting Techniques: insertion sort, quick sort, merge sort, heap sort, shell sort, radix sort , external sort; Lower bound for sorting by comparison of keys.

Unit-II (Advance Topics in Algorithms)
Dynamic Programming: Matrix multiplication and optical binary search tree algorithms.
NP Complete Problem: Complexity classes P and NP, Examples of problems in the NP class.
Parallel algorithms: Parallelism, PRAM and other models; Parallel algorithms; Finding maximum element in a list; Merging and sorting.

Unit-III (Tree)
Introduction to tree data structure; Header node; Threads; Representation of trees in memory; Tree traversal algorithms.
Binary search trees; Searching; Insertion and deletion in a Binary search tree; AVL search trees; Insertion and deletion in AVL search tree; m-way search tree; Searching, Insertion and deletion in an m-way search tree; B-trees; Searching, Insertion and deletion in a B-tree; Huffman's algorithm; General trees.

Unit-IV (Graphs)
Tree vs graphs; Importance of graph data structure; representation in memory; operations on graphs; Warshall's algorithm for shortest path; Dijkstra algorithm for shortest path; Traversal of graph; Topological sorting. Minimum spanning trees; shortest path; Graph component algorithms; String

matching: KMP (*Knuth Morris Pratt)* and Boyer Moore algorithms.

References:

1. Seymour Lipschutz, "Data Structure", Tata-McGraw-Hill.
2. Horowitz, Sahni & Anderson-Freed, "Fundamentals of Data Structures in C", Orient Longman.
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, Mexico City.Prentice- Hall Of India Pvt. Ltd., New Delhi.
5. Yedidyan Langsam, Moshe J. Augenstein, and Aaron M. Tenenbaum, "Data Structures Using C", Prentice- Hall of India Pvt. Ltd., New Delhi.

Note : Latest and additional good books may be suggested and added from time to time.

B.Sc-204: Digital Electronics **Max. Marks (External): 80**
Internal (Theory): 20
Time Allowed: 3 Hrs

Note: Examiner will be required to set NINE questions in all. Question Number 1 will consist of total 8 parts (short-answer type questions) covering the entire syllabus and will carry 16 marks. In addition to the compulsory question there will be four units i.e. Unit-I to Unit-IV. Examiner will set two questions from each Unit of the syllabus and each question will carry 16 marks. Student will be required to attempt FIVE questions in all. Question Number 1 will be compulsory. In addition to compulsory question, student will have to attempt four more questions selecting one question from each Unit.

Unit-I (Introduction)

Overview of semi conductor physics; Diode and transistors characteristics; Diode and transistor as a switch; DTL; RTL; TTL; ECL; CMOS; Logic circuits; fan-in, fan-out; propagation delay; noise immunity of logic circuits.
Analog vs digital electronics; Characteristics of digital electronics; Importance of digital electronics over analog electronics; Basic v/s universal logic gates; -AND, -OR, -EX-OR, -NAND and –NOR logic gates for n-inputs; -NOT gate; Analog to digital (A/D) and digital to analog (D/A) converter; PLA.

Unit-II (Boolean Algebra and Logic Circuits)

Importance of Boolean algebra: postulates and laws of Boolean algebra, Boolean operator & truth table; Boolean Expression; De-Morgan's Theorem; Universal building blocks.
Simplification of logic circuits; Sum of products & product of sums form; Algebraic simplification; K-map minimization techniques; Q-M minimization procedure.

Unit-III (Complex Logic Circuits)

Sequential v/s combinational circuits, Combinational circuits: Adder (half and full), Subtractor (half and full), encoder, decoder, multiplexer, de-multiplexer and comparators.
Sequential circuits: Flip flops and their significance, RS, JK, Master slave, JK , D (delay) and

T(toggle) type flip flops; Elimination of race-around condition; Significance of clock signal and edge triggered flip-flops; Counters – synchronous and ripple counter; Shift registers serial to parallel; Parallel to serial conversion.

Unit-IV (Memory Devices)

Primary Memory Devices: Random access Memory (RAM), its importance, types and design, Static & Dynamic RAM, EDO (Extended Data Out) RAM. Read Only Memory (ROM): importance, types and design, PROM, EEPROM etc, Cache memory and its importance.
Secondary Memory Devices: types, various secondary memory devices (including magnetic disks, magnetic tapes, flash memories, CD, DVD, Blu-ray devices, memory cards) and their importance.

References:

1. Gill, Nasib Singh and Dixit J.B.: Digital Design and Computer Organisation, University Science Press (Laxmi Publications), New Delhi.
2. Mano, M.M. : Digital Logic and Computer Design, Prentice-Hall of India.
3. Stallings, William : Computer Organisation & Architecture.
4. Mano, M.M. : Digital Design, Prentice-Hall of India.
5. Anand Kumar : Fundamentals of Digital Circuits, PHI.
6. Tokheim : Digital Electronics, TMH.
7. S. Rangnekar; Digital Electronics, ISTE/ EXCE.L

Note : Latest and additional good books may be suggested and added from time to time.

B.Sc-205 :Software Lab-III

Max. Marks (External): 80
Internal (Theory): 20
Time Allowed: 3 Hrs

Based on paper B.Sc-201 to create small softwares using some suitable language by following SDLC with proper documentation. Some suggestive softwares are

1. College admission system.
2. Management of class students.
3. Automation of college computer lab.
4. Small expenditure program.
5. Hostel management system.
6. College library management system.
7. College sports department automation.

B.Sc-206: Software Lab-IV

Max. Marks (External): 80
Internal (Theory): 20
Time Allowed: 3 Hrs

Based on paper B.Sc-203 a minimum of 15 software/programs covering the whole syllabus may be developed using some suitable programming language preferably C.

Third Semester with effect from : 2013-2014

B.Sc-301:Software Engineering **Max. Marks (External): 80**
Internal (Theory): 20
Time Allowed: 3 Hrs

Note: Examiner will be required to set NINE questions in all. Question Number 1 will consist of total 8 parts (short-answer type questions) covering the entire syllabus and will carry 16 marks. In addition to the compulsory question there will be four units i.e. Unit-I to Unit-IV. Examiner will set two questions from each Unit of the syllabus and each question will carry 16 marks. Student will be required to attempt FIVE questions in all. Question Number 1 will be compulsory. In addition to compulsory question, student will have to attempt four more questions selecting one question from each Unit.

Unit-I (Introduction)
Software crisis; Problems with the techniques of System Analysis and Design; Introduction of the concept of Software Engineering; Software engineering definition and paradigms; A generic view of software engineering.
Software Development Models; Waterfall model; Prototyping; Iterative enhancement; Spiral model.

Unit-II (Software Requirement Specification and Planning)
Problem analysis; Requirements analysis: statement of system scope, isolation of top level processes and entitle and their allocation to physical element, refinement and review; Software requirements specification (SRS): creating a software specification document, review for a correctness, consistency and completeness.
Software project planning issues; Software cost estimation; project scheduling; Staffing and personnel planning; Quality assurance plans; Verification and validation; Project monitoring; Risk analysis.

Unit-III (System Design)
Design principles; coupling and cohesion; Function oriented design v/s object oriented design; Structured design methodology.
Designing software solutions: refining the software specification, application of fundamental design concept for data, architectural and procedural design using software blue print methodology and object oriented design paradigm; Creating a design document; Review a conformance to software requirements and quality.

Unit-IV (Post Design Activities)
Software Implementation: Relationship between design and implementation; Implementation issues and programming support environment; Coding and procedural design; Good coding style and review of correctness and readability.
Software testing: Role of testing and its relationship to quality assurance; Nature and limitation of software testing; Software testing methods.
Software Maintenance: Maintenance as part of software evaluation; Reason for maintenance; Type of maintenance; Designing for maintainability; Techniques for maintenance.

References:

1. Chhillar Rajender Singh : Software Engineering : Testing, Faults, Metrics, Excel Books.
2. Gill, Nasib Singh : Software Engineering, Khanna Book Publishing Co. (P) Ltd. N. Delhi.
3. Pressman R. S., "Software Engineering – A Practitioner's Approach", Tata McGraw Hill.
4. Jalote P., "An Integrated approach to Software Engineering", Narosa.
5. Sommerville, "Software Engineering", Addison Wesley.
6. Fairley R., "Software Engineering Concepts", Tata McGraw Hill.
7. James Peter, W Pedrycz, "Software Engineering", John Wiley & Sons.

Note : Latest and additional good books may be suggested and added from time to time.

B.Sc-302 :Mathematical Foundations of Computer Science **Max. Marks (External): 80**
Internal (Theory): 20
Time Allowed: 3 Hrs

Note: Examiner will be required to set NINE questions in all. Question Number 1 will consist of total 8 parts (short-answer type questions) covering the entire syllabus and will carry 16 marks. In addition to the compulsory question there will be four units i.e. Unit-I to Unit-IV. Examiner will set two questions from each Unit of the syllabus and each question will carry 16 marks. Student will be required to attempt FIVE questions in all. Question Number 1 will be compulsory. In addition to compulsory question, student will have to attempt four more questions selecting one question from each Unit.

Unit-I

Set, subsets and operations on sets; Venn diagram of sets. Power set of a set; Equivalence relation on a set and partition of a set; Permutation and combinations; Partially ordered sets.
Functions: Boolean functions, Permutation functions.
Induction: Principles of mathematical induction, Format's Theorem.
Exponentiation: How to complete first exponentiation, Advantages of Logarithmic algorithms over linear algorithms.

Unit-II

Big-Oh notation; Binomial coefficients; Lexicographic order.
Number theory: GCD; Euclidean algorithm; Fibonacci numbers; Complexity.

Unit-III

Congruence and equivalence relations; Public key encryption schemes.
Graph Theory: Graphs, Trees and LAN; Minimum distance trees; Minimum weight & minimum distance spanning trees; Recursive procedures.

Unit-IV

Recursion; Recurrence Relations: LHRR, LHRRWCCS, DCRR.
Algorithms for Merge sort, Insertion sort, Bubble sort and 'decimal to binary' conversion.

References:

1. Gupta S.P. and Kapoor, V.K., Fundamentals of Applied statistics, Sultan Chand & Sons, 1996.
2. Gupta S.P. and Kapoor, V.K., Fundamentals of Mathematical statistics, Sultan Chand and Sons, 1995.
3. Graybill, Introduction to Statistics, McGraw.
4. Anderson, Statistical Modelling, McGraw.
5. Babu Ram : Discrete Mathematics.

Note : Latest and additional good books may be suggested and added from time to time.

B.Sc-303 : Object Oriented Programming and Design **Max. Marks (External): 80**
Internal (Theory): 20
Time Allowed: 3 Hrs

Note: Examiner will be required to set NINE questions in all. Question Number 1 will consist of total 8 parts (short-answer type questions) covering the entire syllabus and will carry 16 marks. In addition to the compulsory question there will be four units i.e. Unit-I to Unit-IV. Examiner will set two questions from each Unit of the syllabus and each question will carry 16 marks. Student will be required to attempt FIVE questions in all. Question Number 1 will be compulsory. In addition to compulsory question, student will have to attempt four more questions selecting one question from each Unit.

Unit-I (Introduction)

Concept of Object Oriented Programming and its benefits: Class and objects, data abstraction vs functional abstraction, data encapsulation, data hiding, inheritance, polymorphism.

Classes; Objects; Member functions; Data members; Access specifies; Nested and local classes; Static data members; Preprocessor directives; Namespace.

Unit-II (Constructor and Destructors)

Concept of class constructors: importance, type of constructors, default constructor, parameterized constructor, copy constructor.

Destructors: importance; 'new' and 'delete' operators; C vs C++; implementation of classes in C++.

Unit-III (Inheritance and Polymorphism)

Object based vs object oriented programming languages; Concept of inheritance and reusability; Type of class inheritance in C++; Simple inheritance; Multilevel inheritance; Hierarchical inheritance; Multiple inheritance; Hybrid inheritance.

Polymorphism in object oriented programming and its importance; Run time v/s compile time polymorphism; Operator overloading and function overloading in C++; Virtual v/s pure virtual functions in C++.

Unit-IV (Object Oriented Design)

Introduction to object oriented modeling; Modeling techniques; Object Oriented Design; Object design; Comparison of methodologies (SA/SD, OMT, USD).

Design implementation; Object oriented languages; Applications in data base, compilers animation and business.

References:

1. Bjarne Stroustrup, The C++ Programming Language, Pearson.
2. Balaguruswami, E., Object Oriented Programming In C++, Tata McGraw-Hill.
3. Herbert Scildt, C++, The Complete Reference, Tata McGraw-Hill.
4. Robert Lafore, Object Oriented Programming in C++.

Note : Latest and additional good books may be suggested and added from time to time.

B.Sc-304 : Computer System Architecture **Max. Marks (External): 80**
Internal (Theory): 20
Time Allowed: 3 Hrs

Note: Examiner will be required to set NINE questions in all. Question Number 1 will consist of total 8 parts (short-answer type questions) covering the entire syllabus and will carry 16 marks. In addition to the compulsory question there will be four units i.e. Unit-I to Unit-IV. Examiner will set two questions from each Unit of the syllabus and each question will carry 16 marks. Student will be required to attempt FIVE questions in all. Question Number 1 will be compulsory. In addition to compulsory question, student will have to attempt four more questions selecting one question from each Unit.

Unit-I (Introduction)

Introduction to computer organization and computer architecture; Register transfer and Micro-operations; Register Transfer Language; Bus and Memory Transfers; Arithmetic Micro-operations; Logic Micro-operations; Shift Micro-operations.

Basic Computer Organisation and Design; Instruction and Instruction Codes; Computer instructions; Timing and Control; Instruction Cycle; Memory Reference Instructions; Input-Output and Interrupts; Complete Computer Description.

Unit-II (Programming the Basic Computer)

Machine Language; Assembly Language; Assembler; Program loops; Arithmetic and Logic Subroutines; Inputs-Outputs programming.

Micro-programmed Control; Control Memory; Address Sequencing; Micro-program Example; Design of Control Unit.

Unit-III (Central Processing Unit)

General Register Organization; Stack Organization; Instruction Formats; Addressing Modes; Data and Transfer Manipulation; Program Control.

Reduced Instruction Set Computer (RISC), Pipeline and Vector Processing; Parallel processing; Pipelining; Arithmetic Pipeline; RISC Architecture Vector Processing; Arrays Processor.

Unit-IV (Input-Output Organization)

Peripheral Devices and their characteristics; Input-Output interface; Modes of transfer; Asynchronous Transfer; Priority interrupt, Direct Memory Access (DMA).

Input-output processors (IOP); Serial communication; Multi-processors; Characteristics of multi-processors; Inter-connection structures; Inter-processor Arbitration; Inter-processor Communication and Synchronization; Cache Coherence.

References:

1. John P. Hayes, "Computer Architecture and Organization", McGraw-Hill, 1998.
2. Gill, Nasib Singh and Dixit J.B.: Digital Design and Computer Organisation, University Science Press (Laxmi Publications), New Delhi.
3. M. Morris Mano, "Computer Architecture", 3/e, PHI, 2001.
4. William Stallings, "Computer organization and Architecture", PHI, 1999.
5. P.V.S. Rao, "Computer System Architecture", PHI, 2009.
6. John D. Carpinelli, "Computer System Organization and Architecture", Pearson, 2009.
7. Kai Hwang: Advanced Computer Architecture, McGraw Hill International.

Note : Latest and additional good books may be suggested and added from time to time.

B.Sc-305: Software Lab-V

Max. Marks (External): 80
Internal (Theory): 20
Time Allowed: 3 Hrs

Based on paper B.Sc-302 and B.Sc-304 a minimum of 15 software/programs covering the whole syllabus may be developed using some suitable programming language preferably C.

B.Sc-306: Software Lab-VI

Max. Marks (External): 80
Internal (Theory): 20
Time Allowed: 3 Hrs

Based on paper B.Sc-303 a minimum of 15 software/programs covering the whole syllabus may be developed using some suitable programming language preferably C++.

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Fourth Semester

B.Sc-401 :Data Base Systems **Max. Marks (External): 80**
Internal (Theory): 20
Time Allowed: 3 Hrs

Note: Examiner will be required to set NINE questions in all. Question Number 1 will consist of total 8 parts (short-answer type questions) covering the entire syllabus and will carry 16 marks. In addition to the compulsory question there will be four units i.e. Unit-I to Unit-IV. Examiner will set two questions from each Unit of the syllabus and each question will carry 16 marks. Student will be required to attempt FIVE questions in all. Question Number 1 will be compulsory. In addition to compulsory question, student will have to attempt four more questions selecting one question from each Unit.

Unit-I (Introduction)

Data, Database, Database System and Database Management System (DBMS); DBMS: components, characteristic, objectives and importance; File systems Vs. DBMS; Advantages of DBMS over Traditional File Processing System; Disadvantages of DBMS; Controlled redundancy; Data consistency; Data security; Data abstraction; Data integration; Record and files; Database users and categorization; DBA and its role.

Unit-II (Data Modeling)

Architecture of Database system; Three level architecture; Data independence; Database models based on three level architecture; ER Model; Relational Model, Network Model and Hierarchical Model; Relative advantages and disadvantages of different models.

RDBMS and OORDBMS; Relative advantages and disadvantages; Reasons behind popularity of RDBMS.

Unit-III (RDBMS-I)

Basic concepts of RDBMS; Essential characteristics of RDBMS; Data constraints; Concept of primary key, foreign key, candidate key and secondary key with constraints on them; Relational Data Manipulation: Relations Algebra, Relational Calculus.

Relational Data base Design: Relational Functional Dependencies including Full Functional Dependency, Partial functional Dependency, Transitive Dependency, Multi Valued Dependency and Join Dependency; Lossless decomposition; Computing closure of a set of FD's; Finding keys; Normalization importance and limitations: 1NF, 2NF, 3NF, BCNF, 4NF, PKNF.

UNIT-IV (RDBMS-II)

SQL: history and importance, data types and components; DDL,DML, DCL,TCL, DQL; SQL commands: create, alter, drop, insert, delete, update; 'select' command and its importance in SQL;

Other commands: savepoint, grant, revoke, commit and rollback etc.

Query Processing: General Strategies for query processing; Query optimization; Query processor.

Concept of security, concurrency and recovery.

References:

1. Raghurama Krishnan : Data base Management Systems, Johannes Gehrke, Tata McGraw Hill Latest Edition.
2. Siberschatz, Korth : Data base System Concepts, McGraw Hill, latest edition.
3. P. Radha Krishna : Database Management Systems, HI-TECH Publications.
4. C.J. Date : Introduction to Database Systems, Pearson, Education.
5. Rob & Coronel : Data base Systems design, Implementation, and Management, latest Edition, Thomson.
6. Elmasri Navrate : Data base Management System, Pearson Education.
7. Mathew Leon : Data base Management System, Leon Vikas.
8. Connoley : Data base Systems, Pearson Education.

Note : Latest and additional good books may be suggested and added from time to time.

B.Sc-402: Scientific and Statistical Computing **Max. Marks (External): 80**
Internal (Theory): 20
Time Allowed: 3 Hrs

Note: Examiner will be required to set NINE questions in all. Question Number 1 will consist of total 8 parts (short-answer type questions) covering the entire syllabus and will carry 16 marks. In addition to the compulsory question there will be four units i.e. Unit-I to Unit-IV. Examiner will set two questions from each Unit of the syllabus and each question will carry 16 marks. Student will be required to attempt FIVE questions in all. Question Number 1 will be compulsory. In addition to compulsory question, student will have to attempt four more questions selecting one question from each Unit.

Unit-I (Numerical Methods-I)

Computer Arithmetic: Floating-point representation of numbers; Arithmetic operations with normalized floating-point numbers and their consequences; Significant figures; Error in number representation-inherent error, truncation, absolute, relative, percentage and round-off error.

Iterative Methods to find roots: Bisection, False position, Newton-Raphson method; Discussion of their convergence, Bairstow's method.

UNIT-II (Numerical Methods-II)

Solution of simultaneous linear equations and ordinary differential equations: Gauss-Elimination methods, pivoting, Ill-conditioned equations, refinement of solution. Gauss-Seidal iterative method, Euler method, Euler modified method, Taylor-series method, Runge-Kutta methods, Predictor-Corrector methods.

Interpolation, Extrapolation and Approximation: Polynomial interpolation: Newton, Lagrange's and Difference tables, Approximation of functions by Taylor Series. Chebyshev polynomial: First kind, Second kind and their relations, Orthogonal properties.

UNIT-III (Statistical Methods-I)

Basic Statistics: Measure of Central Tendency; Preparing frequency; Distribution table; Mean, Median, Mode; Mean (Arithmetic, Geometric and Harmonic); Measure of Dispersion: Range, Variance and Standard Deviations; Frequency Distributions and Cumulative Frequency Distributions; Moments and Moments Generating Functions.

UNIT-IV (Statistical Methods-II)

Distribution Patterns: Types of Theoretical Probability; Normal Binomial Poisson distribution; Correlation and Regression: Types of Correlation; Properties of Coefficient of Correlation; Methods of studying Correlation; Aims of Regression Analysis; Kinds of Regression Analysis.

Tests of significance: Z-test, Student T-test, Chi-square test.

Curve fitting: Method of Least squares and Polynomial fit.

References:

1. V. Rajaraman, Computer Oriented Numerical Methods, Prentice Hall, India.
2. S. S. Sastry, Introductory Methods of Numerical Analysis.
3. M. K. Jain, S.R.K. Iyengar & R. K. Jain, Numerical Methods for Scientific and Engineering Computation.
4. H. C. Saxena, Finite Differences and Numerical Analysis.
5. Modes A., Numerical Analysis for Computer Science.
6. Gupta S.P. and Kapoor, V.K., Fundamentals of Applied statistics, Sultan Chand & Sons, 1996.
7. Gupta S.P. and Kapoor, V.K., Fundamentals of Mathematical statistics, Sultan Chand and Sons, 1995.
8. Graybill, Introduction to Statistics, McGraw.
9. Anderson, Statistical Modelling, McGraw.

Note : Latest and additional good books may be suggested and added from time to time.

B.Sc-403 : Operating Systems and UNIX

Max. Marks (External): 80
Internal (Theory): 20
Time Allowed: 3 Hrs

Note: Examiner will be required to set NINE questions in all. Question Number 1 will consist of total 8 parts (short-answer type questions) covering the entire syllabus and will carry 16 marks. In addition to the compulsory question there will be four units i.e. Unit-I to Unit-IV. Examiner will set two questions from each Unit of the syllabus and each question will carry 16 marks. Student will be required to attempt FIVE questions in all. Question Number 1 will be compulsory. In addition to compulsory

question, student will have to attempt four more questions selecting one question from each Unit.

Unit-I (Introduction)

Operating systems concept, history and importance; Operating system as an extended machine; Operating system as a resources manager; Operating system classification: single user, batch processing, multiprogramming, multitasking, multiprocessing and multithreading; Operating systems modes and systems calls; Operating systems architecture with examples of DOS, Windows, UNIX and Linux. Importance of C in designing operating systems; History of UNIX.

Unit-II (Process and Memory Management)

Concept of program, process and job; Processor management functions: processor models, hierarchies and implementation, process states and transition; Multiprogramming; Levels of schedulers viz. short term, midterm and long-term with their roles; CPU scheduling algorithms; Micro-kernel architecture; Process management commands in UNIX.

Memory management functions: memory management of single user operating system, memory management for multi user operating system; Swapping; Paging; Segmentation; Virtual memory; Memory management in UNIX

Unit-III (Device and File Management)

Device Management Function: I/O devices and controller; Interrupt handlers; Device independent I/O; I/O software; Disk scheduling; I/O management in UNIX.

File management function: File naming, structure, types, access, mechanisms, attribute and operations; Hierarchical directory systems; Directory structures and directory operations; File space allocations; File sharing and file locking; Symbolic link; File protection and security; Distributed file systems; UNIX file system.

Unit-IV (Concurrency and Shell programming)

Concurrent Programming; Sequential and concurrent process; Precedence graph; Bernsteins conditions; Time dependency and critical code section; Mutual exclusion problem; Classical process co-ordination problems; deadlock handling; Inter process communication.

UNIX shell programming: introduction and importance; Data types; Control structures; Editors in UNIX; Developing simple shell programs in UNIX.

References:

1. Silberschatz A., Galvin P.B.,and Gagne G., “Operating System Concepts”, John Wiley & Sons Inc., New York.
2. Godbole, A.S., “Operating Systems”, Tata McGraw-Hill Publishing Company, New Delhi.
3. Deitel, H.M., “Operating Systems”, Addison- Wesley Publishing Company, New York.
4. Tanenbaum, A.S., “Operating System- Design and Implementation”, Prentice Hall of India,New Delhi.

Note : Latest and additional good books may be suggested and added from time to time.

B.Sc-404 : Microprocessor-I **Max. Marks (External): 80**
Internal (Theory): 20
Time Allowed: 3 Hrs

Note: Examiner will be required to set NINE questions in all. Question Number 1 will consist of total 8 parts (short-answer type questions) covering the entire syllabus and will carry 16 marks. In addition to the compulsory question there will be four units i.e. Unit-I to Unit-IV. Examiner will set two questions from each Unit of the syllabus and each question will carry 16 marks. Student will be required to attempt FIVE questions in all. Question Number 1 will be compulsory. In addition to compulsory question, student will have to attempt four more questions selecting one question from each Unit.

Unit-I (Introduction)

Classification of computers; PC; Concept of microprocessor and its importance; evolution of microprocessor.

Intel series of microprocessor; Important characteristics of Intel 8085, x86 family, Pentium family, dual core and multi core processors; Motorola series of microprocessors

Unit-II (Microprocessor architecture)

Arithmetic and logic Unit; Control unit; General purpose registers; External system bus architecture.

Difference between 8085 and 8086 microprocessors; Pin diagram of 8085 and 8086.

Unit-III (Memory and I/O Interfacing)

Memory Interfacing: memory devices; Memory decoding; 8085 and 8086 memory interfacing.

Basic I/O interface: I/O mapped I/O; Memory mapped I/O; I/O port address decoding; Interrupt; Direct Memory Access.

Unit-IV (Important devices)

Math coprocessor; 8255 programmable peripheral interface; 8279 programmable key board and display interface; 8253 programmable timer; 8237/8257 DMA controller; Interfacing of above chips with 8085/8086 microprocessor.

Assembly Language (instruction set) of 8086 microprocessor.

References:

1. Venugopal K.R.,"Microprocessor x86 Programming", BPB Publictions.
2. Barry B. Brey, "The Intel Microprocessors: Architecture, Programming & Interfacing" PHI, 6th Edition, 2003.
3. D. V. Hall, "Microprocessor and Interfacing Programming & Hardware" TMH – 2nd Edition.
4. Uffenback, "The 8086 Family Design" PHI, 2nd Edition.
5. Lice & Gibson, "Microcomputer System 8086 / 8088" PHI, 2nd Edition.
6. H. P. Messmer, "Family Architecture Programing & Design: The Indispensible PC Hardware Book" Addison Wesley, 1997.

Note : Latest and additional good books may be suggested and added from time to time.

B.Sc-405: Software Lab-VII

Max. Marks (External): 80
Internal (Theory): 20
Time Allowed: 3 Hrs

Based on paper B.Sc-401 a minimum of 15 software/programs covering the whole syllabus may be developed using some suitable programming language/software.

B.Sc-406: Software Lab-VIII

Max. Marks (External): 80
Internal (Theory): 20
Time Allowed: 3 Hrs

Based on paper B.Sc-402, 403 a minimum of 15 software/programs covering the whole syllabus may be developed using some suitable programming language/editor/Operating system.

B.Sc-407: Summer Training/Project

Max. Marks (External): 80
Internal (Theory): 20
Time Allowed: _

Every student will have to undergo four weeks summer training, after the fourth semester examinations, either in some organization or in the college itself. There he/she must write a project report as per rules of Software Engineering. The report will be submitted to the university via its college. The university will make arrangements for evaluation of the project report and subsequent conduct of viva-voce on appropriate time.

Fifth Semester with effect from : 2014-2015

B.Sc-501 : Data Communication and Computer Networks **Max. Marks (External): 80**
Internal (Theory): 20
Time Allowed: 3 Hrs

Note: Examiner will be required to set NINE questions in all. Question Number 1 will consist of total 8 parts (short-answer type questions) covering the entire syllabus and will carry 16 marks. In addition to the compulsory question there will be four units i.e. Unit-I to Unit-IV. Examiner will set two questions from each Unit of the syllabus and each question will carry 16 marks. Student will be required to attempt FIVE questions in all. Question Number 1 will be compulsory. In addition to compulsory question, student will have to attempt four more questions selecting one question from each Unit.

Unit-I (Introduction)
Computer Networks: importance and advantages; Network types: LAN, MAN, WAN etc; Network topology; Internet; Wired v/s wireless networks.
Network Reference Models; Layered architecture; Protocols; Interface; Services; ISO-OSI model; TCP/IP model; Models for Wireless Network.

Unit-II (Physical and Data Link Layers)
Role of Physical Layer; Data Communication: Concepts of data, signal, channel, bandwidth, bit-rate and baud-rate; Fourier analysis; Maximum data rate of channel; Analog and digital communication; Asynchronous and synchronous transmission; Modulation technique; Multiplexing; Transmission medium.
Role of Data Link Layer; Data encoding techniques; Framing; Transmission errors; Error detection & correction codes DLL protocols; Sliding window protocols; IEEE 802.x standards for LANs; FDDI.

Unit-III (MAC and Network Layers)
Role of Medium Access Sub-layer; Protocols for MAC sub-layer; Pure and slotted Aloha, CSMA, CSMA/CA; CSMA/CD.
Role of Network Layer; Virtual Circuits and Datagram; IP; Routing Concepts; Routing Algorithms: Flooding, Shortest Path Routing, Distance Vector Routing; Link State Routing, Hierarchical Routing; Congestion Control Algorithms; Internetworking.

Unit-IV (Transport Layer and above)
Role of Transport, Presentation and Application layers,
Transport layer in action: segmentation, flow control and error control; TCP v/s UDP.
Network Security Issues: Security threats; Encryption Methods; Authentication; Symmetric –Key Algorithms; Public-Key Algorithms.
Application Layer Issues; Protocols for different applications like HTTP, FTP, SMTP.

References:

1. Andrew S. Tanenbaum, “Computer Networks”, Pearson Education.
2. Michael A. Gallo, William M. Hancock, “Computer Communications and Networking Technologies”, CENGAGE learning.
3. James F. Kurose, Keith W. Ross, “Computer Networking”, Pearson Education.
4. Behrouz A Forouzan, “Data Communications and Networking”, McGraw Hill.

Note : Latest and additional good books may be suggested and added from time to time.

B.Sc-502 : Computer Graphics **Max. Marks (External): 80**
Internal (Theory): 20
Time Allowed: 3 Hrs

Note: Examiner will be required to set NINE questions in all. Question Number 1 will consist of total 8 parts (short-answer type questions) covering the entire syllabus and will carry 16 marks. In addition to the compulsory question there will be four units i.e. Unit-I to Unit-IV. Examiner will set two questions from each Unit of the syllabus and each question will carry 16 marks. Student will be required to attempt FIVE questions in all. Question Number 1 will be compulsory. In addition to compulsory question, student will have to attempt four more questions selecting one question from each Unit.

UNIT – I

Overview of Computer Graphics: Historical background of Computer Graphics; Applications of Computer Graphics; Popular Graphics Softwares; Display devices: Pixel, Resolution, Aspect Ratio; Raster-Scan Systems and Display: CRT, Refresh Rate and Interlacing; Bit Planes, Color Depth and Color Palette, Frame Buffer, Video Controller, Raster-Scan Display Processor, Lookup Table, RGB Color Model, Color CRT monitors; Random-Scan Displays; Flat Panel Display : LCD, Plasma Panel; Graphics Monitors and Workstations; Popular Graphics Input Devices; Hard-Copy Devices.

UNIT – II

Coordinate Representations; Graphics Primitives: Line Drawing Algorithms- DDA Algorithm, Bresenham's Algorithm; Different Line Styles; Circle-Generating Algorithms- Properties of Circles, Circle Drawing using Polar Coordinates, Bresenham's Circle Drawing Algorithm; Ellipse-Generating Algorithms; Anti-aliasing.

UNIT – III

Geometric Transformations: Scaling, Translation, Rotation; Matrix Representations and Homogeneous Coordinates; Rotation Relative to an Arbitrary Point; Reflection; Shearing; Coordinate Transformation; Inverse Transformation; Affine Transformation; Raster Transformation; Composite Transformations; Fixed-point Scaling; Input Techniques: Pointing, Positioning, Rubber-band method, Dragging.

UNIT – IV

Two-Dimensional Viewing: Window-to-Viewport Coordinate Transformation; Zooming; Panning; Clipping: Point Clipping, Line Clipping- Cohen-Sutherland line clipping, Mid-point Subdivision Line Clipping; Polygon Clipping – Sutherland-Hodgeman Polygon Clipping; Text Clipping; Graphics in Three Dimensions: Displays in Three Dimensions, 3-D Transformations; 3-D Viewing: Viewing Parameters, Projections, Parallel and Perspective projection; Hidden Surfaces: Z-Buffer Method, Painter's Algorithm.

References:

1. "Computer Graphics", Donald Hearn, M. Pauline Baker, PHI.
2. "Computer Graphics", Apurva A. Desai, PHI, 2010
3. "Principles of Interactive Computer Graphics", Newmann & Sproull, McGraw Hill.
4. "Computer Graphics Principles & Practice", Foley etc. Addison Wesley.
5. "Procedural Elements of Computer Graphics", Rogers, McGraw Hill.
6. "Introduction to Computer Graphics and Multimedia", Anirban Mukhopadhyay, Arup Chattopadhyay, Vikas.
7. "Computer Graphics", Zhigang Xiang, Roy Plastock, Tata McGraw Hill.

8. "Fundamentals of Computer Graphics and Multimedia", D.P. Mukherjee, PHI.

Note : Latest and additional good books may be suggested and added from time to time.

B.Sc-503 : Principles of Visual and Windows Programming **Max. Marks (External): 80**
Internal (Theory): 20
Time Allowed: 3 Hrs

Note: Examiner will be required to set NINE questions in all. Question Number 1 will consist of total 8 parts (short-answer type questions) covering the entire syllabus and will carry 16 marks. In addition to the compulsory question there will be four units i.e. Unit-I to Unit-IV. Examiner will set two questions from each Unit of the syllabus and each question will carry 16 marks. Student will be required to attempt FIVE questions in all. Question Number 1 will be compulsory. In addition to compulsory question, student will have to attempt four more questions selecting one question from each Unit.

Unit-I

Visual programming v/s traditional programming; Importance of Visual programming; Elements of user interface; Event driver programming; Generalized icons; Formal specification of Iconic systems; Iconic operators; Specification of User Interface as Iconic system.

Unit-II

History of Windows; MS-Windows: Operating system-Definition & functions; Basics of Windows; Basic components of Windows; icons: Types of icons; Taskbar; Activating Windows; Using desktop; Title bar; Running applications; Exploring computer; Managing files and folders; Copying and moving files and folders; Control panel – display properties; Adding and removing software and hardware; Setting date and time; screensaver and appearance.

Unit-III

MS-DOS v/s Windows operating system; Features of Windows operating system; SDK and API; Static Libraries, Dynamic Libraries and DLL; Structure of a Windows Program; The WinMain(), CreateWindow(), DispatchMessage(), GetMessage() functions; Calling conventions in VC/VC++;Windows SDK; MFC; Hungarian notations; How Windows Program Work.

Unit-IV

Difference between window and Windows; Creating and registering a customized Windows Class; Messaging in Windows: Queued v/s Non Queued Messages; Writing text through Windows programming; Drawing in Windows programming; Displaying messages.

Using Keyboard and mouse in Windows program;

References:

1. Petzold, C.,"Programming Windows", Microsoft Press.
2. Kanetkar, Y.P., "Visual C++ Programming", BPB Publications.
3. Herbett Schildts : Windows Programming, TMH.
4. Murray : VC++, TMH.
5. Steve Holzner : Introduction to VC++.

Note : Latest and additional good books may be suggested and added from time to time.

B.Sc-504 : Microprocessor-II **Max. Marks (External): 80**
Internal (Theory): 20
Time Allowed: 3 Hrs

Note: Examiner will be required to set NINE questions in all. Question Number 1 will consist of total 8 parts (short-answer type questions) covering the entire syllabus and will carry 16 marks. In addition to the compulsory question there will be four units i.e. Unit-I to Unit-IV. Examiner will set two questions from each Unit of the syllabus and each question will carry 16 marks. Student will be required to attempt FIVE questions in all. Question Number 1 will be compulsory. In addition to compulsory question, student will have to attempt four more questions selecting one question from each Unit.

Unit-I

Advanced microprocessor architecture; Intel 80286/ 80386/ 80486/ Pentium / Pro-Pentium architecture.

Simple overview of Pentium-I, Pentium-II, Pentium-III, Pentium-IV, Core 2 Duo, Dual Core, core i3, Core i5 and Core i7 processors.

Unit-II

Macintosh power PC; DEC Alpha chip; RISC and CISC Architecture; Pipeline; Super-scalar architecture; Real and protected modes; Virtual 8086 mode.

Unit-III

Programming Model, General purpose registers; Pointer and index register; Program invisible registers; Memory/ addressing and addressing modes.

Advanced memory interfacing; Memory address decoding of 32/64 bit microprocessor; Memory paging mechanism and memory management; Cache memory and cache controller.

Unit-IV

Advanced I/O features 8251 programmable communication interface; Interrupts - interrupt vector and table, hardware and software interrupts; 8259 programmable interrupt controller; real time clock; TTL RGB graphic controller; Analog RGB graphic controller; shared bus operation.

Note: The course should be taught in the context of Intel 80286, 80386, 83486, Pentium-IV and its assembly languages.

References:

1. Venugopal K.R.,"Microprocessor x86 Programming", BPB Publictions.
2. Barry B. Brey, "The Intel Microprocessors: Architecture, Programming & Interfacing" PHI, 6th Edition, 2003.
3. D. V. Hall, "Microprocessor and Interfacing Programming & Hardware" TMH – 2nd Edition.
4. Uffenback, "The 8086 Family Design" PHI, 2nd Edition.
5. Lice & Gibson, "Microcomputer System 8086 / 8088" PHI, 2nd Edition.
6. H. P. Messmer, "Family Architecture Programing & Design: The Indispensible PC Hardware Book" Addison Wesley, 1997.

Note : Latest and additional good books may be suggested and added from time to time.

B.Sc-505 : Software Lab-IX

Max. Marks (External): 80
Internal (Theory): 20
Time Allowed: 3 Hrs

Based on paper B.Sc-502 a minimum of 15 software/programs covering the whole syllabus may be developed using some suitable programming language/software.

B.Sc-506 : Software Lab-X

Max. Marks (External): 80
Internal (Theory): 20
Time Allowed: 3 Hrs

Based on paper B.Sc-503, 504 a minimum of 15 software/programs covering the whole syllabus may be developed using some suitable programming language/editor.

B.Sc-507 : Essential Entrepreneurship Skills

Max. Marks (External): 80
Internal (Theory): 20

Time Allowed: 3 Hrs

Note: Examiner will be required to set NINE questions in all. Question Number 1 will consist of total 8 parts (short-answer type questions) covering the entire syllabus and will carry 16 marks. In addition to the compulsory question there will be four units i.e. Unit-I to Unit-IV. Examiner will set two questions from each Unit of the syllabus and each question will carry 16 marks. Student will be required to attempt FIVE questions in all. Question Number 1 will be compulsory. In addition to compulsory question, student will have to attempt four more questions selecting one question from each Unit.

Unit-I

Need and significance of Entrepreneurship Development in Global contexts; Entrepreneurship – Concepts, Process, Experiences and Strategies; Theories of Entrepreneurship.

The Entrepreneurship – myths and misconception, qualities, characteristics and role demanded of an Entrepreneur; Entrepreneur v/s Professional Managers.

Unit-II

Government Programmes, Policies, Incentive and Institutional Networking for Enterprise setting; Steps of setting new Enterprise; Scanning Business Environment; Sensing Business Opportunity & identifying product.

Unit-III

Business Plan Preparation - Procedure & Steps; Market Survey & Demand Analysis; Growth, Modernization & Expansion of Enterprise.

Unit-IV

Corporate Ethics - Nishkama Karma & Sakam Karma; Success Management; Stress Management; Faxes, e-mails, and text messages composing.

References:

1. Entrepreneurship Development by C.B. Gupta & N.P. Srinivasan, Publisher – Sultan Chand & Sons.
2. Clarence Danhof. " Observation on Entrepreneurship in Agriculture" in R. Wohl's Change and the Entrepreneur. Harvard University, Cambridge.
3. Behavioral Exercises and Games – manual for trainers, learning systems, by M.V. Deshpande, P. Mehta & M. Nandami.
4. Product Selection by Prof. H.N. Pathak, Pub. By (NIESBUD), NSIC-PTC Campus, Okhla.
5. Entrepreneurship Development by Dr S.P. Mishra pub by National Institute for Entrepreneurship and Small Business Development (NIESBUD NSIC PTCB Campus Okhla.
6. DESAI A N: Entrepreneur and environment, Ashish, NEW DELHI.
7. Kumar S A: Entrepreneurship in Small Industry, Discovery, New Delhi.
8. Entrepreneurship Development by – Dr. S. Moharana & Dr. C.R. Das, Pub. By RBSA Publishers, Jaipur.

Note : Latest and additional good books may be suggested and added from time to time.

Sixth Semester

B.Sc-601 : Internet Technologies **Max. Marks (External): 80**
Internal (Theory): 20
Time Allowed: 3 Hrs

Note: Examiner will be required to set NINE questions in all. Question Number 1 will consist of total 8 parts (short-answer type questions) covering the entire syllabus and will carry 16 marks. In addition to the compulsory question there will be four units i.e. Unit-I to Unit-IV. Examiner will set two questions from each Unit of the syllabus and each question will carry 16 marks. Student will be required to attempt FIVE questions in all. Question Number 1 will be compulsory. In addition to compulsory question, student will have to attempt four more questions selecting one question from each Unit.

Unit-I (Introduction)
Internet: What and Why? Internet vs Intranet; Concept of WWW, URL; DNS; Browsers; Accessing the Internet: various methods; ISP; Modem; DSL; Broadband; Email; Exchange Servers; Proxy Servers; Search Engines.
Survey of contemporary Internet Technologies; The role use and implementation of current tools; WiFi; WiMAX; Mobile Internet: 2G vs 3G, Edge, GPRS, HSDPA.

Unit-II (TCP/IP)
Role of Transport Layer in Internet; TCP; Ports; Role of Network Layer in Internet; IP vs UDP; IP Addresses; IPv4 vs IPv6; Protocol hierarchy in Wireless Internet.
Basic TCP/ IP name space, correctness, and protocols; HTTP vs FTP; SMTP; PPP; IMAP;

Unit-III (Internet in Work)
Concept of scripting languages; HTML: overview and features; HTML programming: parts of a HTML script, various tags; Essential HTML features: input, output etc; HTML techniques for text, image links and forms.
DHTML vs HTML; Indexing methods; Gopher; WAIS Server-side programming.

Unit-IV (Other Technologies)

Overview of CGI; JAVA Scripts vs VB Script, PHP, ASP, MySQL; Exploring and extending internet technology using JAVA or Perl. Macromedia/Adobe softwares like Flash, Dreamweaver etc.
Security issues, Emphasis on understanding, exploring and understanding, EDI, Electronic Commerce.

References:

1. Raj Kamal, “Internet and Web Technologies”, Tata McGraw-Hill.
2. Ramesh Bangia, “Multimedia and Web Technology”, Firewall Media.
3. Thomas A. Powell, “Web Design: The Complete Reference” , 4/e, Tata McGraw-Hill
4. Wendy Willard, “HTML Beginners Guide”, Tata McGraw-Hill.
5. Deitel and Goldberg, “Internet and World Wide Web, How to Program”, PHI.

Note : Latest and additional good books may be suggested and added from time to time.

B.Sc-602 : Multimedia **Max. Marks (External): 80**
Internal (Theory): 20

Time Allowed: 3 Hrs

Note: Examiner will be required to set NINE questions in all. Question Number 1 will consist of total 8 parts (short-answer type questions) covering the entire syllabus and will carry 16 marks. In addition to the compulsory question there will be four units i.e. Unit-I to Unit-IV. Examiner will set two questions from each Unit of the syllabus and each question will carry 16 marks. Student will be required to attempt FIVE questions in all. Question Number 1 will be compulsory. In addition to compulsory question, student will have to attempt four more questions selecting one question from each Unit.

Unit-I (Introduction)

Multimedia: concept, components and advantages; Application areas of multimedia; Various Multimedia components and their formats: audio, video, images, animation, text etc. Application of M/M; Intelligent M/M system; Application of environment in various fields such as medical entertainment, manufacturing, business, education etc.

Multimedia technology-computers; Communications and entertainment framework for multimedia systems; M/M devices; Presentation devices and user interface; M/M presentation & authoring.

Unit-II (Representation of Multimedia)

Digital representation of sound and various popular formats in mp3, wav etc; Sound transmission; Digital representation of video and various popular formats; MPEG motion video compression; DVI technology; time-based; media representation & deliver.

Speech recognition brief survey of speech generation and recognition; Digital video & image compression; JPEG image compression standards.

Unit-III (Creation of Multimedia)

Production and delivery of multimedia.

Multimedia Authoring tools; Types of Authoring Tools; Card and Page-Based Authoring Tools; Icon-Based Authoring Tools; Time-Based Authoring Tools; Object-Oriented Authoring Tools; VRML.

Unit-IV (Advanced Topics)

M/M software environments; Limitation of work station operating system; M/M system service OS support continuous media application; Media stream protocol; M/M file system & information representation; data models for M/M & hypermedia application.

Desktop VR; virtual reality OS; distributed virtual environment systems; Virtual environment displace & orientation tracking; Visually coupled system requirements; intelligent VR software systems.

References:

1. Ze-Nian Li, Mark S. Drew, “Fundamentals of Multimedia”, Pearson Education.
2. Tay Vaughan, “Multimedia Making It Work”, Tata McGraw- Hill.
3. Ramesh Bangia, “Multimedia and Web Technology”, Firewall Media.
4. John F. Koegel Buford, “Multimedia Systems”, Addison Wesley, Pearson Education.
5. Ana Weston Solomon, “Introduction to Multimedia”, Tata McGraw-Hill.

Note : Latest and additional good books may be suggested and added from time to time.

B.Sc-603 : Programming in JAVA **Max. Marks (External): 80**

Internal (Theory): 20
Time Allowed: 3 Hrs

Note: Examiner will be required to set NINE questions in all. Question Number 1 will consist of total 8 parts (short-answer type questions) covering the entire syllabus and will carry 16 marks. In addition to the compulsory question there will be four units i.e. Unit-I to Unit-IV. Examiner will set two questions from each Unit of the syllabus and each question will carry 16 marks. Student will be required to attempt FIVE questions in all. Question Number 1 will be compulsory. In addition to compulsory question, student will have to attempt four more questions selecting one question from each Unit.

Unit-I (Introduction)

JAVA's History; Why named JAVA; JAVA as language of Internet; JVM and Platform independence; Byte-code and Security; Automatic Garbage Collection; JAVA v/s C++: who is more object oriented? Other Features of JAVA.

Program Structure of JAVA; JAVA's Class Library; JAVA: Data Types, Variables, and Operators; Operator Precedence; Control Structures in JAVA.

Unit-II (Constructors and Arrays)

Defining Classes & Methods; Constructors and 'new' operator; 'this' reference,

Arrays; Vectors; Matrices; Strings; String Handling; String Buffer Class.

Unit-III (Inheritance and Exception Handling)

Reusability and Inheritance; Class Inheritance; Choosing Base Class; Access Attributes; Types of Inheritance; Abstraction through Abstract Classes; Polymorphism and function overloading; Concept of Interface.

Exception Handling: The concept of Exceptions; Types of Exceptions; Dealing with Exceptions; Creating own Exceptions.

Unit-III (Packages and Multithreading)

Packages & Interfaces: Understanding Packages; Defining and creating a Package; Adding Classes to packages; Importing classes from a package; CLASSPATH.

Multithreading Programming: The JAVA Thread Model, Understanding Threads, The Main Thread, Creating a Thread, Creating Multiple Threads, Thread Priorities.

Unit-IV (Input / Output and Applets)

Input/Output in JAVA: I/O Basic, Byte and Character Structures, I/O Classes, Reading Console Input Writing Console Output, Reading and Writing on Files, Random Access Files, Storing and Retrieving Objects from File, Stream Benefits.

Creating Applets in JAVA: Applet Basics, Applet Architecture, Applet Life Cycle, Simple Applet Display Methods, HTML APPLET Tag; Passing Parameters to Applets.

References:

1. The Complete Reference JAVA, TMH Publication.

2. 2. Beginning JAVA, Ivor Horton, WROX Public.
3. 3. JAVA 2 UNLEASHED, Tech Media Publications.
4. 4. JAVA 2(1.3) API Documentations.
5. 5. Any other book(s) covering the contents of the paper in more depth.

Note : Latest and additional good books may be suggested and added from time to time.

B.Sc-604 : Theory of Computation **Max. Marks (External): 80**
Internal (Theory): 20
Time Allowed: 3 Hrs

Note: Examiner will be required to set NINE questions in all. Question Number 1 will consist of total 8 parts (short-answer type questions) covering the entire syllabus and will carry 16 marks. In addition to the compulsory question there will be four units i.e. Unit-I to Unit-IV. Examiner will set two questions from each Unit of the syllabus and each question will carry 16 marks. Student will be required to attempt FIVE questions in all. Question Number 1 will be compulsory. In addition to compulsory question, student will have to attempt four more questions selecting one question from each Unit.

Unit-I

Evolution of the Components of Systems Programming: Assemblers, Loaders, Linkers, Macros and Compilers.

Software Tools: Variety of software tools, Text editors, Interpreters and program generators, Debug Monitor; Programming environment; Compiler: Phases of Compiler.

Unit-II

Concept of alphabet, string language; Basic operations on language: union, intersection, complementation; Kleene star; Regular languages and regular expressions; Non-deterministic v/s deterministic finite automata, and their equivalence.

Unit-III

Design and implementation of a Syntax analyzer generator; context free languages and context free grammar; Deterministic and non-deterministic push down automata; Pumping theorem; Top down v/s bottom up parsing technique.

Unit-IV

Models of computation: turning machine and RAM; Universal Turning machine; solving problem on turning machine; Turning acceptability and turning decidability; unsolvability of problems (Halting problems and others).

References:

1. Donovan: Systems Programming, Tata McGraw Hill.

2. Dhamdhere: System Software, Tata McGraw Hill.
3. Alfred V.Aho, Ravi Sethi, Jeffrey D.Ullman: Compilers Principles, Techniques and Tools, Addison Wesley.
4. Alfred V.Aho and Jeffrey D.Ullman: Principles of Compiler Design, Addison Wesley.

Note : Latest and additional good books may be suggested and added from time to time.

B.Sc-605 : Software Lab-XI **Max. Marks (External): 80**
Internal (Theory): 20
Time Allowed: 3 Hrs

Based on paper B.Sc-601, 602 a minimum of 15 software/programs covering the whole syllabus may be developed using some suitable programming language/software.

B.Sc-606 : Software Lab-XII **Max. Marks (External): 80**
Internal (Theory): 20
Time Allowed: 3 Hrs

Based on paper B.Sc-603, 604 a minimum of 15 software/programs covering the whole syllabus may be developed using some suitable programming language/editor.

B.Sc-607 : Behavioral and Communication Skills **Max. Marks (External): 80**
Internal (Theory): 20
Time Allowed: 3 Hrs

Note: Examiner will be required to set NINE questions in all. Question Number 1 will consist of total 8 parts (short-answer type questions) covering the entire syllabus and will carry 16 marks. In addition to the compulsory question there will be four units i.e. Unit-I to Unit-IV. Examiner will set two questions from each Unit of the syllabus and each question will carry 16 marks. Student will be required to attempt FIVE questions in all. Question Number 1 will be compulsory. In addition to compulsory question, student will have to attempt four more questions selecting one question from each Unit.

Unit-I (Group Behaviour and Motivation)

Foundation of Group Behaviour: Definition of classifying groups, stages of group development external condition imposed in the group, Group member resources, Group structure, Group Cohesiveness.

Motivation: Characteristics of motivation, process of motivation, Maslow's needs hierarchy,

Achievement motivation, Affiliation motivation, Power motivation, Expectancy Theory of motivation.

Unit-II (Leadership and Power Politics)

Leadership: Nature and definition theories of leadership, styles of leader ship behaviour, the managerial Grid, Fiedler's contingency approach, leadership effectiveness.

Power Politics And Conflict-Bases and sources of power, power tactics, power in groups, Politics: Power in action, implication for performances and satisfaction.

Unit-III (Communication and Stress Management)

Process of communication: The importance of communication barrier of effective communication, effective listening.

Communication Effectiveness in Organization: Changing Management concept in communication, practices to improve communication.

Communication and Group decision making: Direction of communication, formal v/s informal network decision making, group decision making, group v/s the individual, group think and group-shift ,group decision making techniques.

Organization Stress and its management: Stress and its consequences, potential sources of stress, stress management strategies, implication for performance and satisfaction on.

Unit-IV (Practical Communication)

Practice of various essential communication skills:

1. Faxes, e-mails, and text messages composing.

2. Official letters / applications.

3. Grammar questions on the following items: (i) Articles (ii) Preposition (iii) Tenses (iv) Subject verb agreement (v) Voice (vi) Tag questions (vii) Reported speech (viii) Comparatives and superlatives.

4. A paragraph of about 150 words on any one of the given topics.

References:

1. Robbin Stephen B (1994) (sixth edition) organizational behaviour.
2. Costley Dan Land Todd Ralph (1991) Human Relation in (fourth edition) New York: West Publishing company.
3. Reflections by I. P. Anand & Dr. R. K. Malhotra.
4. Remedial English Grammar by F. T. Wood.
5. Business Letter Writing by Jasmin S. and S. Bright, Universal, New Delhi, 1984.
6. English in Situations by R. O. Neil (OUP).

Note : Latest and additional good books may be suggested and added from time to time.