



**UNIVERSITY OF ENGINEERING & MANAGEMENT, KOLKATA**  
**DEPARTMENT OF COMPUTER APPLICATIONS**  
**DETAILED SYLLABUS**

FIRST YEAR FIRST SEMESTER

**Digital Electronics**

**Code: BCA101**

**Contacts: 3L + 1 T**

**Credits: 4**

Data and number representation- binary-complement representation BCD-ASCII, conversion of numbers form one system to the other, 2's complement representation, binary arithmetic

Logic gates, basic logic operations, truth tables, Boolean expression, simplification

Combination circuits, adders, Multiplexer, Sequential circuits, flip-flops, Registers, counter (Async & Sync)

Memory circuits, ROM, PROM, EPROM and dynamic RAM, Digital Components

**Books:**

1. Fundamentals of Digital Circuits, Anand Kumar, PHI
2. Digital Electronics, Tokheim, TMH
3. Digital Electronics, S. Rangnekar, ISTE/EXCEL
4. Digital Technology: Principles & Practice, Virendra Kumar, New Age International
5. Digital Circuit & Design, Salivahan, VIKAS
6. Electronic Circuits, Poornachandra, SCITECH

**Business Systems and Applications**

**Code: BCA102**

**Contacts: 3L + 1 T**

**Credits: 4**

Use of computers for managerial applications, Technology issues and data processing in organisations, Introduction to Information Systems, shift in Information system thinking, latest trends in Information Technology



**UNIVERSITY OF ENGINEERING & MANAGEMENT, KOLKATA**  
**DEPARTMENT OF COMPUTER APPLICATIONS**  
**DETAILED SYLLABUS**

Computer Based Information Systems- office automation systems. Decision making and MIS, transaction processing systems.

Decision support system, Group Decision Support, Executive Information systems, DSS generator

Introduction to:

Artificial Intelligence Based Systems, End user computing, Distributed data processing.

Deciding on IS architecture, IT leadership & IS strategic planning.

Introduction to:

IS strategy and effects of IT on competition.

Introduction to:

ERP, re-engineering work processes for IT applications, Business Process Redesign

Knowledge engineering and data warehouse.

Books:

1. Management Information System, O'Brien, TMH
2. Management Information System: A Concise Study, Kelkar, PHI
3. Decision support Systems, Janaki Raman, PHI
4. Business Information Systems, Munish Kumar, VIKAS
5. Business Application of Computers, M.M. Oka, EPH

**Introduction to Programming**

**Code: BCA103**

**Contacts: 3L + 1 T**

**Credits: 4**



**UNIVERSITY OF ENGINEERING & MANAGEMENT, KOLKATA**  
**DEPARTMENT OF COMPUTER APPLICATIONS**  
**DETAILED SYLLABUS**

Problem analysis, need for programmed languages, introduction to algorithms, algorithmic representations, Pseudocodes flow charts and decision tables, structured programming and modular programming .

Overview of c.

Constant, variables, data, types and size, variable declaration, operators and expressions, type conversion, conditional expression, special operators, precedence rules. Decision making, looping and control structures. Function, recursion, arrays, pointers, structures and unions,

Managing input/output operations, formatted I/O, standard library/user-defined functions, file management in C.

Handling of character strings, Dynamic memory allocations, linked list, Pre-processor. Developing different C Programs.

Books:

1. Programming With C, Gottfried, TMH
2. The C Answer Book, Tondo, PHI
3. Programming & Problem Solving Through C Language, EXCEL BOOKS
4. Practical C Programming, Oualline, SPD/O'REILLY
5. A First Course in Programming with C, Jeyapooan, VIKAS
6. C Programming made easy, Raja Ram, SCITECH
7. Projects Using C, Varalaxmi, SCITECH

**Mathematics - I**

**Code: BCA104**

**Contacts: 3L + 1 T**

**Credits: 4**

Algebra: Sets, Union, intersection, complement, mapping, notion of group, ring, field with simple examples; Polynomials, division algorithm, fundamental theorem of classical algebra (without proof), Descartes rule of sign and their application, relation between roots and coefficients, symmetric function of roots, transformation of polynomial equations, Cardan's solution of cubic equation.



**UNIVERSITY OF ENGINEERING & MANAGEMENT, KOLKATA**  
**DEPARTMENT OF COMPUTER APPLICATIONS**  
**DETAILED SYLLABUS**

Matrices, addition and multiplication of matrices, inverse matrix, solution of linear equations in three variables by Cramer's rule, solution of three line linear equations by matrix inversion method.

Differential calculus: Limits of function and continuity, fundamental properties of continuous functions (without proof), geometric meaning of derivative and differential, rules of differentiation, successive differentiation, Rolle's theorem, mean value theorem, Taylor's and Maclaurin's theorems with Cauchy's and Lagrange's forms of reminder, Taylor's series, function of several variables, partial derivatives, total differential, Euler's theorem on homogeneous functions of two variables.

Introduction to: Application to plane curves.

Integral calculus: Rules of integration of indefinite integrals, solution of definite integrals and their elementary properties, idea of improper integrals.

Dimensional geometry: Transformation of rectangular axes, invariants, general equation of second degree – reduction to standard forms and classification, plane polar equation of a straight line, circle and conic.

Books:

1. Engineering Mathematics, Vol:1 & Vol:2, Sastry, PHI
2. University Algebra through 600 Solved Problems, N. S. Gopalakrishnan, New Age International
3. Engineering Mathematics, Arumugam, SCITECH

**Essential Studies for Professionals - I**

**Code: BCA(GS)101**

**Contacts: 3L + 1T**

**Credits: 2**

Module 1

History - 1 (Ancient):



**UNIVERSITY OF ENGINEERING & MANAGEMENT, KOLKATA**  
**DEPARTMENT OF COMPUTER APPLICATIONS**  
**DETAILED SYLLABUS**

1. Indus valley Civilisation: Excavation, Time period, Creator, Extent, Characteristic, Art and architecture, Decline, Significance
2. Vedic Age: Time period, creator, Social, political, economic and religious conditions during Rig vedic period, later vedic period, vedic literature
3. 16 mahajanapadas: Time period, Location
4. Rise of Magadha: Hariyanka Dynasty, Sishunag Dynasty, Nanda Dynasty, Mauryan Dynasty
5. Protestant religion: Buddhism, Jainism, Ajibaka Religion

Module 2

Geography:

1. Earth and Universe: Origin of the earth, Geological time scales (Era, Epoch, Periods)
2. Rocks and volcanoes: Igneous rocks, Sedimentary rocks, Metamorphic rocks. Types of volcanoes
3. Human Geography and Population Geography: Determinism, Possibilism, Neo determinism, French and German school of thought, Demographic transition model, Indexes, Laws of migration.
4. Soil geography of India
  - Soil formation
  - Soil Horizons
  - Types of Soil
  - Soil erosion and conservation in India
5. National wildlife and parks of India

Module 3

Economics-1(Micro):

1. Basic economics- Types of Economy, Branches of economics, Feature of Indian Economy, HDI.
2. Demand & supply- law of demand, factors of demand, law of supply, different elasticity.

Module 4

Constitution-1(Basic):



**UNIVERSITY OF ENGINEERING & MANAGEMENT, KOLKATA**  
**DEPARTMENT OF COMPUTER APPLICATIONS**  
**DETAILED SYLLABUS**

1. Historical background- The company Rule (1773-1858), The crown rule (1858-1947), making of constitutions, features of constitution.
2. The Preamble- Ingredients, keywords, amendment of preamble.
3. Part & schedule- Details concept on part, schedule & articles & their amendments .
4. Citizenship- Constitutional provisions, Citizenship act, Comparing PIO & OCI card holders.

Books:

History:

1. India's Ancient Past (Ancient History) : R.S. Sharma
2. History of medieval India (Medieval History): Satish Chandra
3. History of Modern India (Modern History): Bipin Chandra
4. India's struggle for Independence (Modern History): Bipin Chandra

Geography:

1. Savindra Singh, R.D Dixit

Economics:

1. Indian Economy- TATA Mc Graw Hill/Ramesh Singh
2. Indian Economy – Arihant

Constitution:

1. Indian Constitution- D.D. Basu
2. Our Constitution- Subhash.C. Kashyap

**Programming Lab**

**Code: BCA191**

**Contacts: 3P**

**Credits: 3**

Programming using C, study of various features of the language, Structured and modular programming, various data structures in applications such as sorting, searching, string and list manipulation.

**Digital Electronics Lab**

**Code: BCA192**

**Contacts: 3P**



**UNIVERSITY OF ENGINEERING & MANAGEMENT, KOLKATA**  
**DEPARTMENT OF COMPUTER APPLICATIONS**  
**DETAILED SYLLABUS**

**Credits: 3**

Lab to complement BCA101

**Skill Development for Professionals - I**

**Code: BCA(GS)181**

**Contacts: 2L+1T**

**Credits: 1**

Module-1

Quantitative Numerical aptitude level-1

Quant foundation- Vedic maths & Collective tricks.

Basic Multiplication – multiplying by numbers ending in zeroes, Multiplying by 2,3,4,5,6,7,8 9, 11,12 & 111.multiplying 2 digits numbers ending in 9 & whose tens digit at to 10, Multiplying by 2 digits number of 9, multiplying by any 2 digit numbers ending in 9,

Division- Divisibility by 2,3,4,5,6,7,8, 9, 11 & 13, Dividing by 5,9, 15,25,125,Dividing by factors.

squaring numbers- squaring any 2 digit numbers ending in 5, squaring any number ending in 5, squaring any 3 digit numbers ending with 25, squaring any numbers ending in 9, squaring any numbers consisting only nines. squaring any 2 digit numbers. Cube & cube roots.

Percentage- Basic concept of percentage & it's shortcut rules & their applications.

Ratio- Basic concept of Ratio & Proportion, Shortcut tricks & their applications.

Simple equation- Linear equation of 2 & more than two variables.

Variation- Ratio , Proportion, Variation, concept of directly proportional &

Partnership – concept, rules & Applications, Percentage Advanced problems & shortcuts.

Profit & Loss- Basic concept, formulae, shortcut tricks & their Application.

Module-2

Objective English-1

1. Introduction of Parts of speech
2. Kinds of Noun, Rules & Application.
3. Definition of Pronoun, Examples, Rules & Application
4. Kinds of Adjectives & Degree of comparison.
5. Kinds of Verbs & Usages.

Module-3



**UNIVERSITY OF ENGINEERING & MANAGEMENT, KOLKATA**  
**DEPARTMENT OF COMPUTER APPLICATIONS**  
**DETAILED SYLLABUS**

Logical Mental Ability-1

CODING AND DECODING & DIRECTION SENSE

a) Conditional Coding ,b) Word-Pattern Coding, c) Chinese Coding, d) Direction Sense Test, e) Direction Distance Test, f) Shadow based Questions

SERIES & NUMBERS

a) Alphabet Series, b) Random Series, c) Number Series, d) Letter Gap, e) Missing Number Series, f) Series Completion, g) Order And Ranking, h) Interchange, i) Comparison

BLOOD RELATIONS

Family Tree Questions, Indication Type BR, Coding Blood Relations, Miscellaneous Blood Relations

ANALOGY

Word Analogy, Classification, Odd-Out

CUBE

Dice, Miscellaneous Problems

Data Sufficiency

a) Problems on Blood Relation, ages, Numbers  
b) Logical Test Based on Data Sufficiency

NON VERBAL REASONING

a) Image Formation  
b) Water –Images  
c) Mirror Image  
d) Image completion  
e) Paper Cutting And Folding

Module-4

Computer proficiency: Basics of C programming.

Books:

Numerical Aptitude

1. Fastrack objective Arithmetic: Arihant
2. Quantitative aptitude for Competitive exam (4th Edition): TATA Mc Graw Hill
3. Quantitative aptitude for Competitive exam (3rd Edition): PEARSON

Objective English

1. Objective English: Kiran Publication
2. General English: Arihant

Logical Mental Ability





**UNIVERSITY OF ENGINEERING & MANAGEMENT, KOLKATA**  
**DEPARTMENT OF COMPUTER APPLICATIONS**  
**DETAILED SYLLABUS**

1. Analytical & Logical Reasoning: M.K. Pandey/B.S.C. Publication, A modern approach to verbal & non verbal Reasoning: R.S. Agarwal



**UNIVERSITY OF ENGINEERING & MANAGEMENT, KOLKATA**  
**DEPARTMENT OF COMPUTER APPLICATIONS**  
**DETAILED SYLLABUS**

**Computer Architecture and Systems Software**

**Code: BCA201**

**Contacts: 3L + 1T**

**Credits: 4**

Microprocessors (8085 features), bus structure, Data representation, Register transfer and micro-operations, Central processing unit, Pipeline and vector processing.

Computer arithmetic, Input-output organisation, Memory organisation, CPU architecture, instruction format, addressing mode, stacks and handling of interrupts.

Basic computer organisation and design, programming the computer with assembly language (same basic applications), Micro-programmed control.

Books:

1. Computer Organization, Hamacher, TMH
2. 0000 to 8085 : Introduction to Microprocessors for Engineers & Scientists, Ghosh & Sridhar, PHI
3. Computer Organization & System Software, EXCEL BOOKS
4. System Architecture, Burd, VIKAS

**Information Systems Analysis & Design**

**Code: BCA202**

**Contacts: 3L + 1 T**

**Credits: 4**

Overview of System analysis and design: Development life cycle (Waterfall, Spiral, incremental models), feasibility studies, Requirements determination, Logical design, Physical design, Program design, Risk and feasibility analysis, prototyping

Information requirement analysis: Process modelling with physical and logical data flow diagrams, Data modelling with entity relationship diagrams, Normalization upto 3NF

System design: Process descriptions, Input/output controls, object modelling, Database design, User Interface design, Documentation, Data Dictionary, Development methodologies: Top down, bottom up, structured chart, decision table, decision tree, CASE productivity tools.



**UNIVERSITY OF ENGINEERING & MANAGEMENT, KOLKATA**  
**DEPARTMENT OF COMPUTER APPLICATIONS**  
**DETAILED SYLLABUS**

Testing – Unit, integration, system, Acceptance, regression, Test Case generation

Case studies.

Books:

1. System Analysis & Design, Parthasarathi, EPH
2. Analysis & Design of Information Systems, Rajaraman, PHI
3. Analysis & Design of Information Systems, Senn, MH
4. Information Systems: Analysis and Design, Ram Bansal 'Vigyacharya', New Age International.
5. System Analysis, Design & MIS, EXCEL BOOKS
6. Analysis, Design & Implementation of Information System, Sharma, VIKAS
7. System Analysis & Design, V.K. Jain, Wiley Dreamtech

**Computer Programming**

**Code: BCA203**

**Contacts: 3L + 1 T**

**Credits: 4**

Introduction to visual Basic, polymorphism, inheritance, class, object etc. Creating standard exe file. Forms, Tool Bar, different Tools (Text Box, label, combo box, list box, timer, Picture, image, command button). Code window. Basic event based programming on controls. Including multiple forms within a project. Saving forms and projects. Using data control for database oriented application (Back end Ms- Access).

Arrays – Single dimensional, two dimensional, dynamic

Searching – Linear and binary, sorting-bubble sort, selection sort, insertion sort; Function and sub-routine-defining a function, referencing a function; defining a subroutine, referencing a subroutine; string processing-string function, concatenation, alphabetical sorting; Data files sequential data file, random access files.

Books:

1. Programming with Visual Basic 6.0, Bradley, TMH
2. Programming & Problem Solving Through Visual Basic, EXCEL BOOKS



**UNIVERSITY OF ENGINEERING & MANAGEMENT, KOLKATA**  
**DEPARTMENT OF COMPUTER APPLICATIONS**  
**DETAILED SYLLABUS**

3. Beginning VB 6, Wright, SPD/WROX
4. Programming with Visual Basic 6.0, Azam, VIKAS
5. Visual Basic 6.0 programming, Eric A. Smith, Wiley Dreamtech
6. Visual Basic 6.0 in 60 days, Krishnan, Scitech

**Mathematics – II**

**Code: BCA204**

**Contacts: 3L + 1 T**

**Credits: 4**

Differential equations: order, degree, solution and formation of a differential equation, standard techniques of solving a linear differential equation with constant coefficients, Cauchy's and Lagrange's linear differential equations with variable coefficients.

Linear algebra: Vector space, subspaces, bases and dimensions, co-ordinates, linear transformation, algebra of linear transformations, isomorphism, representation of transformation by matrices. Sequence and series: Bounded and unbounded sequences, convergence or divergence of a sequence, behaviour of monotone sequences, algebra of convergent sequences, Cauchy's sequence, Cauchy's general principle of convergence, infinite series – its convergence and sum, series with positive terms and standard tests of convergence (without proof), alternating series, Leibnitz test, absolute convergence, rearrangement of absolutely convergent series, test of convergence of Abel and Dirichlet (without proof).

Books:

1. Engineering Mathematics, Vol:1 & 2, Sastry, PHI
2. Engineering Mathematics, Arumugam, Scitech
3. Higher Engineering Mathematics, Vol.2, Rathore, EPH

**English Language and Communication**

**Code: BCA205**

**Contacts: 3L + 1 T**

**Credits: 4**



**UNIVERSITY OF ENGINEERING & MANAGEMENT, KOLKATA**  
**DEPARTMENT OF COMPUTER APPLICATIONS**  
**DETAILED SYLLABUS**

This should cover general and technical writing, oral communications and listening skills: letter writing, technical report writing, and business communication.

Expression: Practical communication skill development, business presentation with multimedia, speaking skill, prepared speech, extempore speech

Reading skill: comprehension test

Writing skill: precise, technical/business letter, organisation of writing material, poster presentation, writing technical document, preparing software user manual, necessary part required to prepare a project documentation

Details in business communication – Introduction, Meaning of communication, Role of communication in Business, Basic elements of the communication process, level of communication, forms, models and media of communication, verbal and non-verbal communication – functions and types. Barriers of effective communication.

Books:

1. Business Correspondence & Report Writing, Sharma, TMH
2. English for Technical communication, Laxminarayanan, Scitech
3. Business Communication, Kaul, PHI
4. Effective Technical English, Laxminarayanan, scitech
5. Communication Skill, Ghanekar, EPH
6. Communication Skill, L.M. Shakh, EPH

**Essential Studies for Professionals - II**

**Code: BCA(GS)201**

**Contacts: 3L+1T**

**Credits: 2**

Module-1

HISTORY-2

1. Post Mauryan Empire: The Sungas, The Indo-greek, Sakas
2. Gupta Period: Chandragupta-I, Samudragupta, Chandragupta II, Kumargupta I, Skandagupta, Economic condition, land grants, caste system, position of women, education system
3. History of South India: Cholas, Chalukyas, Pallavas



**UNIVERSITY OF ENGINEERING & MANAGEMENT, KOLKATA**  
**DEPARTMENT OF COMPUTER APPLICATIONS**  
**DETAILED SYLLABUS**

4. Post gupta period: Palas, Senas

**MODULE 2**

**GEOGRAPHY**

**Physiographic Divisions of India**

1. The Himalayas: Greater Himalayas, Middle Himalayas, Shiwaliks
2. Northern Plains: Punjab plains, Ganga Bramhaputra plain
3. Deccan plateau
4. Coastal plains and islands: Western coastal plains, Eastern coastal plains, Lakshadweep islands, Andaman and nicobar islands
5. Indian monsoon and climate: Factors affecting climate of India, Summer season, Local winds, S.W monsoon winds, Season of retreating monsoon, Winter Season and westerly disturbances, Vagaries of monsoon.

**MODULE 3**

**ECONOMICS(MICRO)**

- 1) Production- Factors of production, fixed inputs, variable inputs, PPC, concept of TP, AP, MP, concept of revenue, AR, MR.
- 2) Cost- Concept of implicit & explicit cost, sunk cost, opportunity cost, shapes of FC, AFC, AC, MC, VC, AVC. Relation between AR & MR, AC & MC.
- 3) Market structure- perfect competition, monopoly, oligopoly, duopoly, monopsony, duopsony, oligopsony.

**Module-4**

**CONSTITUTION**

- 1) Fundamental Rights- Concept & different articles, Right to equality, prohibition of discrimination on certain ground, Equality of opportunity, abolition of untouchability & titles, right to freedom, right to education, right against exploitation, right to freedom of religion, cultural & educational rights, different writes & scopes
- 2) DPSP- Classification of directive principle, sanctioned of directive principal, criticism, Distinction between fundamental rights & directive principle
- 3) Fundamental Duties, criticism, significance
- 4) Union Legislature, President, Vice President, Lok Sabha , Rajya Sabha, P.M., Speaker of Lok Sabha



**UNIVERSITY OF ENGINEERING & MANAGEMENT, KOLKATA**  
**DEPARTMENT OF COMPUTER APPLICATIONS**  
**DETAILED SYLLABUS**

5) State Legislature, CM & Governor. Legislative assembly and Legislative Council

Books:

History:

1. India's Ancient Past (Ancient History) : R.S. Sharma
2. History of medieval India (Medieval History): Satish Chandra
3. History of Modern India (Modern History): Bipin Chandra
4. India's struggle for Independence (Modern History): Bipin Chandra

Geography:

1. India- Khullar

Economics:

2. Indian Economy- TATA Mc Graw Hill/Ramesh Singh
3. Indian Economy – Arihant

Constitution:

1. Indian Constitution- D.D. Basu
2. Our Constitution- Subhash.C. Kashyap

**Programming Lab**

**Code: BCA291**

**Contacts: 3P**

**Credits: 3**

Computer programming with Visual Basic

Different constructs and applications, connecting with MS-ACCESS using data controls.

**Computer Architecture and Systems Software Lab**

**Code: BCA292**

**Contacts: 3P**

**Credits: 3**

Lab to complement BCA201

**Business Presentation and Language Lab**

**Code: BCA281**



**UNIVERSITY OF ENGINEERING & MANAGEMENT, KOLKATA**  
**DEPARTMENT OF COMPUTER APPLICATIONS**  
**DETAILED SYLLABUS**

**Contacts: 2P**

**Credits: 2**

Preparing business presentation with computers using PowerPoint, Developing structured project report with Word and Excel

**Skill Development for Professionals - II**

**Code: BCA(GS)281**

**Contacts: 2L+1T**

**Credits: 1**

Module -1

Quantitative Numerical Aptitude-2

- 1) Average- Concept on average, different missing numbers in average estimation, shortcuts & their application.
- 2) Mixture & Allegation – Proportion & mixtures in percentages, populations & liquids, shortcuts & their application.
- 3) Number system- concept of different numbers , remainder theorem, factors.
- 4) Time & Work- Basic concept, Different problems & their shortcut tricks. Time & Speed & Tides- concept of speed , time & Distance, relative speed, formulae & their application. upstream & Downstream, pipes & cistern.

Module -2

Objective English-2

1. Types of Adverbs & Application.
2. Types of Conjunctions & Application.
3. Fill in the blanks with Prepositions & Articles.
4. Present Tense & Usages.
5. Past & Future Tenses.

Module-3

Logical Mental ability -2

SYLLOGISM

a) Logical Venn Diagram

b) The If Else Statement

SEATING ARRANGEMENT

a) Circular seating arrangement

b) Square seating Arrangement





**UNIVERSITY OF ENGINEERING & MANAGEMENT, KOLKATA**  
**DEPARTMENT OF COMPUTER APPLICATIONS**  
**DETAILED SYLLABUS**

c) Line Arrangement

PUZZLES

a) Seating Arrangement

b) Classification

c) Seating Arrangement with Blood relations.

Module-4

Computer Proficiency: Advanced C programming.

Books:

Quant

1. Fastrack objective Arithmetic: Arihant
2. Quantitative aptitude for Competitive exam (4th Edition): TATA Mc Graw Hill
3. Quantitative aptitude for Competitive exam (3rd Edition): PEARSON

Verbal Ability

1. Objective English: Kiran Publication
2. General English: Arihant

LOGICAL REASONING

1. Analytical & Logical Reasoning: M.K. Pandey/B.S.C. Publication
2. A modern approach to verbal & non verbal Reasoning: R.S. Agarwal



**UNIVERSITY OF ENGINEERING & MANAGEMENT, KOLKATA**  
**DEPARTMENT OF COMPUTER APPLICATIONS**  
**DETAILED SYLLABUS**

**Operating Systems**

**Code: BCA301**

**Contacts: 3L + 1 T**

**Credits: 4**

Importance of OS, Basic concepts and terminology, types of OS, different views, journey of a command execution, design and implementation of OS

Process: Concept and views, OS view of processes, OS services for process management, scheduling algorithms, performance evaluation; Inter process communication and synchronisation, mutual exclusion, semaphores, hardware support for mutual exclusion, queuing implementation of semaphores, classical problem of concurrent programming, critical region and conditional critical region, monitors, messages, deadlocks.

Resource manager, Memory management, file management, processor management, device management

Security and protection, authentication, protection and access control, formal models of protection, worms and viruses.

Multiprocessor system, classification and types, OS functions and requirements, Introduction to parallel computing, multiprocessor interconnection synchronisation.

Distributes OS - rationales, algorithms for distributed processing..

Introduction to Unix OS/DOS (case study)

Books:

1. Operating Systems, Galvin, John Wiley
2. Operating Systems , Milankovic, TMH
3. An Introduction to Operating System, Bhatt, PHI
4. Modern Operating System, Tannenbaum, PHI
5. Guide to Operating Systems, Palmer, VIKAS
6. Operating Systems, Prasad, Scitech

**Data Structures with C**



**UNIVERSITY OF ENGINEERING & MANAGEMENT, KOLKATA**  
**DEPARTMENT OF COMPUTER APPLICATIONS**  
**DETAILED SYLLABUS**

**Code: BCA302**

**Contacts: 3L + 1 T**

**Credits: 4**

Basic concepts of data representation: abstract and system defined types, primitive data structures

Linear data structures and their sequential representation: array, stack, queue, circular queue, dequeue and their operations and applications

Linear data structures and their linked representation: linear link lists, doubly linked lists, linked stack, linked queue and their operations and applications.

Non Linear Data Structures I: Binary trees, binary search trees, representations and operations, thread representations, sequential representations, graphs and their representation.

Searching Techniques- Linear, Binary, Interpolation

Sorting Techniques-Insertion Sort, Bubble, Selection, Quick

Non Linear Data Structures II : Hashing, Files

Programming with Data Structures in C

Books:

1. Data Structures in C, Ajay Agarwal, Cyber Tech
2. Data Structures Using C, Radhakrishnan & Shrinivasan, ISTE/EXCEL BOOKS
3. C and Data Structure, Radhaganesan, Scitech
4. Data Structure Using C & C++, Tannenbaum, PHI
5. Mastering Algorithms with C, Loudon, SPD/O'REILLY

**Graphics & Internet**

**Code: BCA303**

**Contacts: 3L + 1 T**

**Credits: 4**



**UNIVERSITY OF ENGINEERING & MANAGEMENT, KOLKATA**  
**DEPARTMENT OF COMPUTER APPLICATIONS**  
**DETAILED SYLLABUS**

Computer graphics - Co-ordinate systems, Homogenous co-ordinate systems, line drawing algorithms, circle drawing algorithms, Two dimension transformations (rotation, scaling, shearing etc).

Raster scanning, CRT (Interface Design)

Clipping Algorithm (Sutherland-cohen line clipping Algorithm), Projection (Two-dimensional), B-spline curves, shadowing.

TCP/IP, addressing in Internet – IP and domains, Servers, type of Connectivity.

Email services and protocols (X400, SMTP, UUCD, PPP, POP), FTP.

Web publishing - HTTP, browsers (naming), Introduction to HTML, Java script, use of Java applets within HTML files, ASP (Cookies and database connectivity only).

Internet security, Introduction to e-commerce, electronic payment standards and methods.

Books:

1. Procedural & Mathematical Elements in Computer Graphics, Rogers, TMH
2. Computer Graphics, Hearn & Baker, PHI
3. Computer Graphics, EXCEL BOOKS
4. Introduction to Computer Graphics, A. Mukherjee, VIKAS
5. Fundamentals of Computer Graphics & Multimedia, Mukherjee, PHI
6. Beginning ASP 3.0, Baser, SPD/WROX
7. Dynamic HTML, Goodman, SPD/O'REILLY
8. HTML Black Book, Stephen Holzner, Wiley Dreamtech
9. ASP 3.0 programming Bible, Eric A. Smith, Wiley Dreamtech
10. Computer Graphics, Bhandari & Joshi, EPH

**Mathematics for Computing**

**Code: BCA304**

**Contacts: 3L + 1 T**

**Credits: 4**



**UNIVERSITY OF ENGINEERING & MANAGEMENT, KOLKATA**  
**DEPARTMENT OF COMPUTER APPLICATIONS**  
**DETAILED SYLLABUS**

Propositional logic, Logical equivalence

Permutation and combinations

Generating functions, Recurrence relations

Graph Theory Concepts Graphs, sub-graphs, cyclic graphs

Trees, spanning trees, binary trees, Algorithms- Prim's, Kruskal

Isomorphism, homomorphism

Finite automata – NFA, DFA, Conversion, Mealy M/C, Moore M/C ,

Introduction to Languages & Grammars and their relation with Automata.

Books:

1. Discrete Mathematics, Mott, Kandel & Baker, PHI
2. Graph Theory, N. Deo, PHI
3. Discrete Mathematical Structure, C.L. Liu, TMH
4. Discrete Mathematical Structure, Somasundaram, PHI
5. Discrete Mathematical Structure, G.S. Rao, New Age International
6. Discrete Mathematics with Applications, Rosen, TMH
7. Discrete Mathematical Structure, Dubey, EXCEL BOOKS
8. Discrete Mathematics, Iyengar, VIKAS
9. Discrete Structures and Graph Theory, Rao, Scitech
10. Mathematical Foundations, Vijayarangan, Scitech
11. Discrete Structures and Graph Theory, Rathor, EPH.

**Management & Accounting**

**Code: BCA305**

**Contacts: 3L + 1 T**

**Credits: 4**

Basics of management; Planning, scheduling, organising, staffing, directing, controlling

Managerial economics and financial management, productivity management

Financial accounting, financial statements and analysis



**UNIVERSITY OF ENGINEERING & MANAGEMENT, KOLKATA**  
**DEPARTMENT OF COMPUTER APPLICATIONS**  
**DETAILED SYLLABUS**

Conceptual framework of cost accounting

Cost-volume profit relationship, budgeting, cost accumulation system, variable and absorption costing system

Financial accounting computer packages

Financial Management-Finance functions in Business. Relation of finance with other functions.

Source of finance long term and short term. Financial institution – IDBI, ICICI, IFCI and Commercial Banks.

Conceptual framework of Cost-Accounting- Basic cost concept. Cost determination process, costing for materials, labour and overheads.

Profitability Analysis – budgeting – application of Capital budgeting techniques for decision making.

Books:

1. Management Accounting, M.E. Thukaram Rao, New Age International
2. Management Accounting, Khan & Jain, TMH
3. Cost Accounting-An Introduction, Nigam & Jain, PHI
4. Management Accounting, Pande, VIKAS
5. Accounting and Financial Management for MCA & MBA students, SCITECH
6. Management Accounting, A.P.Rao. EPH.
7. Cost & Management Accounting, Inamdar. EPH.

**Essential Studies for Professionals - III**

**Code: BCA(GS)301**

**Contacts: 2L+1T**

**Credits: 2**

Module-1

History-3:

1. Pre sultanate age: Md. Bipin Karim, Aluptagin, Sabuktagin, Sultan Mamud, Md. Ghori



**UNIVERSITY OF ENGINEERING & MANAGEMENT, KOLKATA**  
**DEPARTMENT OF COMPUTER APPLICATIONS**  
**DETAILED SYLLABUS**

2. Delhi Sultanate: Slave dynasty, Khalji dynasty, Tughlaw dynasty, Sayyed dynasty, Lodhi dynasty

3. Bhakti and Sufi movement: Kabir, Gurunanak, Chaitanya, Namdev

4. Mughal Period: Babur, Humayun, Sher shah suri, Akbar, Jehangir, Shah Jahan, Aurangzeb, Aministrative system, Din-i-ilahi, Art and architecture, Land revenue system

Module-2

GEOGRAPHY

1. Drainage system

- Types of river (Perennial, Non perennial, Inland drainage)
- Courses of river: Upper, Middle, Lower courses
- Landforms carved out by river based on the courses.
- Basic terminologies: Antecedent rivers, Consequent rivers, Fault guided river, Tributary, Distributary
- Indian river system (Himalayan, Peninsular, Coastal)

2. Types of Irrigation in India

- Well
- Tanks
- Canal

3. Problems of irrigation in India

4. Status of Irrigation in India as per 2011 census

5. Clouds and Precipitation: Forms of precipitation, Types of rainfall, Types of clouds.

Module-3

MACRO ECONOMICS

1) National income- Concept of GDP, GNP, NNP both in FC & MP, PCI

2) Tax – Concept of TAX , objective of TAX, Direct & Indirect Tax, Progressive, Regressive & Proportional Proportional tax.

3) RBI & Banking- Traditional Functions of RBI, CRR, SLR, REPO, Reverse repo, MSF, LAF market, capital market, capital market, Money market, FOREX.

4) Budget- concept of budget, components of budget, different types of deficit



**UNIVERSITY OF ENGINEERING & MANAGEMENT, KOLKATA**  
**DEPARTMENT OF COMPUTER APPLICATIONS**  
**DETAILED SYLLABUS**

5) Keynesian outlook- IS, LM & different multipliers.

6) Inflation & Deflation- Inflation & its impact, Deflation & its impact, WPI, CPI, GDP deflator.

Module-4

CONSTITUTION-3(Advance)

- 1) Central State relation, Interstate relation,
- 2) Supreme Court-Appointment of Chief Justice, Acting Chief Justice, Qualification, Oath or Affirmation, Tenure of Judge, Removal of Judges, Salaries & allowance, Adhoc Judge, Procedure of the court, write jurisdiction, Power of Judicial review

3) High Court-Appointment of Chief Justice, Acting Chief Justice, Qualification, Oath or Affirmation, Tenure of Judge, Removal of Judges, Salaries & allowance, Adhoc Judge, Procedure of the court, write jurisdiction, Power of Judicial review

4) Duties & Powers of Attorney & Advocate General in Brief

5) Panchayati Raj- Three tier system, Different committees recommendation

6) Municipality, Municipal Council & Corporation, Official Languages & related Articles.

Books:

History:

1. India's Ancient Past (Ancient History) : R.S. Sharma
2. History of medieval India (Medieval History): Satish Chandra
3. History of Modern India (Modern History): Bipin Chandra
4. India's struggle for Independence (Modern History): Bipin Chandra

Geography:

1. India- Khullar

Economics:

1. Indian Economy- TATA Mc Graw Hill/Ramesh Singh
2. Indian Economy – Arihant

Constitution:

1. Indian Constitution- D.D. Basu
2. Our Constitution- Subhash.C. Kashyap

**Internet & Computer Graphics Lab**





**UNIVERSITY OF ENGINEERING & MANAGEMENT, KOLKATA**  
**DEPARTMENT OF COMPUTER APPLICATIONS**  
**DETAILED SYLLABUS**

**Code: BCA391**

**Contacts: 3P**

**Credits: 3**

Developing web pages with HTML, Using ASP, Creating and experimenting with computer graphics. (with C-Language)

**Programming Lab (Data Structure with C)**

**Code: BCA392**

**Contacts: 3P**

**Credits: 3**

Solving problems related to Data structure implemented in C language.

**Skill Development for Professionals - III**

**Code: BCA(GS)381**

**Contacts: 2L+1T**

**Credits: 1**

Module-1

Quantitative Numerical aptitude-3

- 1) Simple & Compound Interest- Basic concept of SI & CI, different formulas & their applications, concept of Growth & Contraction of Business.
- 2) Data Interpretation- Tables, pie chart, histogram, Bar chart, solution tricks & techniques.
- 3) Quant Review- Miscellaneous problems from different chapters & short cuts.
- 4) Indices & Surds- Basic concept, Formulae & their applications, Finding out the square roots, Elimination of Surds, Equation solve.
- 5) Quadratic Equation- polynomials, degree, powers, Equation & factors  
Solution.Progression- Concept of AP, GP & HP

Module-2

Objective English-3



**UNIVERSITY OF ENGINEERING & MANAGEMENT, KOLKATA**  
**DEPARTMENT OF COMPUTER APPLICATIONS**  
**DETAILED SYLLABUS**

1. Error based on Noun & Pronoun.
2. Error based on Adjective & Degree of comparison.
3. Error based on Adverb & Synonym And Antonym.
4. Error Based on Verbs & Some Special Phrasal Verbs.
5. Reading Comprehension Passage.

**Module-3**

**Logical Mental Ability-3**

a)Statement And Assumption, b)Statement And Conclusion, c)Statement And Course Of Action,  
d)Cause And Effect, e)Drawing Inference

Machine Input-Output

a) Pattern Based I/O

Inequality

a) Coded Inequality, b) Jumbled Inequality, c) Conditional inequality

Calendar And Clock

a)Miscellaneous Problems

**Module-4**

Computer proficiency: C programming, Basics of C++.

Books:

Numerical Aptitude

1. Fastrack objective Arithmetic: Arihant
2. Quantitative aptitude for Competitive exam (4th Edition): TATA Mc Graw Hill
3. Quantitative aptitude for Competitive exam (3rd Edition): PEARSON

Verbal Ability

1. Objective English: Kiran Publication
2. General English: Arihant



**UNIVERSITY OF ENGINEERING & MANAGEMENT, KOLKATA**  
**DEPARTMENT OF COMPUTER APPLICATIONS**  
**DETAILED SYLLABUS**

LOGICAL REASONING

1. Analytical & Logical Reasoning: M.K. Pandey/B.S.C. Publication
2. A modern approach to verbal & non verbal Reasoning: R.S. Agarwal.



**UNIVERSITY OF ENGINEERING & MANAGEMENT, KOLKATA**  
**DEPARTMENT OF COMPUTER APPLICATIONS**  
**DETAILED SYLLABUS**

**Data Base Management System**

**Code: BCA401**

**Contacts: 3L + 1 T**

**Credits: 4**

Introduction to DBMS, architecture, administration roles, data dictionary  
Traditional models, three-level architecture, hierarchical model, network model and relational model, File organization , Security.

Relational model – definitions and properties, keys , integrity rules, relational algebra, joins, set operations, Tuple relational calculus

SQL constructs, embedded SQL , Query & Query Optimisation Techniques.

Database design, conceptual, logical and physical models, ER diagram and model,

Functional Dependency (Armstrong’s Axioms), Normal forms( 1NF, 2NF, 3NF, BCNF)

Indexing- Primary, Secondary, Multilevel

Books:

1. Data Base System Concepts, Korth, TMH
2. Fundamentals of DBMS, Vig & Walia, ISTE/EXCEL
3. Data Base Management System, A.K. Pujari, ISTE/EXCEL
4. Data Base Management System, Leon, VIKAS
5. Data Base Concepts, Kroenke, PHI
6. Oracle PL/SQL Programming, Feuerstein, SPD/O’REILLY
7. Data Base Management System, V.K. Jain, Wiley Dreamtech
8. SQL PL/SQL for Oracle 8 & 8i, P.S. Deshpande, Wiley Dreamtech

**Object-Oriented Programming with C++**

**Code: BCA402**

**Contacts: 3L + 1 T**

**Credits: 4**



**UNIVERSITY OF ENGINEERING & MANAGEMENT, KOLKATA**  
**DEPARTMENT OF COMPUTER APPLICATIONS**  
**DETAILED SYLLABUS**

Basics of Object Oriented programming and software design  
C++ object-oriented programming

C++ & ANSI standard C, Predefined classes in C++

Building objects with classes, Introduction to Constructor, Destructor, Defining operations on objects, Using Inheritance in C++, Concepts of

Overloading ,Virtual functions and Polymorphism

Using C libraries in C++ programs, Using commercial class libraries (Standard template library)

Advanced Topics in C++ ( Templates, Exception Handling, file handling, Streams)

Books:

1. Object Oriented Programming and C++, Balaguruswamy, TMH
2. Programming in C++, Shah & Thakker, ISTE/EXCEL
3. C++ Programming Today,Johnston,PHI
4. Revolutionary Guide to Object Oriented Programming Using C++ ,Olshevsky,SPD/WROX
5. Object Oriented Programming and C++, R.Rajaram, New Age International
6. Object Oriented Programming with C++ & JAVA,Samanta,PHI
7. Object-Oriented Programming with C++, Subburaj, VIKAS
8. Object-Oriented Programming with C++, Emmerel , Wiley Dreamtech
9. Programming with C++,Radhaganesan,Scitech

**Software Project Management and Quality Assurance**

**Code: BCA403**

**Contacts: 3L + 1 T**

**Credits: 4**

Project management concepts

People, process, project and product (4P)

Planning software. Projects – project schedule, PERT, Gantt Charts, S/W project plan document.



**UNIVERSITY OF ENGINEERING & MANAGEMENT, KOLKATA**  
**DEPARTMENT OF COMPUTER APPLICATIONS**  
**DETAILED SYLLABUS**

System development life cycle.

Project teams, project monitoring and controls- Formal Technical Review (FTR), Cost estimation, COCOMO model, S/W metrics-size oriented and functions oriented.

Using project management software tools, quality management, issue, standards and methods. ISO and CMM.

Risk management, Configuration management.

Books:

1. Software Project Management, Hughes, TMH
2. Software Project Management, Kelkar, PHI
3. Information System Project Mgmt., Schwable, VIKAS
4. Software Project Management from concept to deployment with CD, Kieron Conway, Wiley Dreamtech

**Statistics, Numerical Methods & Algorithms**

**Code: BCA404**

**Contacts: 3L + 1 T**

**Credits: 4**

Approximation in numerical computation, Truncation and rounding errors.

Interpolation : Lagrange's interpolation, Newton forward and backward differences interpolation, Newton divided difference.

Numerical Integration: Trapezoidal rule, Simpson 1/3 rule, Weddle's rule.

Numerical solution of a system of linear equation

Gauss elimination method, Matrix inversion, LU factorisation method, Gauss-Jacobi method, Gauss Seidel method.

Algebraic Equation : Bisection method, Secant method, Regula-Falsi method, Newton Raphson method, Method of Iteration



**UNIVERSITY OF ENGINEERING & MANAGEMENT, KOLKATA**  
**DEPARTMENT OF COMPUTER APPLICATIONS**  
**DETAILED SYLLABUS**

Numerical solution of ordinary differential equation : Taylor's series method, Euler's method, Runga – kutta method, predictor – correction method.

Books :

1. Numerical Mathematical Analysis ,Sastry, PHI
2. Numerical Mathematical Analysis (By J.B. Scarborough)
3. Numerical Analysis & Algorithms, Pradeep Niyogi, TMH
4. Numerical Mathematical Analysis , Mathews, PHI
5. C language and Numerical Methods ( By C.Xacier)
6. Numerical Analysis ( By S. Ali Mollah)
7. Introductory Numerical Analysis(By Dutta & Jana)
8. Numerical Methods (Problems and Solution) (By Jain , Iyengar & Jain),New Age International
9. Computer Oriented Numerical Methods, N. Dutta, VIKAS
10. Numerical Methods, Arumugam, Scitech
11. Numerical Methods in Computer Applications, P.U.Wayse. EPH.

**Environment and Ecology**

**Code: BCA405**

**Contacts: 3L**

**Credits: 3**

Introduction , components of the environment, environmental degradation

Ecology: Elements of Ecology ; Ecological balance and consequences of change, principles of environmental impact assessment

Air Pollution and Control: Atmospheric composition, energy balance, climate, weather, dispersion, sources and effects of pollutants, primary and secondary pollutants, green house effect, depletion of ozone layer, standards and control measures.

Water Pollution and Control: Hydrosphere, natural water, pollutants: their origin and effects, river / lake / ground water pollution, standards and control.



**UNIVERSITY OF ENGINEERING & MANAGEMENT, KOLKATA**  
**DEPARTMENT OF COMPUTER APPLICATIONS**  
**DETAILED SYLLABUS**

Land Pollution: Lithosphere, pollutants (municipal, industrial, commercial, agricultural, hazardous solid wastes); their origin and effects, collection and disposal of solid waste, recovery and conversion methods.

Noise Pollution: Sources, effects, standards and control.

Books:

1. Environmental Science, Cunningham, TMH
1. Environmental Pollution Control Engineering, C.S.Rao, New Age International
2. Environmental Science, Wright & Nebel, PHI
3. Environmental Pollution Analysis, S.M.Khopkar, New Age International
4. Environmental Mgmt, N.K. Oberoi, EXCEL
5. Environmental Mgmt, Mukherjee, VIKAS
6. Ecosystem Principles & Sustainable Agriculture, Sithambaranathan, Scitech

**Essential Studies for Professionals - IV**

**Code: BCA(GS)401**

**Contacts: 2L+1T**

**Credits: 2**

**Module-1**

**Indian Geography**

1. Natural vegetation of India
2. Minerals and multipurpose river projects of India
3. Agriculture of India
  - Types of Agriculture (Intensive subsistence, Extensive subsistence, Mixed farming, Jhoom cultivation)
  - Types of crops (Rice, Wheat, Sugarcane, Pulses, Cotton, Jute, Tobacco)

**Module-2**

**HISTORY**

1. Socio cultural Changes: Introduction of western Education, Ram Mohan Roy and BramhoSamaj, Young Bengal movement, Arya samaj, Ramkrishna Mission, Aligarh movement, Vidyasagar





**UNIVERSITY OF ENGINEERING & MANAGEMENT, KOLKATA**  
**DEPARTMENT OF COMPUTER APPLICATIONS**  
**DETAILED SYLLABUS**

2. Revolt of 1857: Cause, Character, cause of failure, impact
3. Partition of Bengal: Cause, Swadeshi and Boycott, Newspaper
4. Indian National congress

Module-3

INDIAN POLITY

- 1) Election Commission- Related Articles, Power & Function & Provision of Election
- 2) Emergency Provisions- Related Articles, Conditions Application, Supreme power during emergency.
- 3) National Commission for SC/ST/OBC, Function of the commissions, Special offer & related articles for SC/ST/OBC
- 4) Different amendments of Indian Constitution & the related articles
- 5) Formation UPSC, Related Articles, Scope & Power, Duties of CAG, Formation SPSC, Related Articles, Scope & Power.

Module-4

Economics- (Indian Economy)

- I. Indian Planning & NITI Aayog
- II. Indian Foreign trade and International organizations
- III. Balance of Payment and Balance of Trade

Books:

History:

1. India's struggle for Independence (Modern History): Bipin Chandra

Geography:

1. Savindra Singh, R.D Dixit

Economics:

1. Indian Economy- TATA Mc Graw Hill/Ramesh Singh
2. Indian Economy – Arihant

Constitution:

1. Indian Constitution- D.D. Basu
2. Our Constitution- Subhash.C. Kashyap
3. Ancient Past (Ancient History) : R.S. Sharma
4. History of medieval India (Medieval History): Satish Chandra



**UNIVERSITY OF ENGINEERING & MANAGEMENT, KOLKATA**  
**DEPARTMENT OF COMPUTER APPLICATIONS**  
**DETAILED SYLLABUS**

5. History of Modern India (Modern History): Bipin Chandra India's

**Database Lab (Oracle)**

**Code: BCA491**

**Contacts: 3P**

**Credits: 3**

Study of commercial DBMS package such as Oracle. Developing database application with Oracle Creation of a database, writing SQL queries and retrieving data, PL/SQL.

**Computing Lab**

**Code: BCA492**

**Contacts: 3P**

**Credits: 3**

1. Solving various problems related to object oriented programme with C++
2. Implement Numerical problems Using C/MAT LAB
3. Assignments on Interpolation: Newton forward & backward, Lagrange
4. Assignments on Numerical Integration: Trapezoidal Rule, Simson's 1/3 Rule, Weddle's Rule
5. Assignments on Numerical solution of a system of linear equation: Gauss elimination, Gauss Jacobi, Matrix Inversion, Gauss Seidel
6. Assignments on Algebraic Equation: Bisection, Secant, Regula-falsi, Newton Raphson
7. Assignments on Ordinary Differential Equation: Taylor Series, Euler's method, RungeKutta.

**Skill Development for Professionals - IV**

**Code: BCA(GS)481**

**Contacts: 2L+1T**

**Credits: 1**

Module-1



**UNIVERSITY OF ENGINEERING & MANAGEMENT, KOLKATA**  
**DEPARTMENT OF COMPUTER APPLICATIONS**  
**DETAILED SYLLABUS**

Quantitative Numerical Aptitude -4 (advance)

- 1) Permutation & Combination.
- 2) Probability- basic concepts of probability , different theorems & applications, binomial, poisson & normal Distributions.
- 3) Geometry- Concept of different shapes like triangle, quadrilateral, rectangle, square, circle etc. different theorems & their applications.
- 4) Mensuration- Formulae on triangles, square, Rhombus, parallelogram, sphere, circle, cone, pyramid etc, Application based problem solving. Coordinate Geometry- Locus, Straight lines, Circle etc

Module-2

Verbal English

1. Miscellaneous Corrections on Tense part 1.
2. Miscellaneous Corrections on Tense part 2.
3. Fill in the blanks ( Single Blank)
4. Miscellaneous Vocabulary

Module-3

- 1.Communication DevelopMent.
- 2.Personality Development.

Module-4

Problem Based learning on C & C++ Programming language.

Books:

Quant

1. Fastrack objective Arithmetic: Arihant
2. Quantitative aptitude for Competitive exam (4th Edition): TATA Mc Graw Hill
3. Quantitative aptitude for Competitive exam (3rd Edition): PEARSON



**UNIVERSITY OF ENGINEERING & MANAGEMENT, KOLKATA**  
**DEPARTMENT OF COMPUTER APPLICATIONS**  
**DETAILED SYLLABUS**

**Data Communication & Computer Networks**

**Code: BCA501**

**Contacts: 3L + 1 T**

**Credits: 4**

Introduction to computer network- Topology; Base Band & Broad Band Topology;

Guided & Unguided Media.

Overview of Data & Signal Bits. Baud & Bit Rate. Modulation (AM, PM, FM);

Multiplexing (TDM, FDM, STDM).

Digital To Analog – ASK, PSK, FSK, QPSK.

Transmission methods – Synchronous & Asynchronous, Flow Control, Error Control, Error Detection methods.

Goals of Layered protocols- Introduction to OSI, TCP/IP

HDLC- frame format, station, states, configuration, access control.

LAN Topology – Ethernet (IEEE 802.3), Token Bus (IEEE 802.4), Token Ring (IEEE 802.5)

Switching Technologies – Circuit, Message, and Packet.

X.25, X.21, RS-232 C – frame format, channel, packet frames, facilities (In brief Only).

ISDN- D channel, B-Channel, International Standards, NT1, NT2, TA, TE Devices.

Bridging & Routing – Static.

Congestion Control – Leaky Bucket & Token Bucket Algorithms.

Introduction to data security (private key, public key)

Books:

1. Data Communication & Networking, Forouzan, TMH
2. Computer Networks, Tannenbaum, PHI



**UNIVERSITY OF ENGINEERING & MANAGEMENT, KOLKATA**  
**DEPARTMENT OF COMPUTER APPLICATIONS**  
**DETAILED SYLLABUS**

3. Computer Communication Networks, Shanmugam & Rajeev, ISTE/EXCEL
4. Data Communication, Prakash C. Gupta, PHI
5. Data & network Communication, Miller, VIKAS
6. Data Communication & Network, Dr. Prasad, Wiley Dreamtech
7. Computer network Theory, Prasad, Scitech

**Unix and Shell Programming**

**Code: BCA502**

**Contacts: 3L + 1 T**

**Credits: 4**

The UNIX Operating System

File system, General-purpose utilities

The Bourne Shell, Simple filters

Advanced Filters – I, Advanced Filters - II

Line editing with ex, Vi editor

The Process, communication and scheduling

Programming with the Shell

Introduction to System administration.

Books:

1. UNIX-Concepts & Applications, Sumitava Das, TMH
2. Learning UNIX Operating System, Peek, SPD/O'REILLY
3. Understanding UNIX, Srirengan, PHI
4. Learning the Vi Editor, Lamb, SPD/O'REILLY
5. Essentials Systems Administration, Frisch, SPD/O'REILLY

**Windows Programming**



**UNIVERSITY OF ENGINEERING & MANAGEMENT, KOLKATA**  
**DEPARTMENT OF COMPUTER APPLICATIONS**  
**DETAILED SYLLABUS**

**Code: BCA503**

**Contacts: 3L + 1 T**

**Credits: 4**

Windows concepts and terminology, key elements, creating the look, using OO technology, communication via messages, windows resources and functions  
Writing windows applications, taking control of windows, adding menus, dialog boxes, MFC programming concepts

**Values and Ethics of Profession**

**Code: BCA505**

**Contacts: 3L**

**Credits: 3**

Science, Technology and Engineering as Knowledge and as Social and Professional Activities (2 lectures)

Effects of Technological Growth: Rapid Technological growth and depletion of resources. Reports of the Club of Rome. Limits of growth; sustainable development ( 2 lectures)

Energy Crisis; Renewable Energy Resources (2 lectures)

Environmental degradation and pollution. Eco-friendly Technologies. Environmental Regulations. Environmental Ethics (4 lectures)

Appropriate Technology Movement of Schumacher: later developments (2 lectures)

Technology and developing nations. Problems of Technology transfer. Technology assessment, impact analysis (4 lectures)

Human Operator in Engineering projects and industries. Problems of man machine interaction. Impact of assembly line and automation. Human centered Technology (4 lectures)

Ethics of Profession



**UNIVERSITY OF ENGINEERING & MANAGEMENT, KOLKATA**  
**DEPARTMENT OF COMPUTER APPLICATIONS**  
**DETAILED SYLLABUS**

Engineering profession: Ethical issues in engineering practice. Conflicts between business demands and professional ideals. Social and ethical responsibilities of Technologists. Codes of professional ethics. Whistle blowing and beyond. Case studies. (8 lectures)

Profession and Human Values

Value Crisis in contemporary society (2 lectures)

Nature of values: Value Spectrum of a 'good' life (2 lectures)

Psychological values: Integrated personality; mental health (2 lectures)

Societal values: The modern search for a 'good' society, justice, democracy, secularism, rule of law; values in Indian Constitution (4 lectures)

Aesthetic values: Perception and enjoyment of beauty, simplicity, clarity (2 lectures)

Moral and ethical values: Nature of moral judgments; canons of ethics; ethics of virtue; ethics of duty; ethics of responsibility

Books:

1. Ethics in Mgmt & Indian Ethos, Ghosh, VIKAS
2. Business Ethics, G.Pherwani, EPH.
3. Ethics, Indian Ethos & Mgmt, Balachandran, Raja & Nair, SHROFF Publishers

**Elective – I :**

**Advanced Unix and Shell Programming**

**Code: BCA504A**

**Contacts: 3L + 1 T**

**Credits: 4**



**UNIVERSITY OF ENGINEERING & MANAGEMENT, KOLKATA**  
**DEPARTMENT OF COMPUTER APPLICATIONS**  
**DETAILED SYLLABUS**

Organisation of Unix. User interface, Programmer interface. The environment of Unix process System calls. Process control, File related system calls. Process related system calls. Signals programming using system calls. Advanced I/O multiplexing. Memory mapped I/O. Interprocess communication: Pipes, shared memory, semaphores, messages. Advanced inter-process communications. Streams, Pipes, Open server.

Books:

1. Your UNIX, The Ultimate Guide, Sumitava Das, TMH
2. Design of Unix Operating System, Bach, PHI
3. UNIX Programming Environment, Kernigham & Pike, PHI
4. Learning UNIX Operating System, Peek, SPD/O'REILLY
5. Learning the Vi Editor, Lamb, SPD/O'REILLY
6. Essentials Systems Administration, Frisch, SPD/O'REILLY

**Human-Computer Interaction**

**Code: BCA504B**

**Contacts: 3L + 1 T**

**Credits: 4**

Foundations of human-computer interaction (8 hours): Human-centered development and evaluation, Human performance models, accommodating human diversity, Principles of good design and good designers, engineering tradeoffs

Human-centered software evaluation (6 hours): Evaluation without users: walkthroughs, KLM, guidelines, and standards, Evaluation with users: usability testing, interviews, survey, experiment

Human-centered software development (10 hours): Approaches, characteristics, and overview of process, Functionality and usability: task analysis, interviews, surveys, Specifying interaction and presentation, Prototyping techniques and tools

Graphical user-interface design (10 hours): Choosing interaction styles and interaction techniques, HCI aspects of common widgets, HCI aspects of screen design: layout, color, fonts, labeling, Handling human failure, Beyond simple screen design: visualization, representation, metaphor, Multi-modal interaction: graphics, sound, and haptics, 3D interaction and virtual reality





**UNIVERSITY OF ENGINEERING & MANAGEMENT, KOLKATA**  
**DEPARTMENT OF COMPUTER APPLICATIONS**  
**DETAILED SYLLABUS**

Graphical user-interface programming (10 hours): UIMS, dialogue independence and levels of analysis, Widget classes, Event management and user interaction, Geometry management, GUI builders and UI programming environments, Cross-platform design

HCI aspects of multimedia systems (8 hours): Categorization and architectures of information: hierarchies, hypermedia, Information retrieval and human performance (Web search, Usability of database query languages, Graphics, Sound), HCI design of multimedia information systems, Speech recognition and natural language processing, Information appliances and mobile computing

HCI aspects of collaboration and communication (8 hours): Groupware to support specialised tasks: document preparation, multi-player games, Asynchronous group communication: e-mail, bulletin boards, Synchronous group communication: chat rooms, conferencing, Online communities: MUDs/MOOs, Software characters and intelligent agents

**E-commerce**

**Code: BCA504C**

**Contacts: 3L + 1 T**

**Credits: 4**

Computer Systems in Electronic Business

Business Process Re-Engineering

Electronic commerce Policy and Theory

Supply Chain Management

Customer Relationship Management

International trading network & communication protocols

Electronic payment standards

E-Commerce strategy, Marketing and Business Processes



**UNIVERSITY OF ENGINEERING & MANAGEMENT, KOLKATA**  
**DEPARTMENT OF COMPUTER APPLICATIONS**  
**DETAILED SYLLABUS**

Books:

1. E-Commerce, P.T. Joseph, PHI
2. E-Commerce Mgmt.- Text & Cases, Krishnamurthy, VIKAS
3. Streaming Multimedia Bible with CD, Steve, Wiley Dreamtech
4. E-Commerce, Oka, EPH.
5. Beginning E-Commerce, Reynolds, SPD/WROX

**Essential Studies for Professionals - V**

**Code: BCA(GS)501**

**Contacts: 2L+1T**

**Credits: 2**

Module-1

GEOGRAPHY

- India's political divisions and its relation with neighboring countries
- India's Advanced physiology
- India's Advanced Drainage
- Economic geography of India
- Transportation network of India

Module 2

CONSTITUTION AND INDIAN POLITY

INTERNATIONAL RELATIONSHIP :

Relationship of India and China, political and economical,  
Relationship of India and Nepal, political and economical,  
Relationship of India and Bangladesh, political and economical,  
Relationship of India and Sri Lanka, political and economical,  
Relationship of India and Pakistan, political and economical,



**UNIVERSITY OF ENGINEERING & MANAGEMENT, KOLKATA**  
**DEPARTMENT OF COMPUTER APPLICATIONS**  
**DETAILED SYLLABUS**

Module 3

History

1. Important Personalities: DadabhaiNaraji, S.N Banerjee, W.C Banerjee, Ram Mohan Roy, Sir Syed Ahmed Khan, R.C dutta, J.L Nehru
2. Role of Gandhi in INC: Champaran, Satyagraha, Khedagraha, Ahmedabad Satyagraha, Non cooperation movement, civil disobedience movement, Quit India movement

MODULE 4

ECONOMICS

- 1.Special Economic Zone
2. New Economic Policies (L.P.G. Model)
- 3.Indian Agriculture
- 4.Industrial Reforms

**Unix & Networking**

**Code: BCA591**

**Contacts: 3P**

**Credits: 3**

Using Unix, writing shell script, experimenting with Unix administration and programming.  
Network set-up and administration

**Minor Project**

**Code: BCA582**

**Contacts: 9P**

**Credits: 6**

Students are supposed to submit a minor Research based project under the guidance of the faculty members.

**Skill Development for Professionals - V**

**Code: BCA(GS)581**



**UNIVERSITY OF ENGINEERING & MANAGEMENT, KOLKATA**  
**DEPARTMENT OF COMPUTER APPLICATIONS**  
**DETAILED SYLLABUS**

**Contacts: 2L+1T**

**Credits: 1**

Module-1 Verbal English

1. Basic concept on Active And Passive Voice.
2. Application based on voice change.
3. Essay or Paragraph writing
4. Email / Letter writing.

Module-2

10 PRACTICE SET ON APTITUDE TEST.

Module-3

10 MISCELLANEOUS SET PAPER.

Module-4

Computer Proficiency: C, C++, Basics on JAVA.

Books

Essay& Report writing- P.C.DAS/ P.K.DE SARKAR

**Elective – II :**

**Data Science & Data Analytics**

**Code: BCA601A**

**Contacts: 3L + 1 T**

**Credits: 4**

Introduction to Data Management:

Brief idea about Data Warehousing, Architecture and Data Flows, Data pre-processing before analysis, Data preparation, OLAP & OLTP, Case study.

Introduction to Data Mining:



**UNIVERSITY OF ENGINEERING & MANAGEMENT, KOLKATA**  
**DEPARTMENT OF COMPUTER APPLICATIONS**  
**DETAILED SYLLABUS**

Brief idea about Data Mining, It's goals and techniques, Architecture and KDD Process, Knowledge representation methods.

Statistics and Analytics:

Data Visualization, Summarize and describe data sets using a measures such as Central tendency and variability, Learn probability, Central Limit Theorem and much more to draw inferences, Case study based on R Programming.

Introduction to Big Data Analytics:

Understand the basic concepts of Big Data and Hadoop as processing platforms for Big Data, Managing Big Data - Learn and Use Hadoop Ecosystem tools for data ingestion, extraction and management. Introduction to Hive.

Cloud Computing:

Introduction to Cloud Computing, types, services, applications, Security & research scope.

Internet of Things:

Introduction to IOT and WSN, Basic concepts of Robotics Using Arduino & Rasberry Pi Programming.

Introduction to NLP & AI:

Introduction to artificial intelligence, Brief idea about Natural Language Processing.

Basic concepts of Machine Learning:

To implement linear regression, Data classification, Data clustering – To learn how to create segments based on similarities using K-Means and Hierarchical clustering, Case study using Python.

Applications of Machine Learning:

Time series, Decision trees, Support Vector Machine, Neural Networks, Case Study Using MATLAB.

Books:

1. "Data Mining : Concepts and Techniques" by Jiawei Han and Micheline Kamber
2. "Artificial Intelligence and Soft Computing: Behavioral and Cognitive Modeling of the Human Brain" by Amit Konar
3. "Big Data" by Anil Maheshwari
4. "Wireless Sensor Networks" by Ian F. Akyildiz & Mehmet Can Vuran
5. "Wireless Ad Hoc and Sensor Networks : Theory and Applications" by Xian Yang Li
6. "Fundamentals of Neural Networks: Architectures, Algorithms and Applications" by L. Fausett



**UNIVERSITY OF ENGINEERING & MANAGEMENT, KOLKATA**  
**DEPARTMENT OF COMPUTER APPLICATIONS**  
**DETAILED SYLLABUS**

7. "Mastering Cloud Computing : Foundations and Applications Programming" by Rajkumar Buyya
8. "Natural Language Processing with Python" by Steven Bird, Ewan Klein and Edward Loper
9. "Head First Python" by Paul Barry

**Advanced Networking and Communication**

**Code: BCA601B**

**Contacts: 3L + 1 T**

**Credits: 4**

Introduction to computer network- Topology; Base Band & Broad Band Topology; Guided & Unguided Media.

Overview of Data & Signal Bits. Baud & Bit Rate. Modulation (AM, PM, FM);

Multiplexing (TDM, FDM, STDM).

Encoding (RZ, NRZ, BIPLOAR, MANCHESTER, DIFF. MANCHESTER).

Digital To Analog – ASK, PSK, FSK, QPSK.

Transmission methods – Synchronous & Asynchronous, Flow Control, Error Control, Error Detection methods.

Goals of Layered protocols- Introduction to OSI, TCP/IP, IBM, SNA, ATM.

Bit oriented (BSC) & Character oriented Protocol (SDLC, LAPB, LAPD, LLC)

HDLC- frame format, station, states, configuration, access control.

LAN Topology – Ethernet (IEEE 802.3), Token Bus (IEEE 802.4), Token Ring (IEEE 802.5)

Introduction to WAN – DQDB (IEEE 802.6) & FDDI.

Switching Technologies – Circuit, Message, and Packet.



**UNIVERSITY OF ENGINEERING & MANAGEMENT, KOLKATA**  
**DEPARTMENT OF COMPUTER APPLICATIONS**  
**DETAILED SYLLABUS**

X.25, X.21, RS-232 C – frame format, channel, packet frames, facilities (In brief Only).

ISDN- D channel, B-Channel, International Standards, NT1, NT2, TA, TE Devices.

Introduction to leased lines, DSL, Digital Carriers.

Bridging & Routing – Static & Dynamic (In Brief).

IP, IP addressing, ICMP, ARP.RARP.

Congestion Control, TCP, UDP.

HTTP,FTP,Telnet,SMTP.

Introduction to data security (private key, public key, ISO standards).

Introduction to Mobile technology (Topology, FDM, TDM, CDMA), Satellite Communication (LEO, GEO, TDM).

Books:

1. Data Communication & Networking, Forouzan, TMH
2. Computer networks, Tannenbaum, PHI
3. Computer Communication Networks, Shanmugam & Rajeev, ISTE/EXCEL
4. Data & Computer Communication, Stallings, PHI
5. Data & Network Communication, Miller, VIKAS
6. Data Communication & Network, Dr. Prasad, Wiley Dreamtech
7. Computer Network Theory, Prasad, Scitech

**Intelligent Systems**

**Code: BCA601C**

**Contacts: 3L + 1 T**

**Credits: 4**

Scope of Artificial Intelligence, games, theorem proving, natural language processing, vision and speech processing, robotics, expert systems, AI techniques in search and knowledge abstraction



**UNIVERSITY OF ENGINEERING & MANAGEMENT, KOLKATA**  
**DEPARTMENT OF COMPUTER APPLICATIONS**  
**DETAILED SYLLABUS**

Problem solving; state space search, search space control, heuristic search, hill climbing, branch and bound

Knowledge representation; predicate logic, rule-based system, structured knowledge representation, semantic net

Handling uncertainty, Fuzzy sets, probabilistic reasoning

Learning, learning automation, learning by induction, Neural Networks, Genetic Algorithms

Emerging technologies and devices

Books:

1. Artificial Intelligence, Rich & Knight, TMH
2. Introduction to AI & Expert Systems, Patterson, PHI
3. Neural Networks, Fuzzy Logic & Genetic Algorithms, Rajsekharan, PHI
4. Expert Systems, Giaranto, VIKAS

**Image Processing**

**Code: BCA601D**

**Contacts: 3L + 1 T**

**Credits: 4**

Image digital representation. Elements of visual perception. Sampling and quantisation. Image processing system elements. Fourier transforms.

Extension to 2-D, DCT, Walsh, Hadamard transforms. Enhancement and segmentation. Point and region dependent techniques. Image encoding: Fidelity criteria. Transform compression. KL, Fourier, DCT, Spatial compression, Run length coding. Huffman and contour coding.

Restoration: Models: Constrained & Unconstrained, Inverse filtering, Least squares filtering, Recursive filtering.

Books:

1. Digital Image Processing & Analysis, Chanda, PHI





**UNIVERSITY OF ENGINEERING & MANAGEMENT, KOLKATA**  
**DEPARTMENT OF COMPUTER APPLICATIONS**  
**DETAILED SYLLABUS**

2. Fundamentals of Digital Image Processing, Jain, PHI
3. Image Processing , Analysis & Machine Vision , Sonka, VIKAS

**Elective – III :**

**Software Engineering**

**Code: BCA602A**

**Contacts: 3L + 1 T**

**Credits: 4**

Introduction of Software Engineering  
Software life cycles - different models

Structured system design

User Interface Design

Data Oriented Analysis and Design

Object Oriented Analysis & Design

Software quality assurance, Software testing techniques and strategies, test planning, reporting and bug fixing

Test automation, regression testing

Software maintenance

Computer Aided Software Engineering (CASE) tool

Software Complexity & Reliability

Software Project Management

Books:

1. Software Engineering , Rogers G. Pressman, TMH
2. Software Engineering, Ghezzi, 2nd Ed, PHI



**UNIVERSITY OF ENGINEERING & MANAGEMENT, KOLKATA**  
**DEPARTMENT OF COMPUTER APPLICATIONS**  
**DETAILED SYLLABUS**

3. Software Engineering, K.K. Aggarwal & Yogesh Singh, New Age International
4. Software Engineering, Leon, VIKAS
5. Software Engineering: Principles & Practice, Vanvliet, SPD/JOHN WILEY
6. Software Testing Fundamentals: Methods & Metrics, Marnie Hutchison, Wiley  
Dreamtech

**Object Oriented Programming with Java**

**Code: BCA602B**

**Contacts: 3L + 1 T**

**Credits: 4**

Oops Concept and Introduction to JAVA

An overview of Java

Data Types - variables and arrays

Operators, Control statements

Classes and objects, Inheritance, String and string buffer, Packages, Interfaces, Exception handling, Multithreaded Programming, Applets,

Event handling

Abstract Window Toolkit

Books:

1. JAVA 2- The Complete Reference, TMH
2. Beginning JAVA 2 SDK 1.4, Horton, SPD/WROX
3. Programming in JAVA, EXCEL
4. Object Oriented Programming With C++ & JAVA, Samanta, PHI
5. Object Oriented Application Development Using JAVA, Doke, VIKAS
6. Programming with Java 2, Xavier, Scitech

**Advanced Database Management**

**Code: BCA602C**



**UNIVERSITY OF ENGINEERING & MANAGEMENT, KOLKATA**  
**DEPARTMENT OF COMPUTER APPLICATIONS**  
**DETAILED SYLLABUS**

**Contacts: 3L + 1 T**

**Credits: 4**

Database Design: Multivalued dependencies, theory of normalisation-4NF, 5NF, 6NF DKNF  
ANSI SQL2: DDL, DML, constraints and assertions, views, database security.

Transaction processing, concurrency control, Recovery management. Transaction model properties, lock base protocols, Two-phase locking, Live – Lock, Time- Stamp Protocol.

Brief introduction to distributed database, temporal database and object-oriented database.

Embedded SQL & Applications.

Books:

1. Data Base System Concepts, Korth , MH
2. Data Base Management System, RamaKrishnan, MH
3. Data Base Management System, A.K. Pujari, ISTE/EXCEL
4. Data Base Management System, Leon, VIKAS
5. Data Base Management System, V.K. Jain, Wiley Dreamtech

**Essential Studies for Professionals - VI**

**Code: BCA(GS)601**

**Contacts: 2L+1T**

**Credits: 2**

Module-1

INDIAN POLITY AND GOVERNANCE

INTERNATIONAL ORGANISATION AND INDIA.

UNO, international court, security council, general assembly, secretariats, social and economic council of UNO.

International summits and political economical relationship

Diplomacy powers of Indian leaders

Developed, underdeveloped and developing countries and policies of world bank and IMF

Module-2



**UNIVERSITY OF ENGINEERING & MANAGEMENT, KOLKATA**  
**DEPARTMENT OF COMPUTER APPLICATIONS**  
**DETAILED SYLLABUS**

HISTORY

1. Governor generals and viceroys of India: Lord William Bentick, Lord Cornwallis, Lord Dalhousie, Lord Warrern Hastings, Lord Canning, Lord Mayo, Lord Lytton, , Lord Ripon
2. Important books and authors:
3. Important newspapers and its editors
4. Various acts during British era: 1773 regulating act, 1784 Pitt's India act, Charter act (1793,1813,1833,1853), Indian council act, Government of India act 1858, Government of India act 1935
5. Educational Commission: Sir CharleswoodDespatch, Hunter Commission, Raleigh Commission, Saddler Commission

Module-3

**GEOGRAPHY**

- World Geography: Grasslands of the world, Natural regions of the world
- Important facts about the developed nations: USA, Canada, Russia, Japan, Western Europe
- Important facts about the developing nations: S.E countries, S.W nations

Module 4

**ECONOMICS**

Insurance Sector In India

Co Operatives Society Of India

Poverty And Unemployment

Census Of India

Books:

History:

1. India's Ancient Past (Ancient History) : R.S. Sharma
2. History of medieval India (Medieval History): Satish Chandra
3. History of Modern India (Modern History): Bipin Chandra
4. India's struggle for Independence (Modern History): Bipin Chandra

Geography:

1. Savindra Singh, R.D Dixit



**UNIVERSITY OF ENGINEERING & MANAGEMENT, KOLKATA**  
**DEPARTMENT OF COMPUTER APPLICATIONS**  
**DETAILED SYLLABUS**

Economics:

1. Indian Economy- TATA Mc Graw Hill/Ramesh Singh
2. Indian Economy – Arihant

Constitution:

1. Indian Constitution- D.D. Basu
2. Our Constitution- Subhash.C. Kashyap

**Major Project**

**Code: BCA681**

**Contacts: 21P**

**Credits: 16**

Students are supposed to submit a Research based project under the guidance of the faculty members.

**Seminar**

**Code : BCA682**

**Credits: 2**

Students are supposed to give a Seminar on any recent technological trends

**Comprehensive Viva-Voce**

**Code : BCA683**

**Credits: 4**

Students need to appear for a Comprehensive Viva-Voce covering their full BCA Syllabus

**Skill Development for Professionals - VI**

**Code: BCA(GS)681**

**Contacts: 2L+1T**

**Credits: 1**



**UNIVERSITY OF ENGINEERING & MANAGEMENT, KOLKATA**  
**DEPARTMENT OF COMPUTER APPLICATIONS**  
**DETAILED SYLLABUS**

Module-1

Verbal English

1. Blank Fillers ( Double Blanks)
2. Rearrangement of Sentences.
3. Basic concept on Direct & Indirect Speech.
4. Application based on Direct & Indirect Speech.
5. Precis Writing.

Module-2

MISCELLANEOUS SET BASED ON ALL COMPETATIVE EXAM .

Module-3

Computer Proficiency Miscellaneous set based problems solving.

Books:

ARIHANT FAST TRACK ARITHMETIC.

ARIHANT GENERAL ENGLISH .