

**Regular Course (Scheme and Syllabus)**  
**BACHELOR OF COMPUTER APPLICATIONS (BCA)**  
**Faculty of Information Technology and Computer Science**  
**Deenbandhu Chhotu Ram University of Science & Technology, Murthal (Sonapat), Haryana, India**  
**From Session: 2011-12**

**Scheme & Syllabus**  
**of**

**BACHELOR OF COMPUTER APPLICATIONS (BCA)**  
**(3-years Graduate Programme)**

**Faculty of Information Technology and Computer Science**  
**Deenbandhu Chhotu Ram University of Science &**  
**Technology, Murthal (Sonapat)-131039, India**

**Regular Course (Scheme and Syllabus)**  
**BACHELOR OF COMPUTER APPLICATIONS (BCA)**  
**Faculty of Information Technology and Computer Science**  
**Deenbandhu Chhotu Ram University of Science & Technology, Murthal (Sonapat), Haryana, India**  
**From Session: 2011-12**

**BCA – 1<sup>st</sup> Semester**

Sr. No.	Paper Code	Title of Paper	L	T	P	Sessional	Theory	Practical	Total	Credit
1.	BCA -101	Mathematical Foundation	3	1	-	50	100	-	150	4
2.	BCA -103	Digital Electronics	3	1	-	50	100	-	150	4
3.	BCA -105	Computer Fundamentals & Application Tools	3	1	-	50	100	-	150	4
4.	BCA -107	Communication Skills - I	3	1	-	50	100	-	150	4
5.	BCA -125	Software Lab. – I (Based on BCA-105)	-	-	3	50	-	50	100	3
6.	BCA -129	Seminar	-	-	-	100	-	-	100	1
		<b>Total</b>	<b>12</b>	<b>4</b>	<b>3</b>	<b>350</b>	<b>400</b>	<b>50</b>	<b>800</b>	<b>20</b>

**BCA – 2<sup>nd</sup> Semester**

Sr. No.	Paper Code	Title of Paper	L	T	P	Sessional	Theory	Practical	Total	Credit
1.	BCA -102	Introduction to Information Technology	3	1	-	50	100	-	150	4
2.	BCA -104	Discrete Mathematics	3	1	-	50	100	-	150	4
3.	BCA -106	Programming In C	3	1	-	50	100	-	150	4
4.	BCA -108	Computer Organization and Architecture	3	1	-	50	100	-	150	4
5.	BCA -126	Software Lab. – II (Based on BCA-106)	-	-	3	50	-	50	100	3
6.	BCA -130	Seminar	-	-	-	100	-	-	100	1
		<b>Total</b>	<b>12</b>	<b>4</b>	<b>3</b>	<b>350</b>	<b>400</b>	<b>50</b>	<b>800</b>	<b>20</b>

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**BCA– 3<sup>rd</sup> Semester**

Sr. No.	Paper Code	Title of Paper	L	T	P	Sessional	Theory	Practical	Total	Credit
1.	BCA - 201	Numerical and Statistical Methods	3	1	-	50	100	-	150	4
2.	BCA - 203	Data Structure using C	3	1	-	50	100	-	150	4
3.	BCA - 205	Operating System	3	1	-	50	100	-	150	4
4.	BCA - 207	Communication Skills - II	3	1	-	50	100	-	150	4
5.	BCA - 223	Software Lab. – III (Based on BCA - 203)	-	-	3	50	-	50	100	3
6.	BCA - 229	Seminar	-	-	-	100	-	-	100	1
		<b>Total</b>	<b>12</b>	<b>4</b>	<b>3</b>	<b>350</b>	<b>400</b>	<b>50</b>	<b>800</b>	<b>20</b>

**BCA– 4<sup>th</sup> Semester**

Sr. No.	Paper Code	Title of Paper	L	T	P	Sessional	Theory	Practical	Total	Credit
1.	BCA - 202	System Programming	3	1	-	50	100	-	150	4
2.	BCA - 204	Object Oriented Programming	3	1	-	50	100	-	150	4
3.	BCA - 206	System Analysis & Design	3	1	-	50	100	-	150	4
4.	BCA - 208	Computer Oriented Optimization Techniques	3	1	-	50	100	-	150	4
5.	BCA - 224	Software Lab. – IV (Based on BCA – 204)	-	-	3	50	-	50	100	3
6.	BCA - 230	Seminar	-	-	-	100	-	-	100	1
		<b>Total</b>	<b>12</b>	<b>4</b>	<b>3</b>	<b>350</b>	<b>400</b>	<b>50</b>	<b>800</b>	<b>20</b>

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**BCA– 5<sup>th</sup> Semester**

Sr. No.	Paper Code	Title of Paper	L	T	P	Sessional	Theory	Practical	Total	Credit
1.	BCA-301	Principles of Internet & Web Designing	3	1	-	50	100	-	150	4
2.	BCA-303	Data Base Management systems	3	1	-	50	100	-	150	4
3.	BCA-305	Software Engineering	3	1	-	50	100	-	150	4
4.	BCA-307	E-Commerce	3	1	-	50	100	-	150	4
5.	BCA-309	Accounting & Financial Management	3	1	-	50	100	-	150	4
6.	BCA-321	Software Lab. – V (Based on BCA-301)	-	-	3	50	-	50	100	3
7.	BCA-323	Software Lab. – VI (Based on BCA-303)	-	-	3	50	-	50	100	3
8.	BCA-329	Seminar	-	-	-	100	-	-	100	1
9.		<b>Total</b>	<b>15</b>	<b>5</b>	<b>6</b>	<b>450</b>	<b>500</b>	<b>100</b>	<b>1050</b>	<b>27</b>

**BCA– 6<sup>th</sup> Semester**

Sr. No.	Paper Code	Title of Paper	L	T	P	Sessional	Theory	Practical	Total	Credit
1.	BCA-302	Visual Programming	3	1	-	50	100	-	150	4
2.	BCA-304	Java Programming	3	1	-	50	100	-	150	4
3.	BCA-306	Data Communication	3	1	-	50	100	-	150	4
4.	BCA-308	Software Project Management	3	1	-	50	100	-	150	4
5.	BCA-310	Personality Development	3	1	-	50	100	-	150	4
6.	BCA-322	Software Lab. - VII (Based on BCA-302)	-	-	3	50	-	50	100	3
7.	BCA-324	Software Lab. – VIII (Based on BCA-304)	-	-	3	50	-	50	100	3
8.	BCA-332	Project	-	-	9	50	-	100	150	9
9.	BCA-330	Seminar	-	-	-	100	-	-	100	1
		<b>Total</b>	<b>15</b>	<b>5</b>	<b>15</b>	<b>500</b>	<b>500</b>	<b>200</b>	<b>1200</b>	<b>36</b>

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**BCA - 101 MATHEMATICAL FOUNDATION**

**Note:** Total **8 Questions** are to be set by the examiner covering the entire syllabus uniformly. **Question No. 1(COMPULSORY)** having **Objective Type Questions** of **2 marks** from entire syllabus. Rest of the **Seven** questions are from **Section A, B & C** of **Syllabus**. A candidate is required to attempt any **Four questions** out of Sections A, B & C by selecting **ATLEAST ONE** Question from Each Section. All questions shall carry equal marks.

**Total Marks : 150**  
**Theory Paper : 100**  
**Internal Assessment : 50**

**Minimum Pass Marks : 40%**  
**Maximum Time : 3 Hrs.**

**SECTION A**

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

**MATRICES:** Definition, Types of Matrices, Addition, Subtraction, Scalar Multiplication and Multiplication of Matrices, Adjoint, Inverse, Rank of Matrix Dependence of Vectors, Eigen Vectors of a Matrix, Cayley-Hamilton Theorem (without proof). Solving simultaneous equations using gauss elimination method, gauss jaordan method and matrix inversion method.

**STATISTICS:** Measures of Central Tendency, Preparing frequency distribution table, arithmetic mean, geometric mean, harmonic mean, median and mode. Measure of dispersion: Range, mean, deviation, standard deviation, co-efficient of variation.

**SECTION B**

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

**DIFFERENTIATION:** Derivative, Derivatives of Sum, Differences, Product & Quotients, Chain Rule, Derivatives of Composite Functions, Logarithmic Differentiation, Rolle's Theorem, Mean Value Theorem, Expansion of Functions (Maclaurin's & Taylor's), Indeterminate Forms, L' Hospital's Rule, Maxima & Minima, Concavity, Asymptote, Singular Points, Curve Tracing, Successive Differentiation & Liebnitz Theorem.

**SECTION C**

**INTEGRATION:** Integral as Limit of Sum, Riemann Sum, Fundamental Theorem of Calculus, Indefinite Integrals, Methods of Integration Substitution, By Parts, Partial Fractions, Integration of Algebraic and Transcendental Functions, Elementary concepts of Gamma and Beta Functions.

**VECTOR ALGEBRA:** Definition of a vector in 2 and 3 Dimensions; Double and Triple Scalar and Vector Product and their Applications.

**References**

- Gupta S.P. and Kapoor, V.K., Fundamentals of Mathematical statistics, Sultan Chand and Sons, 1995.
- Gupta S.P. and Kapoor, V.K., Fundamentals of Applied statistics, Sultan Chand & Sons, 1996.
- B.S. Grewal, "Elementary Engineering Mathematics", 34th Ed., 1998..

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- H.K. Dass, “Advanced Engineering Mathematics”, S. Chand & Company, 9th Revised Edition, 2001.
- Shanti Narayan, “Integral Calculus”, S. Chand & Company, 1999
- Shanti Narayan, “Differential Caluculs”, S.Chand & Company, 1998.

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**BCA-103 DIGITAL ELECTRONICS**

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**Total Marks : 150**  
**Theory Paper : 100**  
**Internal Assessment : 50**

**Minimum Pass Marks : 40%**  
**Maximum Time : 3 Hrs.**

**SECTION A**

**Number System:** Binary, octal, Hexadecimal Number, their addition and subtraction, Base conversions, Number code: 8421, Other BCD codes, Grey, ASCII, EBCDIC.  
**Boolean Algebra:** Laws and theorems of Boolean algebra. De Morgan's theorem, XOR and XNOR gates, Half and Full Adder and Subtractor circuits.

**SECTION B**

**Fundamentals:** Products, Sum of products and Product of sums, Form of Boolean expressions, Truth Tables and Karnaugh maps, pair reads octets and Karnaugh simplification. Multiplexers BCD to Decimal to BCD decoders and, decoders' characteristics of digital integrated digital.

**SECTION C**

**Flip Flop:** RS Flip Flop, Clocked, RS Flip Flop, Edge trigger D Flip Flop. Flip Flop Switching time, JK Flip Flop. JK Master Slave Flip Flop. Clock wave forms, Shift registers: Serial in and serial out, Parallel in and parallel out. Counters: Asynchronous counters Synchronous counters, ring counter.

**Memories for Digital:** System: Semiconductor Memories, Memory organization and expansion, classification of memories on the basis of principles of operation, physical characteristics and fabrication technology, ROM and basic memory cells.

**References:**

- Moris Mano, "Digital Logic and Computer Design", PHI Publications, 2002
- R. P. Jain, "Modern Digital Electronics", TMH, 3rd Edition, 2003.
- R.L. Tokheim, "Digital Electronics, Principles and Applications", Tata McGraw Hill, 1999.
- W. Gothman, "Digital electronics", PHI.
- S. Salivahanan & S. Ariviyhan. "Digital circuits and design", Vikas Publication, 2001
- Malvino Leach, "Digital Principles and Application", TMH, 1999.
- Floyd, Thomas : Digital Fundamentals.
- V. Rajaraman : Computer Fundamentals (PHI)

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**BCA-105 COMPUTER FUNDAMENTALS & APPLICATION TOOLS**

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**Total Marks : 150**  
**Theory Paper : 100**  
**Internal Assessment : 50**

**Minimum Pass Marks : 40%**  
**Maximum Time : 3 Hrs.**

**SECTION A**

**MS Windows:** Introduction to M.S. Windows; Features of Windows; Various versions of Windows & its use; Working with Windows; My Computer & Recycle bin ; Desktop, Icons and Windows Explorer; Screen description & working styles of Windows; Dialog Boxes & Toolbars; Working with Files & Folders; simple operations like copy, delete ,moving of files and folders from one drive to another, Shortcuts & Autostarts; Accessories and Windows Settings using Control Panel- setting common devices using control panel, modem, printers, audio, network, fonts, creating users, internet settings, Start button & Program lists; Installing and Uninstalling new Hardware & Software program on your computer.

Introduction to Internet and E-mail; searching information through a search engines (google, altavista, sulekha, khoj etc)

**SECTION B**

**MS Word Basics:** Introduction to MS Office; Introduction to MSWord; Features & area of use. Working with MS Word.; Menus & Commands; Toolbars & Buttons; Shortcut Menus, Wizards & Templates; Creating a New Document; Different Page Views and layouts; Applying various Text Enhancements; Working with – Styles, Text Attributes; Paragraph and Page Formatting; Text Editing using various features ; Bullets, Numbering, Auto formatting, Printing & various print options

**Advanced Features of MS-Word:** Spell Check, Thesaurus, Find & Replace; Headers & Footers ; Inserting – Page Numbers, Pictures, Files, Autotexts, Symbols etc.; Working with Columns, Tabs & Indents; Creation & Working with Tables including conversion to and from text; Margins & Space management in Document; Adding References and Graphics; Mail Merge, Envelops & Mailing Labels. Importing and exporting to and from various formats.

**SECTION C**

**MS Excel:** Introduction and area of use; Working with MS Excel.; concepts of Workbook & Worksheets; Using Wizards; Various Data Types; Using different features with Data, Cell and Texts; Inserting, Removing & Resizing of Columns & Rows; Working with Data & Ranges; Different Views of Worksheets; Column Freezing, Labels, Hiding, Splitting etc.; Using different features with Data and Text; Use of Formulas, Calculations & Functions; Cell Formatting including Borders & Shading; Working with Different Chart Types; Printing of Workbook & Worksheets with various options.

**MS PowerPoint:** Introduction & area of use; Working with MS PowerPoint; Creating a New Presentation; Working with Presentation; Using Wizards; Slides & its different views; Inserting,

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Deleting and Copying of Slides; Working with Notes, Handouts, Columns & Lists; Adding Graphics, Sounds and Movies to a Slide; Working with PowerPoint Objects; Designing & Presentation of a Slide Show; Printing Presentations, Notes, Handouts with print options.

### **References:**

- Windows XP Complete Reference. BPB Publications
- Joe Habraken, Microsoft Office 2000, 8 in 1 by, Prentice Hall of India
- I.T. Tools and Applications by A. Mansoor, Pragya Publications, Matura

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**BCA-107 COMMUNICATION SKILLS-I**

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**Total Marks : 150**  
**Theory Paper : 100**  
**Internal Assessment : 50**

**Minimum Pass Marks : 40%**  
**Maximum Time : 3 Hrs.**

**SECTION A**

**Communicative Grammar:**

**Part A :** Spotting the errors pertaining to nouns, pronouns, adjective and adverbs; Concord - grammatical concord, notional concord and the principle of proximity between subject and verb.

**Part B :** Changing the voice : from Active to Passive and Passive to Active.

**Lexis:** Idioms and phrases; Words often confused; One-Word Substitutes; Formation of words (suffixes, prefixes and derivatives);

**SECTION B**

**Oral Communication:**

**Part-A:** Introduction to principal components of spoken English – Transcription, Wordaccent, Intonation, Weak forms in English.

**Part-B:** Developing listening and speaking skills through various activities, such as (a) role play activities, (b) Practising short dialogues (c) Group discussion (d) Debates (e) Speeches (f) Listening to news bulletins (g) Viewing and reviewing T.V. programmes etc.

**Written Communication:** Developing reading and writing skills through such tasks/activities as developing outlines, key expressions, situations, slogan writing and theme building exercises, dialogue writing, interpreting pictures/cartoons.

**SECTION C**

**Book Review** – Herein the students will be required to read and submit a review of a book (Literary or non-literary) of their own choice. This will be followed by a presentation of the same in the class.

**Technical Writing:**

- (a) Business Letters, Format of Business letters and Business letter writing
- (b) E-mail writing
- (c) Reports, Types of Reports and Format of Formal Reports
- (d) Press Report Writing

**References:**

- Language in Use (Upper intermediate Level, Adrian Doff Christopher Jones, Cambridge University Press

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- Common Errors in English, Abul Hashem, Ramesh Publishing House, new Delhi.
- Objective English, Tata Mc. Graw Hill Publishing Company Ltd., New Delhi.
- Spoken English for India, R.K. Bansal & J.B. Harrison, Orient Longman, Delhi.
- The sounds of English, Veena Kumar, Makaav Educational Software, New Delhi.
- English Phonetics & Phonology, P. Roach, Cambridge University Press, London.
- English for Engineers and Technologists: A Skill Approach, Vol. 2, Orient Longman, Delhi.
- Business Communication, M.S. Ramesh and C.C. Pattanshetti, R.Chand and Company, Delhi
- Group Discussion, Sudha Publications/Ramesh Publishing House, New Delhi.
- English Grammar & Composition. By Rajinder Pal & Prem Lata Suri, Sultan Chand Pub. New Delhi.

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**BCA – 2<sup>nd</sup> Semester**

<b>Sr. No.</b>	<b>Paper Code</b>	<b>Title of Paper</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>Sessional</b>	<b>Theory</b>	<b>Practical</b>	<b>Total</b>	<b>Credit</b>
1.	BCA -102	Introduction to Information Technology	3	1	-	50	100	-	150	4
2.	BCA -104	Discrete Mathematics	3	1	-	50	100	-	150	4
3.	BCA -106	Programming In C	3	1	-	50	100	-	150	4
4.	BCA -108	Computer Organization and Architecture	3	1	-	50	100	-	150	4
5.	BCA -126	Software Lab. – II (Based on BCA-106)	-	-	3	50	-	50	100	3
6.	BCA -130	Seminar	-	-	-	100	-	-	100	1
		<b>Total</b>	<b>12</b>	<b>4</b>	<b>3</b>	<b>350</b>	<b>400</b>	<b>50</b>	<b>800</b>	<b>20</b>

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**BCA-102 INTRODUCTION TO INFORMATION TECHNOLOGY**

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**Total Marks : 150**  
**Theory Paper : 100**  
**Internal Assessment : 50**

**Minimum Pass Marks : 40%**  
**Maximum Time : 3 Hrs.**

**SECTION A**

What are computers? The evolution of computers, Classification of computers, The control unit, computer organization & Block diagram representation, storage devices, microprocessors, instruction set, CISC & RISC processor, Input-Output devices, interconnection architectures.

Low level and high level languages, assemblers, compilers, interpreters, linkers, algorithms, flow charting, decision tables, pseudo code, software, application software packages

**SECTION B**

Operating system concepts, Different types of operating systems, structure of operating system, DOS/UNIX/LINUX commands, Data Processing, File systems and Database Management Systems, different types of Database Management System.

**SECTION C**

Basic elements of a Communication System, Data transmission modes, Data Transmission speed, Data transmission media, Digital and Analog Transmission, Network topologies, Network Types (LAN, WAN and MAN), Communication protocols, Inter networking tools, Distributed Computing Systems

**REFERENCES:**

- Alex Leon & Mathews Leon, "Fundamentals of Information Technology", Leon Techworld, 1999.
- P. K. Sinha & Priti Sinha, "Computer Fundamentals", BPB Publications, 1992.
- V. Raja Raman, "Introduction to Computers", PHI, 1998.
- Alex Leon & Mathews Leon, "Introduction to Computers", Vikas Publishing House, 1999.
- Norton Peter, "Introduction to computers", 4th Ed., TMH, 2001.
- Simon Haykins, "Communication System", John Wiley & Sons, 1999.

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**BCA-104 DISCRETE MATHEMATICS**

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**Total Marks : 150**  
**Theory Paper : 100**  
**Internal Assessment : 50**

**Minimum Pass Marks : 40%**  
**Maximum Time : 3 Hrs.**

**SECTION – A**

**Graphs:** Introduction to graphs, Graph terminology, Representing Graphs and Graph Isomorphism, Connectivity. Directed and undirected graphs and their matrix representations, reachability, Chains, Circuits, Eulers paths and cycles, Hamiltonian paths and cycles, Minima's Path Application (Flow charts and state transition Graphs, Algorithm for determining cycle and minimal paths), Trees, Binary trees, Binary search trees and traversals, Graph coloring.

**SECTION – B**

**Groups & Subgroups:** Group axioms, permutation groups, subgroups, cosets, normal subgroups, semi - groups, free semi – groups, applications.

**Finite Fields:** Definition, representation, structure, minimal polynomials, polynomial roots, Splitting Field, Integral Domain, Irreducible polynomial.

**Formal Languages:** Representation of special languages and grammars, finite state machines.

**SECTION – C**

**Lattices & Boolean Algebra:** Relation to partial ordering, lattices, Hasse Diagram, Axiomatic definition of Boolean algebra as algebraic structures with two operations basic results truth values and truth tables, the algebra of propositional functions, Boolean algebra of truth values, Applications (Switching Circuit, Gate Circuit).

**References:**

- Kenneth G. Rosen: “Discrete Mathematics and Its Applications”, McGRAW-Hill International Edition, Mathematics Series.
- Babu Ram: “Discrete Mathematics and Its Applications”, Vinayaka Publications.
- C.L. Liu, “Discrete Mathematics and Its Applications”, McGRAW-Hill International Edition, Mathematics Series.
- Trembley, “Discrete Mathematics and Its Applications”, Tata McGRAW-Hill.
- Alan Doerr, Kenneth Levaseur, “Applied Discrete Structures for Computer Sciences”, Galgotia Publications Pvt. Ltd.

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- Scymour Lipschutz, Marc Lars Lipson, “Discrete Mathematics”, McGRAW-HILL International Editions, Schaum’s Series.
- Bernard Kolman, Robert C. Busby, “Discrete Mathematical Structures for Computer Science”, Prentice Hall of India.

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**BCA-106 PROGRAMMING IN C**

**Note:** Total **8 Questions** are to be set by the examiner covering the entire syllabus uniformly. **Question No. 1 (COMPULSORY)** having **Objective Type Questions** of **2 marks** from entire syllabus. Rest of the **Seven** questions are from **Section A, B & C** of **Syllabus**. A candidate is required to attempt any **Four questions** out of Sections A, B & C by selecting **ATLEAST ONE** Question from Each Section. All questions shall carry equal marks.

**Total Marks : 150**  
**Theory Paper : 100**  
**Internal Assessment : 50**

**Minimum Pass Marks : 40%**  
**Maximum Time : 3 Hrs.**

**SECTION – A**

**Elements of C:** C character set, identifiers and keywords, Data types: declaration and definition, storage classes in C, Type conversion, Types of error, 'C' macro, macro vs function.

**Operators:** Arithmetic, relational, logical, bitwise, unary, assignment and conditional operators and their hierarchy & associativity.  
Data input/output.

**SECTION – B**

**Control statements:** Sequencing, Selection: if and switch statement; alternation, Repetition: for, while, and do-while loop; break, continue, goto.

**Functions:** Definition, prototypes, passing parameters, recursion.

**Data Structures:** arrays, struct, union, string, data files.

**Pointers:** Declaration, operations on pointers, array of pointers, pointers to arrays.

**SECTION – C**

**String handling,** Streams, File Operations, Formatted I/O, Character I/O, Line I/O, Block I/O, File positioning, String I/O.

**Low - level Programming :** Bitwise operators, Bit- fields in Structures, Other low- level techniques : Defining machine- dependent types, Using unions to provide multiple views of data, using pointers as addresses, the volatile type qualifier.

**Writing Large programs:** Source files, Header files, Dividing a program into files, Building a multiple-file program.

**References:**

- Deitel & Deitel: C How to Program (Prentice Hall ), 1996.
- Yashwant Kanetker, Let us C, BPB Publications.

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- R. B. Patel, Fundamental of Computers and Programming in C, Khanna Book Publishing Company PVT. LTD. Delhi, India, 1<sup>st</sup> edition, 2008, ISBN: 13: 978-81-906988-7-0, pp. 1-962.
- Gottfried, Programming with C, Tata McGraw Hill.
- Brian W. Kernighan, Dennis M. Ritchie, The C Programming Language, 2<sup>nd</sup> Ed., Prentice Hall of India.

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From Session: 2011-12

**BCA-108 COMPUTER ORGANIZATION AND ARCHITECTURE**

**Note:** Total **8 Questions** are to be set by the examiner covering the entire syllabus uniformly. **Question No. 1 (COMPULSORY)** having **Objective Type Questions** of **2 marks** from entire syllabus. Rest of the **Seven** questions are from **Section A, B & C** of **Syllabus**. A candidate is required to attempt any **Four questions** out of Sections A, B & C by selecting **ATLEAST ONE** Question from Each Section. All questions shall carry equal marks.

**Total Marks : 150**  
**Theory Paper : 100**  
**Internal Assessment : 50**

**Minimum Pass Marks : 40%**  
**Maximum Time : 3 Hrs.**

**SECTION-A**

Basis Computer Architecture, Functional Organisation, Register Organisation, Arithmetic and Logic Unit, Central Processing unit, Instruction Formats, Addressing Modes. Data Transfer and Manipulation, interrupts RISC/CISC architecture.

**SECTION-B**

Register transfer and macro-operations, Register Transfer Languages (RTL). Arithmetic, Logic and Shift Macro-operations, Sequencing, Micro-program sequences.

**SECTION –C**

**Memory & Storage:** Processor Vs. Memory speed: Cache memory. Associative memory, Virtual memory and Memory management

**Input/Output organization:** Peripheral devices, I/O Asynchronous Data Transfer: Strobe Control, Data Transfer Schemes (Programmed, Initiated, DW, Transfer), I/O Processor.

**References:**

- Moris Mano, “Computer System Architecture”, PHI Publications, 2002.
- R. P. Jain, “Modern Digital Electronics”, TMH, 3rd Edition, 2003.
- V. Rajaraman : Computer Fundamentals (PHI).

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**From Session: 2011-12**

**BCA– 3<sup>rd</sup> Semester**

<b>Sr. No.</b>	<b>Paper Code</b>	<b>Title of Paper</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>Sessional</b>	<b>Theory</b>	<b>Practical</b>	<b>Total</b>	<b>Credit</b>
1.	BCA - 201	Numerical and Statistical Methods	3	1	-	50	100	-	150	4
2.	BCA - 203	Data Structure using C	3	1	-	50	100	-	150	4
3.	BCA - 205	Operating System	3	1	-	50	100	-	150	4
4.	BCA - 207	Communication Skills - II	3	1	-	50	100	-	150	4
5.	BCA - 223	Software Lab. – III (Based on BCA - 203)	-	-	3	50	-	50	100	3
6.	BCA - 229	Seminar	-	-	-	100	-	-	100	1
		<b>Total</b>	<b>12</b>	<b>4</b>	<b>3</b>	<b>350</b>	<b>400</b>	<b>50</b>	<b>800</b>	<b>20</b>

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**BCA – 201 NUMERICAL AND STATISTICAL METHODS**

**Note:** Total **8 Questions** are to be set by the examiner covering the entire syllabus uniformly. **Question No. 1 (COMPULSORY)** having **Objective Type Questions** of **2 marks** from entire syllabus. Rest of the **Seven** questions are from **Section A, B & C** of **Syllabus**. A candidate is required to attempt any **Four questions** out of Sections A, B & C by selecting **ATLEAST ONE** Question from Each Section. All questions shall carry equal marks.

**Total Marks : 150**  
**Theory Paper : 100**  
**Internal Assessment : 50**

**Minimum Pass Marks : 40%**  
**Maximum Time : 3 Hrs.**

**Section – A**

**Computer Arithmetic:** Floating point representation of numbers, arithmetic operations with normalized floating point numbers and their consequences. Error in number representation - pitfalls in computing.

**Iterative Methods:** Bisection, False position, Newton-Raphson methods, Discussion of convergences, Polynomial evaluation, Solving polynomial equations (Bairstow's Method).

**Section – B**

**Solving of Simultaneous Linear Equations and ordinary Differential Equations:** Gauss elimination method, Ill-conditioned equations, Gauss-Seidal iterative method, Taylor's series and Euler methods, Runge-kutta methods, Predictor corrector methods.

**Numerical Differentiation and Integration:** Differentiation formulae based on polynomial fit, Pitfalls in differentiation, Trapezoidal, Simpson's rules and Gaussian Quadrature.

**Interpolation and Approximation:** Polynomial interpolation, Difference tables, Inverse interpolation, Polynomial fitting and other curve fitting. Approximation of functions by Taylor series and Chebyshev polynomials.

**Section – C**

**Statistical methods:** Sample distributions, Test of Significance, chi-square, t and F test.

**Analysis of Variance:** Definition, Assumptions, Cochran's Theorem, One-way classification, ANOVA Table, Two-way classification (with one observation per cell).

**Time Series Analysis:** Components and Analysis of Time Series, Measurement of Trend, Seasonal fluctuations and cyclic movement.

**References :**

- Gupta S.C. and Kapoor, V.K., Fundamentals of Applied Statistics, Sultan Chand & Sons, 1996.
- Jain M.K, Iyengar S.R.K, Jain R.K, Numerical Methods for Scientific and Engineering Computation, New Age International (P) Ltd.
- Gupta S.P. and Kapoor, V.K., Fundamentals of Mathematical Statistics, Sultan Chand and Sons, 1995.
- Rajaraman V., Computer Oriented Numerical Methods, Prentice Hall, India.
- Graybill, Introduction to Statistics, McGraw.
- B.S.Grewal, Numerical Methods, Khanna Publications.

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**BCA - 203 Data Structure Using C**

**Note:** Total **8 Questions** are to be set by the examiner covering the entire syllabus uniformly. **Question No. 1 (COMPULSORY)** having **Objective Type Questions** of **2 marks** from entire syllabus. Rest of the **Seven** questions are from **Section A, B & C** of **Syllabus**. A candidate is required to attempt any **Four questions** out of Sections A, B & C by selecting **ATLEAST ONE** Question from Each Section. All questions shall carry equal marks.

**Total Marks : 150**  
**Theory Paper : 100**  
**Internal Assessment : 50**

**Minimum Pass Marks : 40%**  
**Maximum Time : 3 Hrs.**

**Section – A**

**Introduction To Data Structure:** Definition, Classification of data structures-primitive and non primitive, Operations on data structures

**Dynamic Memory Allocation And Pointer:** Definition Accessing the address of a variable and initializing pointers, Accessing a variable through its pointer, Meaning of static and dynamic memory allocation, Memory allocation function: malloc, calloc, free and realloc.

**Section – B**

**Stack:** Definition, Array representation of stack, Operation on stack: Infix, prefix and postfix, Application of stacks.

**Queue:** Definition, Array representation of queue, Type of queue: Simple queue, Circular queue, Double ended queue, priority queue, operations on all the types of queues

**Linked List:** Definition, Representation of linked list, Advantages and disadvantages of linked list. Types of linked list: Singly linked list, doubly linked list, Circular linked list and circular doubly linked list. Operations on singly linked list: creation, insertion, deletion, search and display.

**Section – C**

**Tree:** Definition, Complete binary tree, binary search tree, heap tree terminology: root, node, edge, path, depth, parent node, ancestor of a node. Binary tree: Array representation of tree, Creation of binary tree. Traversal of binary tree: Preorder, Inorder and postorder.

**SEARCHING AND SORT**

Basic search techniques, search algorithm: sequential search, Binary search.

**Sort:** Definition, different types: Bubble sort, Selection sort, Merge sort, Insertion sort, Quick sort.

**References:**

- R. B. Patel, Expert Data Structures With C, Khanna Publications, Delhi, India, 3<sup>rd</sup> Edition 2008, ISBN 81-87522-41-0, pp. 1-950.
- Bandyopadhyay, Data Structure using C, Pearson Education

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- Kanetkar Yashwant, Data Structure using C, BPB Publications.
- Salaria R.S., Data Structure and algorithm using C, Khanna Publications
- Yedidyah Langsam, Moshe J Augernstein and Aarson M.Tanenbaum, Data Structures using C and C ++, PHI, New Delhi (1997)
- Trembley, J.P. and Sorenson P.G., An Introduction to Data Structures with Applications, McGraw-Hill International Student Edition, New York(1984)
- Seymour Lischutz, Data Structures, McGraw-Hill Book Company, Schaum's Outline Series, New York(1986).

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**BCA – 205 OPERATING SYSTEMS**

**Note:** Total **8 Questions** are to be set by the examiner covering the entire syllabus uniformly. **Question No. 1 (COMPULSORY)** having **Objective Type Questions** of **2 marks** from entire syllabus. Rest of the **Seven** questions are from **Section A, B & C** of **Syllabus**. A candidate is required to attempt any **Four questions** out of Sections A, B & C by selecting **ATLEAST ONE** Question from Each Section. All questions shall carry equal marks.

**Total Marks : 150**  
**Theory Paper : 100**  
**Internal Assessment : 50**

**Minimum Pass Marks : 40%**  
**Maximum Time : 3 Hrs.**

**Section – A**

**Introductory Concepts:** Operating system functions and characteristics, historical evolution of operating systems, Real time systems, Distributed systems, Methodologies for implementation of O/S service system calls, system programs, Interrupt mechanisms.

**File Systems:** Functions of the file system, File access and allocation methods, Directory Systems: Structured Organizations, directory and file protection mechanisms, implementation issues: hierarchy of file and device management.

**Section – B**

**CPU Scheduling:** Levels of Scheduling, Comparative study of scheduling algorithms.

**Storage Management:** Storage allocation methods: Single contiguous allocation, Multiple contiguous allocation, Paging; Segmentation combination of Paging and Segmentation, Virtual memory concepts, Demand Paging, Page replacement Algorithms, Thrashing.

**Section – C**

**Deadlocks:** Deadlock characterization, Deadlock prevention and avoidance, Deadlock detection and recovery, practical considerations.

**Concurrent Processes:** Critical section problem, Semaphores, Classical process co-ordination problems and their solutions, Interprocess Communications.

**References :**

- Peterson, J.L. & Silberschatz, A., Operating System Concept, Addison Wesley, reading.
- Brinch, Hansen, Operating System Principles, Prentice Hall of India
- Haberman, A.N., Introducing to Operating System Design Galgotia Publication, New Delhi
- A.S. Godbole: Operating Systems, TMH.
- Tanenbaum, A.S., Operating System
- Hansen P.B., Architecture Concurrent Programs, PHI.
- William Stallings, “Operating System”, Prentice Hall of India, 4th Edition, 2003

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**BCA – 207    COMMUNICATION SKILLS - II**

**Note:** Total **8 Questions** are to be set by the examiner covering the entire syllabus uniformly. **Question No. 1 (COMPULSORY)** having **Objective Type Questions** of **2 marks** from entire syllabus. Rest of the **Seven** questions are from **Section A, B & C** of **Syllabus**. A candidate is required to attempt any **Four questions** out of Sections A, B & C by selecting **ATLEAST ONE** Question from Each Section. All questions shall carry equal marks.

**Total Marks : 150**  
**Theory Paper : 100**  
**Internal Assessment : 50**

**Minimum Pass Marks : 40%**  
**Maximum Time : 3 Hrs.**

**Section – A**

**Essentials of Grammar:** Parts of Speech, Punctuation, Vocabulary Building, Phonetics

**Office Management:** Types of Correspondence, Receipt and Dispatch of Mail, Filing Systems, Classification of Mail. Role & Function of Correspondence, MIS, Managing Computer

**Section – B**

**Letter & Resume Writing:** Types of Letters-Formal / Informal, Importance and Function, Drafting the Applications, Elements of Structure, Preparing the Resume, Do's & Don'ts of Resume, Helpful Hints

**Presentation Skills:** Importance of Presentation Skills, Capturing Data, Voice & Picture Integration, Guidelines to make Presentation Interesting, Body Language, Voice Modulation, Audience Awareness, Presentation Plan, Visual Aids, Forms of Layout, Styles of Presentation.

**Section – C**

**Interview Preparation:** Types of Interview, Preparing for the Interviews, Attending the Interview, Interview Process, Employers Expectations, General Etiquette, Dressing Sense, Postures & Gestures

**Group Discussion & Presentation:** Definition, Process, Guidelines, Helpful Expressions, Evaluation

**References:**

- English Phonetics and Phonology, Peter Roach, Cambridge University Press.
- Communication skills for Engineers, Sunita Mishra, C. Murali Krishna, Dorling Kindersley (India)
- Group Discussion, Sudha Publications/Ramesh Publishing House, New Delhi.
- English Grammar & Composition. By Rajinder Pal & Prem Lata Suri, Sultan Chand Pub. New Delhi.

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**BCA– 4<sup>th</sup> Semester**

<b>Sr. No.</b>	<b>Paper Code</b>	<b>Title of Paper</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>Sessional</b>	<b>Theory</b>	<b>Practical</b>	<b>Total</b>	<b>Credit</b>
1.	BCA - 202	System Programming	3	1	-	50	100	-	150	4
2.	BCA - 204	Object Oriented Programming	3	1	-	50	100	-	150	4
3.	BCA - 206	System Analysis & Design	3	1	-	50	100	-	150	4
4.	BCA - 208	Computer Oriented Optimization Techniques	3	1	-	50	100	-	150	4
5.	BCA - 224	Software Lab. – IV (Based on BCA – 204)	-	-	3	50	-	50	100	3
6.	BCA - 230	Seminar	-	-	-	100	-	-	100	1
		<b>Total</b>	<b>12</b>	<b>4</b>	<b>3</b>	<b>350</b>	<b>400</b>	<b>50</b>	<b>800</b>	<b>20</b>

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**BCA – 202    SYSTEM PROGRAMMING**

**Note:** Total **8 Questions** are to be set by the examiner covering the entire syllabus uniformly. **Question No. 1 (COMPULSORY)** having **Objective Type Questions** of **2 marks** from entire syllabus. Rest of the **Seven** questions are from **Section A, B & C** of **Syllabus**. A candidate is required to attempt any **Four questions** out of Sections A, B & C by selecting **ATLEAST ONE** Question from Each Section. All questions shall carry equal marks.

**Total Marks : 150**  
**Theory Paper : 100**  
**Internal Assessment : 50**

**Minimum Pass Marks : 40%**  
**Maximum Time : 3 Hrs.**

**Section – A**

Fundamental of Language Processing and specifications, Evolution of Computer System Programming, Assembler, Loaders, Linkers, Macros, compiler, Software Tools, Text Editors, Interpreter and program generator, Debug monitors, Programming environment.

**Section – B**

Assemblers: Introduction to Assembler, databases used in assembler design, Design of Assembler - Single Pass & Double Pass.

Introduction to Compilers: A brief discussion on various phases of compilers. Intermediary forms.

**Section – C**

Introduction to Loaders, functions of a loader, types of Loaders, databases used in Loaders, Design of Loaders - Absolute & DLL.

Introduction to Macros, Various types of Macros, Features of Macro facilities, Design of Macro Processor - Single Pass & Double Pass.

**Reference Books:**

- Systems Programming, Donovan, Tata Mc Graw Hill
- System Programming, Dhamdhare (IInd Revised Edition), Tata Mc Graw Hill
- System Software, Leland. L. Beck, Pearson Education.

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**BCA - 204 OBJECT - ORIENTED PROGRAMMING**

**Note:** Total **8 Questions** are to be set by the examiner covering the entire syllabus uniformly. **Question No. 1 (COMPULSORY)** having **Objective Type Questions** of **2 marks** from entire syllabus. Rest of the **Seven** questions are from **Section A, B & C** of **Syllabus**. A candidate is required to attempt any **Four questions** out of Sections A, B & C by selecting **ATLEAST ONE** Question from Each Section. All questions shall carry equal marks.

**Total Marks : 150**  
**Theory Paper : 100**  
**Internal Assessment : 50**

**Minimum Pass Marks : 40%**  
**Maximum Time : 3 Hrs.**

**Section – A**

**Introduction to OOP:** Programming paradigms, Structured / Procedural Programming, Object Oriented Programming, Characteristics of Object oriented Programming.

**Introduction to C++:** Character set of C++, Identifiers, Keywords, Variables and Constants; Basic Data Types, user defined and derived data types,

**Operators in C++:** Unary, Binary and ternary operators; Arithmetic, logical, relational, bitwise operators, Assignment Operators; Type conversion, & Scope resolution operator, Memory Management Operators (new, delete), Reference Variable / Operator

**Control Structure in C++:** If statements, do-while, while and for loop; switch, break, continue, exit and goto statements.

**Functions in C++:** The main function, Function prototyping, default arguments, const arguments, call by reference and return by reference; Inline function,

**Section – B**

**Arrays and Strings:** Types of arrays, array declaration, Operations on arrays, and string manipulation functions; pointers and arrays

**Structure, Class and Object, Member Variable, Member Function, structs vs classes, function overloading, Static data & member function, const member function, friend functions & friend classes**

**Section – C**

**Role of Constructors & destructors,** Types of Constructors, dynamic objects, operator overloading

**Inheritance & Polymorphism,** Types of Polymorphism, Early Binding vs Late Binding, Function Overriding vs Overloading, Virtual functions, abstract class, virtual class

**Reference Books:**

- Object Oriented Programming with C++ by E. Balaguruswamy, Tata McGraw-Hill
- The Complete Reference: C++ by Herbert Schildt, Tata McGraw-Hill

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- Object Oriented Programming in C++ by Robert Lafore, Galgotia Publications
- Let Us C++ by Yashwant Kanetkar, BPB
- Object Oriented Programming in C++ by Nabajyoti Barkakati, PHI

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**BCA –206    SYSTEM ANALYSIS & DESIGN**

**Note:** Total **8 Questions** are to be set by the examiner covering the entire syllabus uniformly. **Question No. 1 (COMPULSORY)** having **Objective Type Questions** of **2 marks** from entire syllabus. Rest of the **Seven** questions are from **Section A, B & C** of **Syllabus**. A candidate is required to attempt any **Four questions** out of Sections A, B & C by selecting **ATLEAST ONE** Question from Each Section. All questions shall carry equal marks.

**Total Marks : 150**  
**Theory Paper : 100**  
**Internal Assessment : 50**

**Minimum Pass Marks : 40%**  
**Maximum Time : 3 Hrs.**

**Section – A**

**System:** Definition, characteristics, elements & types of system. System development life cycle, Role of System Analyst, Basis of planning and initial Investigation, Recognition of need: Feasibility study.

**Section – B**

**System Analysis**-introduction, information collection, interviews, questionnaires, observation, record searching and document analysis, analysis tools, data flow diagram, data dictionary, decision tree, structured English and decision table, Role of System Analyst.

**Section – C**

**System Design:** The process of design, logical and physical design, Structure design Methodology, form-driven design methodology (IPO charts, structured walk through), Input / Output & Form design. Methods for System implementation and System testing.

**References:**

- Elias M. Awad, "System Analysis and Design", Galgotia Publications Pvt. Ltd., eleventh Edition, 1991.
- Lee, "Introducing System Analysis and Design", Volumes 1 & 11, Galgotia Book Source, 1995.
- Jeffrey A. Hoffer, Joey F. George, Joseph S. Valacich, "Modern Systems Analysis and Design", third Edition, Pearson Education, Asia, 2002.
- Perry Edwards, "System Analysis and Design", McGraw International Edition, 1993.

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**BCA –208    COMPUTER ORIENTED OPTIMIZATION TECHNIQUES**

**Note:** Total **8 Questions** are to be set by the examiner covering the entire syllabus uniformly. **Question No. 1 (COMPULSORY)** having **Objective Type Questions** of **2 marks** from entire syllabus. Rest of the **Seven** questions are from **Section A, B & C** of **Syllabus**. A candidate is required to attempt any **Four questions** out of Sections A, B & C by selecting **ATLEAST ONE** Question from Each Section. All questions shall carry equal marks.

**Total Marks : 150**  
**Theory Paper : 100**  
**Internal Assessment : 50**

**Minimum Pass Marks : 40%**  
**Maximum Time : 3 Hrs.**

**Section –A**

**Introduction:** Definition, characteristics, Nature, scope, objectives; Models in OR, Principal and Approximation of O.R. Models, characteristics, advantages, limitations of models; phases of OR, General Methods of solving models, Scientific Methods.

**Section – B**

**Linear Programming:** Linear Programming: Introduction, requirements of a LPP, applications of LP, General LP problems, Formulation, Graphical solution, standard and matrix forms of linear programming problems, Simplex method and its flow chart, Two phase Simplex method, Big-M Method, Degeneracy.

**Section -C**

**Duality:** Introduction, Definition, General Rule for converting any primal into its Dual, Dual Simplex method and its flow chart.

**PERT and CPM:** PERT and CPM: Introduction, PERT Vs. CPM, network construction, Forward and Backward computation, Representation in Tabular form critical path computations, floats and slacks.

**References:**

- Sharma, S.D., Operations Research, Kedar Nath & Ram Nath, Meerut, 1996.
- Gupta P.K, Hira and D.S., Operation Research, Sultan Chand & Sons, New Delhi, 1994.
- Kanti Swarup, Gupta P.K. & Man Mohan, Operation Research, Sultan Chand & sons, New Delhi, 1990.
- Taha, H.A., Operation Research - An Introduction, McMillan Publishing Co, New York, 1986.

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**From Session: 2011-12**

**BCA– 5<sup>th</sup> Semester**

Sr. No.	Paper Code	Title of Paper	L	T	P	Sessional	Theory	Practical	Total	Credit
1.	BCA-301	Principles of Internet & Web Designing	3	1	-	50	100	-	150	4
2.	BCA-303	Data Base Management systems	3	1	-	50	100	-	150	4
3.	BCA-305	System Simulation	3	1	-	50	100	-	150	4
4.	BCA-307	Software Engineering	3	1	-	50	100	-	150	4
5.	BCA-309	E-Commerce	3	1	-	50	100	-	150	4
6.	BCA-321	Accounting & Financial Management	3	1	-	50	100	-	150	4
7.	BCA-323	Software Lab. – V (Based on BCA-301)	-	-	3	50	-	50	100	3
8.	BCA-329	Software Lab. – VI (Based on BCA-303)	-	-	3	50	-	50	100	3
9.	BCA-301	Seminar	-	-	-	100	-	-	100	1
		<b>Total</b>	<b>18</b>	<b>6</b>	<b>6</b>	<b>500</b>	<b>600</b>	<b>100</b>	<b>1200</b>	<b>31</b>

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**BCA – 301 Principles of Internet and Web Designing**

**Note:** Total **8 Questions** are to be set by the examiner covering the entire syllabus uniformly. **Question No. 1 (COMPULSORY)** having **Objective Type Questions** of **2 marks** from entire syllabus. Rest of the **Seven** questions are from **Section A, B & C** of **Syllabus**. A candidate is required to attempt any **Four questions** out of Sections A, B & C by selecting **ATLEAST ONE** Question from Each Section. All questions shall carry equal marks.

**Total Marks : 150**  
**Theory Paper : 100**  
**Internal Assessment : 50**

**Minimum Pass Marks : 40%**  
**Maximum Time : 3 Hrs.**

**Section-A**

**Internet Basics:** Introduction to Internet, Architecture and its working, applications, Internet Addressing, Basic Internet protocols, Internet domains, DNS, ISP, Intranets and extranets.

**Section-B**

**World Wide Web:** Concepts, Web browsers, Web server, Proxy servers. Client - Server paradigm. Web site development Phases: Designing, Development and Publishing, HTTP, URL registration.

**Section-C**

**HTML:** Basics of DHTML and XHTML, HTML, Concepts, Structure of HTML documents, HTML Elements: Core attributes, Language attributes, Core Events, Block Level Events, Text Level Events, linking, Images and Anchors: Attributes, Image Maps, Meta Information, Image Preliminaries, Image Download issues, Images as Buttons, Backgrounds: Colors and Text, Fonts, Layout with Tables.

**Advanced Layout:** Frames and layers, Audio Support & Video Support in Browsers, Style Sheets, Positioning with Style sheets, Forms, Forms Control, New and emerging Form Elements.

**References:**

- Honey Cutt, Using the Internet, 4<sup>th</sup> ed., PHI.
- Douglas E. Comer, Computer Networks and Internets, Addison Wesley.
- Robert W. Sebesta, Programming with World Wide Web, 4<sup>th</sup> Edition, Pearson Education.
- Xavier, World Wide Web Design with HTML, TMH
- Thomas A. Powell, The Complete Reference HTML & XHTML, Fourth Edition, Tata Mcgraw Hill, New Delhi.

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**BCA - 303 Data Base Management Systems**

**Note:** Total **8 Questions** are to be set by the examiner covering the entire syllabus uniformly. **Question No. 1 (COMPULSORY)** having **Objective Type Questions** of **2 marks** from entire syllabus. Rest of the **Seven** questions are from **Section A, B & C** of **Syllabus**. A candidate is required to attempt any **Four questions** out of Sections A, B & C by selecting **ATLEAST ONE** Question from Each Section. All questions shall carry equal marks.

**Total Marks : 150**  
**Theory Paper : 100**  
**Internal Assessment : 50**

**Minimum Pass Marks : 40%**  
**Maximum Time : 3 Hrs.**

**SECTION - A**

**Basic Concepts:** Database, Database management Systems, RDBMS, Conventional File Processing Vs RDBMS, Characteristics of the Database, Data Models, Schema, Instance, Data Independence, Database Languages, The Entity-Relationship Model, Strong and Weak Entity Sets, Generalization, Specialization and Aggregation.

**SECTION - B**

**Relational Model:** Concepts, Languages, Relational Algebra, Integrity Constraints, Functional Dependencies: Full and partial, Normalization: 1NF, 2NF, 3NF & BCNF.  
**SQL** –Introduction, Writing Queries in SQL, Specifying Constraints.

**SECTION - C**

**Transaction Management:** Transaction Concept and State, Problems with Transaction Management, ACID Properties, Concurrent Execution, 2 Phase Locking Protocols, Timestamp-based Protocols, Deadlock Handling, Failure Classification, Log-based Recovery, and Shadow Paging.

**References:**

- Korth, Silberschatz, Database System Concepts, 4th Ed., TMH.
- Elmasri & Navathe: Fundamentals of Database Systems, 4th Ed., A. Wesley.
- Date C. J., An Introduction to Database Systems, 7th Ed., Narosa Publishing.
- S. K Singh, Data Base systems: Concept Design and Applications, Pearson Ed.

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**BCA – 305 Software Engineering**

**Note:** Total **8 Questions** are to be set by the examiner covering the entire syllabus uniformly. **Question No. 1 (COMPULSORY)** having **Objective Type Questions** of **2 marks** from entire syllabus. Rest of the **Seven** questions are from **Section A, B & C** of **Syllabus**. A candidate is required to attempt any **Four questions** out of Sections A, B & C by selecting **ATLEAST ONE** Question from Each Section. All questions shall carry equal marks.

**Total Marks : 150**  
**Theory Paper : 100**  
**Internal Assessment : 50**

**Minimum Pass Marks : 40%**  
**Maximum Time : 3 Hrs.**

**Section – A**

**Introduction to Software Engineering:** Software crisis, Software engineering Approach and Challenges, Software development process models with comparison: Waterfall, Rapid prototyping, Time boxing and Spiral Models, Automation through software environments.

**Section – B**

**Planning the Software Project:** Cost Estimation, Planning Schedule, Project Monitoring, Quality Assurance and Risk Management.

**Structured Analysis:** Initial Investigation, Feasibility study, Traditional and modern methods of requirement determination, SRS, Structuring the requirements: Process modeling, Logic modeling, Conceptual data modeling.

**Section – C**

**Design Fundamentals:** Function and Object Oriented Design concepts, overview of Verification and Validation.

**Coding and Maintenance:** Coding Process, Testing fundamentals, Types of Testing, Metrics, Types of Maintenance.

**Software Re-Engineering:** Source Code Translation, Program Restructuring, Data Re-Engineering, Reverse Engineering.

**References:**

- Somerville Ian, Software Engineering, 5th ed., Addison Wesley-2000.
- Kumar Ashok, Software Engineering, Vayu Education of India.
- Pressman S. Roger, Software Engineering, Tata McGraw-Hill.
- Jalote Pankaj, An integrated Approach to Software, Engineering, Narosa Publishing House.
- Mall Rajib, Fundamentals of Software Engineering, Prentice Hall of India .
- Gill Nasib S., Software Engineering, Khanna Book Publishing Co.
- Aggarwal K. K., “Software Engineering”, Publishing New Ways.

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**BCA – 307 E - Commerce**

**Note:** Total **8 Questions** are to be set by the examiner covering the entire syllabus uniformly. **Question No. 1 (COMPULSORY)** having **Objective Type Questions** of **2 marks** from entire syllabus. Rest of the **Seven** questions are from **Section A, B & C** of **Syllabus**. A candidate is required to attempt any **Four questions** out of Sections A, B & C by selecting **ATLEAST ONE** Question from Each Section. All questions shall carry equal marks.

**Total Marks : 150**  
**Theory Paper : 100**  
**Internal Assessment : 50**

**Minimum Pass Marks : 40%**  
**Maximum Time : 3 Hrs.**

**Section A**

**An overview of E- Commerce-** Operating System Services, Developer Services, Data Services, Application Services, Store Services, Client Services, Types of E Commerce Solutions- Direct Marketing and Selling, Supply Chain Integration, Corporate Procurement.

**Electronic Data Interchange:** Evolution, uses, Benefits, Working of EDI, EDI Standards (includes variable length EDI standards), Cost Benefit Analysis of EDI, Electronic Trading Networks, EDI Components, File Types, EDI Services.

**Applications of Electronic Commerce,** Obstacles in adopting E-Commerce Applications, Future of E Commerce.

**Section B**

**E-Strategy:** Information and Strategy, The virtual value chain, seven dimensions of commerce strategy, planning E-commerce project, E-commerce strategy and knowledge management, E-Business Strategy and Data Warehousing and Data Mining.

**E-Commerce Marketing Concepts:** Basic marketing concepts for internet marketing, Ecommerce marketing and branding strategies, Strengthening the customer relationship.

**Electronic Payment Systems-** Overview of Electronic Payment Systems, Cybercash (Customer to Merchant Payments, Peer to Peer Payments, Security). Smart Card (Card Types, Closed or Open Security, Privacy, Card Costs, Non Card Costs), Electronic Banking, Electronic Fund Transfers.

**Section C**

**Security issues:** Introduction to Security, Passwords, Viruses, Firewalls, Encryption overview, Elements of an encryption system, Secret key encryption, Public-key encryption, Digital signatures, Digital Certificates, Cryptography export restrictions, Secure Sockets Layer (SSL), Secure Electronic Transactions (SET).

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**References:**

- Doing Business on the Internet E-COMMERCE (Electronic Commerce for Business) S. Jaiswal, Galgotia Publications.
- E-Commerce An Indian Perspective, P.T.Joseph, S.J., PHI.
- Electronic Commerce: Greenstein, Merylin, Tata Mc.Graw Hill
- E-Commerce Business.Technology. Society, Kenneth C. Laudon, Carol Guerico Traver, Pearson Education.
- E-Commerce: Schneider, Thomson Publication

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**BCA – 309      Accounting & Financial Management**

**Note:** Total **8 Questions** are to be set by the examiner covering the entire syllabus uniformly. **Question No. 1 (COMPULSORY)** having **Objective Type Questions** of **2 marks** from entire syllabus. Rest of the **Seven** questions are from **Section A, B & C** of **Syllabus**. A candidate is required to attempt any **Four questions** out of Sections A, B & C by selecting **ATLEAST ONE** Question from Each Section. All questions shall carry equal marks.

**Total Marks : 150**  
**Theory Paper : 100**  
**Internal Assessment : 50**

**Minimum Pass Marks : 40%**  
**Maximum Time : 3 Hrs.**

**SECTION - A**

**Accounting:** Principles of Accounting - meaning, objectives, importance, limitation & scope of Accounting, Concept and Conventions, Accounting Terminology, Double entry system for Accounting. Introduction to basic books of a sole proprietor organization. Trial Balance, Final Accounts of a sole proprietor organization.

**SECTION - B**

**Financial Management:** Meaning, scope and Goal along with various functional areas of Financial Management, Various sources of short term & long term finance, Ratio Analysis: meaning, advantages, limitations, and type of ratios.

**Costing:** Basic principles of Costing, nature, importance, Methods of Costing and Elements of Costing, Break Even Analysis.

**SECTION - C**

**Business Applications:** Uses of computer in Business Applications. Analysis, Design and implementation related issues for wage accounting system (Pay Roll), Inventory System and production control system.

**References:**

- Sofat & Hiro, Basic Accounting, Prentice Hall of India.
- Nigam and Jain, Cost Accounting, Prentice Hall of India.
- T.M. Ramachandran, Computerised Business Applications- An overview, Galgotia Publications.
- Maheshwari, An Introduction to Accountancy, Vikas Publishing House Pvt. Ltd.
- Shashi K. Gupta, Financial Management, Kalyani Publishers.
- D.K.Goel, Financial Accounting, Arya Publications.

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**BCA– 6<sup>th</sup> Semester**

<b>Sr. No.</b>	<b>Paper Code</b>	<b>Title of Paper</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>Sessional</b>	<b>Theory</b>	<b>Practical</b>	<b>Total</b>	<b>Credit</b>
1.	BCA-302	Visual Programming	3	1	-	50	100	-	150	4
2.	BCA-304	Java Programming	3	1	-	50	100	-	150	4
3.	BCA-306	Data Communication	3	1	-	50	100	-	150	4
4.	BCA-308	Software Project Management	3	1	-	50	100	-	150	4
5.	BCA-310	Personality Development	3	1	-	50	100	-	150	4
6.	BCA-322	Software Lab. - VII (Based on BCA-302)	-	-	3	50	-	50	100	3
7.	BCA-324	Software Lab. – VIII (Based on BCA-304)	-	-	3	50	-	50	100	3
8.	BCA-332	Project	-	-	9	50	-	100	150	9
9.	BCA-330	Seminar	-	-	-	100	-	-	100	1
		<b>Total</b>	<b>15</b>	<b>5</b>	<b>15</b>	<b>500</b>	<b>500</b>	<b>200</b>	<b>1200</b>	<b>36</b>

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**BCA - 302 Visual Programming**

**Note:** Total **8 Questions** are to be set by the examiner covering the entire syllabus uniformly. **Question No. 1 (COMPULSORY)** having **Objective Type Questions** of **2 marks** from entire syllabus. Rest of the **Seven** questions are from **Section A, B & C** of **Syllabus**. A candidate is required to attempt any **Four questions** out of Sections A, B & C by selecting **ATLEAST ONE** Question from Each Section. All questions shall carry equal marks.

**Total Marks : 150**  
**Theory Paper : 100**  
**Internal Assessment : 50**

**Minimum Pass Marks : 40%**  
**Maximum Time : 3 Hrs.**

**Section - A**

Introduction of Object based Event Oriented Languages, Visual Architecture: Method, Statement, Properties and Event; Difference between Visuals and Non-Visuals.

**The Integrated Development Environment and its elements:** Menu Bar, Context Menus, Tool Bar, Project Explorer, Tool Box, Properties Window; Form Designer, Immediate window; Object Browser; Code Editor Window; Form Layout Window.

**The Language And Its Elements:** Data Types, Variables, Constants, Control Structures: decision and repetitive statements, Arrays, Collections, Subroutines, Functions and Arguments.

**Section – B**

**Designing and Coding a Application:** Working with Forms, Form Properties; Writing Visual Basic Projects; Developing an Application; Design the User Interface; Write Code to Respond to User Input/Events; Building Dynamic Forms at Runtime, Design a Form using Default Controls, Responding to the User with Event Procedures.

**Drag and Drop Operations,** Menus and Toolbar designing, dynamic menu appearance; Dialog Box: Working with Built-in Dialog Boxes, Creating Own Dialog Boxes, and working with Common Dialogs Control.

**Section - C**

Multiple Document Interface (MDI), Object Linking and Embedding (OLE), Error handling- Types of Errors, Error handling methods and functions, Graphics with Visual Basic; Working with files, Object Oriented programming.

**Visual and Database Programming:** Database Models Visual data manager, Introduction about Data Control and Data-Bound controls Programming with DAO, RDO, and ADO, Data Report Designer.

**Reference:**

- Brian Siler, Jeff Spotts, Special Edition Using Visual Basic 6.0, PHI.
- Evangelos Petroustos, Mastering Visual Basic-6, BPB.
- J C Bradley, A.C. Millsbaugh, Programming in Visual Basic – 6, TMH.

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- Jerke, VB - 6 : The Complete Reference, TMH.
- Howard Hawee, Visual Basic – 6, PHI.
- David Jung, Visual Basic 6 Super Bible, TechMedia Publications.
- Kruplinski, Shephert, Wingo, “ Programming Visual C++ 5<sup>th</sup> Edition”, Microsoft Press.
- J.P. Mueller, “Visual C++ from the Ground Up”, TMH

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**BCA – 304      Java Programming**

**Note:** Total **8 Questions** are to be set by the examiner covering the entire syllabus uniformly. **Question No. 1 (COMPULSORY)** having **Objective Type Questions** of **2 marks** from entire syllabus. Rest of the **Seven** questions are from **Section A, B & C** of **Syllabus**. A candidate is required to attempt any **Four questions** out of Sections A, B & C by selecting **ATLEAST ONE** Question from Each Section. All questions shall carry equal marks.

**Total Marks : 150**  
**Theory Paper : 100**  
**Internal Assessment : 50**

**Minimum Pass Marks : 40%**  
**Maximum Time : 3 Hrs.**

**SECTION – A**

**Introduction to Java:** History and Features of java language, java v/s C/C++, Java and internet, Java development kit, Java Virtual Machine, Java API, Running java application and applets, Command line arguments.

**Java Programming:** Data types, operators and expressions, formatted output, control statements, classes, objects and methods, constructors, method overloading, access qualifiers, array, String class and its methods, StringBuffer, StringTokenizer, inheritance, using super, method overriding, final, packages and interface.

**SECTION – B**

**Applet Programming:** Introduction to Applets, Life cycle of applets, Applet Tag, executing applets in a web page, passing parameters to applet.

**Exception Handling:** Exception types, using try, catch and finally, multiple catch clauses, nested try statements, throw and throws, user defined exceptions.

**SECTION – C**

**Event Handling:** Delegation Event Model, Event classes and event listener interfaces, handling mouse and keyboard events, Adapter classes, inner classes

**Graphics Programming:** AWT classes, working with Frame window, Graphics class, awt controls, layout managers, menu, dialog boxes.

**References:**

- H.M. Deitel, P.J. Deitel, Java How to Program, sixth edition, Pearson Education.
- Herbert Schildt, The Complete Reference Java 2, fifth edition, Tata McGrawHill.
- E. Balaguruswami, Programming with Java, second edition, Tata McGrawHill.
- Mughal K.A., Rasmussen R.W., A Programmer's Guide to Java Certification, Addison-Wesley, 2000.

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- Cay S. Horstmann, Gray Cornell, Core Java 2 Volume I-Fundamentals and Volume II-Advanced Features, Sun Microsystems Press, Pearson Education.
- David Flanagan, Java in a Nutshell, fourth edition, O'Reilly
- Jonni Kanerva, The Java FAQ, Pearson Education

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**BCA – 306 Data Communication**

**Note:** Total **8 Questions** are to be set by the examiner covering the entire syllabus uniformly. **Question No. 1 (COMPULSORY)** having **Objective Type Questions** of **2 marks** from entire syllabus. Rest of the **Seven** questions are from **Section A, B & C** of **Syllabus**. A candidate is required to attempt any **Four questions** out of Sections A, B & C by selecting **ATLEAST ONE** Question from Each Section. All questions shall carry equal marks.

**Total Marks : 150**  
**Theory Paper : 100**  
**Internal Assessment : 50**

**Minimum Pass Marks : 40%**  
**Maximum Time : 3 Hrs.**

**Section - A**

**Network Concepts:** Goals and applications of Data Communication; Network Topologies; Structures of Networks. **Network Architecture:** Concept of protocols & services; OSI model and functions of its layers; TCP/IP reference model, **Data Communication Concepts:** Components of a data communication system; transmission modes; transmission media - guided and wireless media; multiplexing (frequency division and time division).

**Section - B**

**Framing and Error Control :** Framing techniques; Error control- error detection & correction : Hamming Method, CRC and checksum etc.

**Data Link Control :** Acknowledgments; Medium Access Control and LANs : Multiple Access protocols of MAC sub layer - ALOHA, 1-persistent, p-persistent and non-persistent CSMA, CSMA/CD, Collision free protocols, Limited contention protocols, MACA, GSM, CDPD, CDMA; IEEE Standard 802 for LANs .

**Section - C**

**Routing:** Deterministic and Adaptive routing; Centralized and distributed routing; shortest-path; flooding; flow based; optimal; distance vector, link-state, hierarchical; routing for mobile hosts; broadcast and multicast routing;

**Congestion control:** Principles of congestion control; Traffic shaping; choke packets; load shedding; RSVP.

**References:**

- Godbole Achyut's, Data Communications and Networks, Tata Mc-Graw Hill.
- Behrouz, Forouzan, Introduction to Data communications and Networking, Tata Mc-Graw Hill.
- William Stallings, Data and Computer Communications, Pearson education.
- Fred Halsall, Data Communications, Computer Networks and Open Systems, 4/e, Addison Wesley.

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**BCA – 308 Software Project Management**

**Note:** Total 8 Questions are to be set by the examiner covering the entire syllabus uniformly. **Question No. 1 (COMPULSORY)** having **Objective Type Questions** of 2 marks from entire syllabus. Rest of the **Seven** questions are from **Section A, B & C** of **Syllabus**. A candidate is required to attempt any **Four** questions out of Sections A, B & C by selecting **ATLEAST ONE** Question from Each Section. All questions shall carry equal marks.

**Total Marks : 150**  
**Theory Paper : 100**  
**Internal Assessment : 50**

**Minimum Pass Marks : 40%**  
**Maximum Time : 3 Hrs.**

**Section – A**

**Software Project Management:** Conventional approach, Software Project Management phases, Boehm's top 10 industrial software metrics, 7-S of Project Management, Three generations of software economics. Software cost estimation process, Modern trends of SPM for Improving software economics, software processes and team effectiveness, Round-trip engineering, Principles of modern software management.

**Section – B**

**A Software Management Process Framework:** Life cycle phases - inception, elaboration, construction and training phase. Artifacts of the process - the artifact sets, management artifacts, engineering artifacts, pragmatics artifacts. Model based software architectures. Workflows of the process. Checkpoints of the process.

**Section – C**

**Software Management Disciplines:** Iterative process planning. Project organizations and responsibilities. Process automation. Project control and process instrumentation - core metrics, management indicators, Life cycle expectations. Process discriminants.

**References :**

- Walker Royce, Software Project management, Addison Wesley.
- Maylor, Project management, 2/e.
- Kathy Schwalbe, Information Technology Project Management, 4/E, Cengage Learning.
- Humphrey, Managing the Software Process.

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**BCA - 310      Personality Development**

**Note:** Total **8 Questions** are to be set by the examiner covering the entire syllabus uniformly. **Question No. 1 (COMPULSORY)** having **Objective Type Questions** of **2 marks** from entire syllabus. Rest of the **Seven** questions are from **Section A, B & C** of **Syllabus**. A candidate is required to attempt any **Four questions** out of Sections A, B & C by selecting **ATLEAST ONE** Question from Each Section. All questions shall carry equal marks.

**Total Marks : 150**  
**Theory Paper : 100**  
**Internal Assessment : 50**

**Minimum Pass Marks : 40%**  
**Maximum Time : 3 Hrs.**

**Section – A**

**Personality & Personal Grooming :** Personality and self-concept, Element of Personality, Determinants of Personality, Causes of deranged Personality, Personality Analysis. Grooming, Personal hygiene, Social, Business and Dining Etiquettes, Body language use and misuse, Art of good Conversation, Art of Intelligent Listening.

**Section – B**

**Interpersonal Skills & Role playing:** Dealing with seniors, colleagues, juniors, customers, suppliers, contract workers, owners etc at work place.

**Group Discussion & Presentation skills:** Team behavior, how to effectively conduct yourself during GD, do's and don'ts, clarity of thoughts and its expression, Presentation skills & seminar skills.

**Section – C**

**Interviews Preparation:** Intent and purpose, selection procedure, types of interviews, Self planning, writing winning resume, knowledge of company profiles, academics and professional knowledge review, update on current affairs and possible questions, time – keeping, grooming, dress code, document portfolio, frequently asked questions and their appropriate answers, self – introduction, panel addressing, mental frame – work during interviews

**References :**

- Venkata Ratanam C.S, Srivastava B.K. ,Personal management and Human Resources, Tata McGraw Hill Publishing Ltd. New Delhi.
- Keith Davis, Human Behaviour at Work, Tata McGraw Hill Pub. Ltd. New Delhi.
- Thomas A. Harris, I m OK, You re OK, Pan Books, London and Sydney.
- Ranjana Salgaocar, Pleasure of your Company, Pyramid Publishers, Goa.
- Arun Agarwal, How to get the job you want, Vision Books, New Delhi.
- Rohit Anand, Sanjeev Bikhchandani, Get That Job, Harper Collins.