

## Semester – I

Paper Code	Paper Name	Theory		Sessional		Practical		Total
		Max	Min	Max	Min	Max	Min	
SOSBCA101	Calculus	80	32	20	12	-		100
SOSBCA102	Information Technology	80	32	20	12	-		100
SOSBCA103	Internet & E - commerce	80	32	20	12			100
SOSBCA104	Problem solving using 'C'	80	32	20	12	-		100
SOSBCA105	PC Packages	80	32	20	12	50	25	150
SOSBCA106	Practical in 'C'	-		20	12	80	40	100
	<b>Total</b>	<b>400</b>		<b>120</b>		<b>130</b>		<b>650</b>

## Semester – II

Paper Code	Paper Name	Theory		Sessional		Practical		Total
		Max	Min	Max	Min	Max	Min	
SOSBCA201	Advance Calculus	80	32	20	12	-		100
SOSBCA202	Computer Organization	80	32	20	12	-		100
SOSBCA203	Communicative English Grammar	80	32	20	12			100
SOSBCA204	Object Oriented Programming in C++	80	32	20	12	-		100
SOSBCA205	DBMS	80	32	20	12	50	25	150
SOSBCA206	Practical in c++	-		20	12	80	40	100
	<b>Total</b>	<b>400</b>		<b>120</b>		<b>130</b>		<b>650</b>

## Semester – III

Paper Code	Paper Name	Theory		Sessional		Practical		Total
		Max	Min	Max	Min	Max	Min	
SOSBCA301	Discrete Mathematics	80	32	20	12	-		100
SOSBCA302	Visual Basic.Net	80	32	20	12	-		100
SOSBCA303	Introduction to Operating System	80	32	20	12			100
SOSBCA304	Communication Techniques	80	32	20	12	-		100
SOSBCA305	Computer Graphics & Multimedia	80	32	20	12	50	25	150
SOSBCA306	Practical in Visual Basic.Net	-		20	12	80	40	100
	<b>Total</b>	<b>400</b>		<b>120</b>		<b>130</b>		<b>650</b>

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## Semester – IV

Paper Code	Paper Name	Theory		Sessional		Practical		Total
		Max	Min	Max	Min	Max	Min	
SOSBCA401	Numerical Methods	80	32	20	12	-		100
SOSBCA402	Advanced Computer Architecture	80	32	20	12	-		100
SOSBCA403	Data Structure using c++	80	32	20	12	50	25	150
SOSBCA404	Accounting & Management Control	80	32	20	12	-		100
SOSBCA405	Programming in Java	80	32	20	12			100
SOSBCA406	Practical in Java	-		20	12	80	40	100
	<b>Total</b>	<b>400</b>		<b>120</b>		<b>130</b>		<b>650</b>

## Semester – V

Paper Code	Paper Name	Theory		Sessional		Practical		Total
		Max	Min	Max	Min	Max	Min	
SOSBCA501	Differential Equations	80	32	20	12	-		100
SOSBCA502	Software Engineering	80	32	20	12	-		100
SOSBCA503	Artificial Intelligence & Expert Systems	80	32	20	12			100
SOSBCA504	Programming in Advance Java	80	32	20	12	-		100
SOSBCA505	Oracle 8i	80	32	20	12	50	25	150
SOSBCA506	Practical in Advance Java	-		20	12	80	40	100
	<b>Total</b>	<b>400</b>		<b>120</b>		<b>130</b>		<b>650</b>

## Semester – VI

Paper Code	Paper Name	Theory		Sessional		Practical		Total
		Max	Min	Max	Min	Max	Min	
SOSBCA601	Probability & Statistics	80	32	20	12	-		100
SOSBCA602	Networking Concepts	80	32	20	12	-		100
SOSBCA603	Introduction to Asp.net & C#	80	32	20	12			100
SOSBCA604	Software Testing	80	32	20	12	-		100
SOSBCA605	Mobile Application Development	80	32	20	12	50	25	150
SOSBCA606	Project in Asp.net & C#	-		20	12	80	40	100
	<b>Total</b>	<b>400</b>		<b>120</b>		<b>130</b>		<b>650</b>

## Program Specific Outcome:

Aim of BCA programme is to prepare graduates for attaining the ability to apply knowledge of computer science in practice. It also enhances not only comprehensive understanding of the theory but its application too in various fields. In order to enhance programming skills of the young IT professionals, the program has also provide concept of software project development in language/technology.

PAPER CODE SOSBCA - 101

**Calculus**

**Course Outcome -**

After completion of the course, student will get the skill to solve differentiation and Integration of rational and irrational algebraic functions and transcendental functions.

**UNIT-I**

**Review of concepts of function of one variable:** Definition of a function, Types of Functions. **Limits:** definition, working rule for finding out the limit, fundamental properties of limits, problems based on limits. **Continuity:** Definition, Points of Discontinuity, Classification of Discontinuity, Problems based on Continuity & Discontinuity. **Differentiability:** Condition for Differentiability and problems.

**UNIT-II**

Rolles theorem, First and Second Mean value theorems, Taylor's theorem, Successive differentiation, Leibnitz Theorem, Taylor's & Maclaurin's series, Intermediate forms.

**UNIT-III**

Tangents, Normals, Curvature, Tests for Concavity and Convexity, Points of Inflexion, Multiple Points, Tracing of Curves in Cartesian and polar co-ordinates.

**UNIT-IV**

Integration of rational and irrational algebraic functions and transcendental functions, reduction formulae.

**UNIT-V**

Definite Integrals, Quadrature, Rectification, Volumes and surfaces of solids of revolution.

**Text & Reference Books :**

1. Differential Calculus by Gorakh Prasad
2. Integral Calculus by Gorakh Prasad
3. Schaum's Outline Series on Calculus



**PAPER CODE SOSBCA – 102**  
**Information Technology**

**Course Outcomes-**

On the completion of this course, student will get the skill to expertise in fundamental concepts of Information Technology and Familiar with peripheral devices, programming languages, computer software and basics of networking.

**UNIT 1** - Computer system concepts, Computer system characteristics, Capabilities and limitations, Types of computers-Analog, Digital, Hybrid, General, Special Purpose, Micro, Mini, Mainframe, Super, Basic components of a computer system - Control unit, ALU, Input/Output functions and characteristics, memory - RAM, ROM, EPROM, PROM and other types of memory. Data representation and codes, Decimal, Binary ,Octal and Hexadecimal System and inter conversion ,BCD numbers and ASCII codes.

**UNIT 2**-Computer hardware, Input devices- Keyboard, Mouse, Trackball, Joystick, Digitizing tablet, Scanners, Digital Camera, MICR, OCR, OMR, Bar-code Reader, Voice Recognition, Light pen, Touch Screen, Output devices- Monitors - characteristics and types of monitor -Digital, Analog, Size, Resolution, Refresh Rate, Interlaced / Non Interlaced, printers - daisy wheel, dot matrix, inkjet, laser, line printer, plotter, sound card and speakers , memory devices, ram, rom, mass storage devices, cd-rom, flash memory and their characteristics and uses.

**UNIT 3**-System software - Assemblers, Translators, Interpreters, Compilers, Operating Systems - Functions, Types- Batch, Single, Multiprogramming, Languages : High level languages, Procedural and Object Oriented languages. Application Software – Word Processing, Spreadsheet, Presentation Graphics, Data Base Management Software.

**UNIT 4**-Computer networking: Goals and applications, LAN, MAN ,WAN computer communication.: communication modes : simplex, half duplex, full duplex.types of network - lan, wan, man etc., topologies of lan - ring, bus, star, and tree topologies, components of lan -media, bridges, hub, routers, repeater and gateways, communication channels - twisted, coaxial, fiber optic, modem –characteristics.

**UNIT 5**- what is – Desktop, Cluster, Grid, and Cloud computing, why cloud computing, Challenges and opportunities, cloud computing three basic services- SAAS,PAAS,IAAS. Concept of Big Data , Difference Between Big Data and Small Data , 3V Characteristics - Volume , Velocity , Variety. Different Types of Big Data. -Structured Big Data, Un Structured Big Data, Semi Structured Big Data , What is Hadoop.

**Text & Reference Books :**

- 1.Introduction To Computers C. Xavier 2ndedition,
2. - Principles of big data Preparing, Sharing and Analyzing Complex Information - Jules J. Berman
3. *Cloud Computing: Principles and Paradigms*, - Rajkumar Buyya, James Broberg, Andrzej M. Goscinski-



**PAPER CODE SOS BCA – 103  
INTERNET & E- COMMERCE**

**Course Outcomes-**

At the end of this course , student will get the skill of using Internet and its services, E-mail, different protocols and how to work on browser that perform searching on search engines. Students will aware general idea of e-commerce and their business significance.

**UNIT I**

Introduction of Internet & E- Commerce: Internet & Its services , H/S & S/W requirements to connect to the internet, Introduction of WWW, Web Server and Web Client, Difference between the web and the internet, Internet Service Provider (ISP), Web publishing concepts, Domain name registration, space on host server for website .

**UNIT II**

Choosing an Internet service Provider: Stability, Customer service, Performance , Pricing, Establishing an Internet account. E- mail Basics: Running an E - Mail program, Sending mail, Reading mail, Replying to mail, Deleting mails, Newsgroups, mailing Lists, Chatting.

**UNIT III**

Data Transmission Protocols , client/Server Architecture & its Characteristics, FTP & its usage. Telnet Concept , Remote Logging , Protocols , Terminal Emulation. Message board, Internet chatting - Voice chat , text chat

**UNIT IV**

An Introduction to Internet Explorer: Starting Internet Explorer, A quick tour with Internet Explorer, At the Helm in internet explorer, viewing Various file types. Internet search Engine: What is search Engine , How do search Engines work, Types of search Engines..

**UNIT V**

Brief history of e-com, Elements of e- com, Types, Intermediaries, and E- commerce, Advantages and Disadvantages of e-com, E-commerce practices Vs traditional business practices. E-Business: E-Business Vs E-Commerce, EDI- Who use EDI, Origin, Benefits, Migration to open EDI-Approach, E-com with WWW/Internet.

Electronic Communication & WWW: PC & networking, network topology and communication media, E-mail, OSI and TCP/IP models, LAN, WAN, MAN, internetworking - Bridges and gateways, What is WWW, Web Architecture, The Web and E- com. Electronic Payment System: Overview, Electronic or digital cash , Electronic checks - Benefits , Online credit based system, Debit card , smart Cards.

**Text & Reference Books :**

1. Alexis Leon and Mathews Leon - Internet for everyone (Tech World )
2. Douglas Comer - The Internet Book (prentice Hall)
3. SYBEX - BPB publication - Internet Complete (Second Edition )
4. V.K. Jain - O level Module - M- 1.2 - Internet & web page designing , BPB Publication
5. " Electronic Commerce (A Manager's Guide) " By Ravi Kolkata & Andrew B. Whinston.
6. " Web Commerce Technologies Handbook " By Daniel Minoli & Emma Minoli
7. "E- Commerce" By Dr. Varinder Bhatia



**PAPER CODE SOS BCA - 104**

**Problem solving using 'C'**

**Course Outcomes-**

Upon successful completion of this course student will get the skill of writing code in C language through decision control statements, loop statements, arrays, modular programming and pointers after that student will write efficient programs in C language. The main focus is on problem solving techniques, algorithm, and flow chart and writing efficient programs.

**Unit 1**-programming fundamentals : program concept, algorithms, flow charts - symbols, rules for making flow chart, advantage & disadvantage, programming techniques – top down, bottom up, modular, structured - features, merits & demerits, Testing & debugging.

**Unit 2**-programming in c including features of 'c', ctokens, variables, identifiers, keywords, data types, constants, operator and expression, operators: arithmetic, logical, relational, conditional and bit wise operators, precedence and associativity of operators, type conversion in expression, basic input/output and library functions single character input/output i.e. getch(), getchar(). Getche(), putchar(),formatted input output i.e. printf() and scanf().

**Unit 3**- branching constructs: If statement, if.....else statement, nesting of if...else statement, else if ladder, the ?: operator, goto statement, switch statement, compound statement, loop controls: for, while, do-while loops, break, continue, goto statement, arrays : what is array,declaring initializing 2d array. String: declaration,string functions – strcat,strcmp,strcmp, strlen, strstr.

**Unit 4**- functions: categories, user defined function , function arguments, return values and nesting of function, recursion, calling of functions, scope and life of variables - local and global variable, storage classes - auto, extern, static, pointers: operations on pointers, operators for pointers, pointers and function, array of pointers, pointer and strings.

**Unit 5**- preprocessor, #define, defining functions like macros, #error, #include, conditional compilation directives i.e. #if, #else, #elif and #ifdef & undef. structures : the concept of structure , initializing a structure, the structure tag, dot operator , array of structure, structure and pointer, arrow operator and nesting of structure. Unions : initialization and use of it in a program. Command line arguments

**Text & Reference Books :**

- 1.Let us C Yashwant Kanitkar, BPB Publicatiuon
- 2.Programming in ANSI C Balgurusuamy Tata McGraw Hill
- 3.C Programming Schaum's series
4. The sprit of C Mulish Cooper, Jaico Publishing
5. Programming with ANSI & Turbo C Kamthane, Pearson Education.



**PAPER CODE SOS BCA - 105**  
**PC Packages**

**Course Outcomes-**After completion of the course, skill of students will be increase so they can easily understand the core concepts of computer applications. Students will also get skilled in the use of computer applications such as ms word, access, excel and power point presentation slides relevant to their upcoming project and their reports.

**UNIT – I**

**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; Shortcuts & Autostarts; Accessories and Windows Settings using Control Panel; Start button & Program lists; Installing new Hardware & Software.

**UNIT – II**

**BASICS OF WORD:** creating word documents; the word window , entering text . editing document text; text, copying and moving text. applying text enhancements; applying fonts and font styles in word, highlighting text for distinctive look . aligning and formatting ; aligning text, using indentation options, setting line spacing options, using tabs. creating lists, numbers and symbols ; numbering and bullets, creating special characters. replacing and checking text ; creating and applying frequently used text, finding and replacing text , more about spelling and grammar, using the thesaurus command. getting into print ; using print preview, changing page orientation and paper size, aligning text vertically, setting margins, printing options.

**Advanced Formatting Techniques in Word :**Formatting Pages; Formatting Sections, Creating and Modifying Page Numbers, Creating Headers and Footers , Taking Care of Loose Ends .Working With Columns ; Working With Newspaper Columns, Revising Column Structure. Constructing High-Quality Tables ; Creating and Revising Tables , Modifying Table Structure , Formatting Tables , Using Tables Calculatingly. Working Smarter with Word ; Using Templates. Creating Outlines in Word ; Creating an Outline , Modifying an Outline

**UNIT- III**

**access concepts & terms :** database tables ,relational databases , records , fields , controls & objects , queries & dynasets, forms, reports ,properties , wizards , macros , access requirements , starting & quitting access , the access workspace & tool, views . Creating database & tables with & without wizard , field name , data types & properties , adding & deleting fields in fields , renaming fields & their caption , resizing fields , freezing columns , primary key field & indexing fields. Form: Form wizard , saving & modifying forms : Entering & Editing data , Finding , sorting & displaying data , queries & dynasets , creating & using select queries , using wild cards in queries , reformatting dynasets. Reports : Creating reports, previewing reports, printing reports, modifying, saving. Relational databases – definition, purpose, creation, viewing, deleting. Expressions , Macros.

**UNIT- IV**

**Creating Excel Worksheets :**Entering and Editing Cell Entries ; The excel Application Window , Workbooks and Worksheets, Moving the Cell Pointer, Entering Text and Numbers , Revising Text and Numbers. Working with Numbers ; Creating Formulas, Formatting numbers. Changing Worksheet Layout ; Adjusting Column Width and Row Height, Inserting and Deleting Rows and Columns, Inserting and Deleting Cells , Moving and Copying Cell Contents , Naming a Worksheets , Selecting Worksheets , Copying and Moving Worksheets, Inserting and Deleting Worksheets, Other Formatting Options ; Aligning Text , Border and Color. Printing in Excel ; Print Preview, Changing Page Setup , Checking Worksheet Spelling.

**Advanced Techniques in Excel :** Using Functions and References ; Using Functions , Entering Functions, Relative and Absolute Cell References. Naming Ranges ; Naming Ranges , Using Names . Creating Easy-to-Understand Charts ; Pie Charts , Series Charts , Creating Charts , Moving , Sizing , and Printing Chart Objects . Editing and Formatting Charts ; Adding a Data Series , Deleting a Data Series , Modifying and Formatting Charts.

**UNIT – V**

**Creating PowerPoint Presentations:**Creating a Basic Presentation , Building Presentations, Modifying Visual Elements , Formatting and Checking Text , Adding Objects, Applying Transitions , Animation Effects and Linking , Preparing handouts , Taking the Show on the Road.

**Text & Reference Books :** 1. Microsoft Office 97 : Will Train , Gini Courter, Annette Marquis *bpb Publication*.



**PAPER CODE SOS BCA– 201**  
**Advanced Calculus**

**Course Outcomes-**

After completion of the course, student will get the skill to solve of the partial derivative of a function and its applications, apply beta and gamma function to simplify integration and understand the concept of convergence of improper integrals.

**UNIT-I**

Partial differentiation:

Function of several variables, Limits, continuity and differentiability, Partial derivatives, Euler's Theorem, Mean value theorem & Taylor's theorem for functions of Two variables.

**UNIT-II**

Envelopes, Evolutes, Maxima, Minima and saddle points of functions of two variables, Lagrange's multiplier method.

**UNIT-III**

Gamma and Beta functions and their properties, some important deductions (duplication formula)

**UNIT-IV**

Multiple integrals:

Integration of functions of two & three variables, Double & triple integrals, Change of order of Intigration , Use of double and triple integrals in finding areas and volumes.

**UNIT-V**

Improper Integrals:

Convergence of improper integrals, Evaluation of convergent improper integrals.

**Text & Reference Books :**

1. Schaum's Outline Series on Calculus
2. Differential Calculus by Gorakh Prasad
3. Integral Calculus by Gorakh Prasad



**PAPER CODE SOS BCA - 202**  
**Computer organization**

**Course Outcomes-**

On completion of the course, Students will get the skill to examine the operation of the major building blocks of a computer system and it also familiar to number system, Boolean algebra, flip-flops and memory hierarchy.

**UNIT 1-**Boolean algebra, Boolean equation of logic gates , Logic Gates, AND, OR, NOT GATES and their Truth tables, NOR, NAND & XOR gates, Boolean Algebra, Basic Boolean Law's, Demorgan's theorem, Boolean laws and theorems, Duality theorem.

**UNIT 2-**karnaugh map map simplification, minimization techniques, sum of product & product of sum., pairs, quads and octats , donot care condition,,grey code,multiplexer and demultiplexer, bcd to decimal decoder, seven segment dcoder,encoder.

**UNIT 3-**aritmatic circuits, binary addition, unsigned binary numbers, sign magnitude numbers, 2's complement arithmetic addition, subtraction, overflow, half adder, full adder, subtractor circuits.

**UNIT 4-**Flip flops, RS, D, JK, Master Slave, Shift registers, Types of shift registers, Asynchronous and Synchronous counters.

**UNIT 5-**semiconductor memories, memory addressing, rom, proms, eproms, rams, drams, srams, memory cells a to d and d to a converters.

**Text & Reference Books :**

- 1.Digital Principles and applications Malvino A.P. & Leech Tata Mc Graw Hill
- 2.Digital Computer Organisation – Morris Mano – Pearson

**PAPER CODE SOS BCA - 203**  
**Communicative English Grammar**

**Course Outcomes-**

At the end of this course, students will get the skill of English grammar in writing and speaking. Hence Communicative skill of students will be increase that make student more appropriate in corporate world.

**Unit-I Sentence-** its kinds, subject and predicate. Parts of Speech- Noun, Pronoun, Adjective, Verb and Adverb in detail.

**Unit-II Tenses-** Present, Past and Future (Indefinite, Continuous, Perfect & Perfect Continuous) Conditional Sentences, Sequence of Tenses, Agreement of the verb with the subject, Active and Passive Voices, Direct and Indirect Narration.

**Unit-III** Uses of Infinitive, Participles and Gerund. Articles, Punctuation and Preposition, **Word-building-** forming Nouns from Verbs/ Adjectives and vice versa, Prefixes and Suffixes.

**Unit-IV The Structure of Sentences-** Clauses (subordinate and coordinate) and Phrases, Simple, Complex and Compound Sentences. Transformation of Sentences, Synthesis of Sentences.

**Unit-V Translation-** from Hindi to English & Vice Versa. Writing a paragraph in about 100-150 words on current National/International Events, Renowned Political Leaders, Sports Personalities, Social workers, Thinkers, Scientists, Nobel Prize Winners etc.

**Text & Reference Books :**

1. A.J. Thomson & A.V. Martinet : A Practical English Grammar.(OUP)
2. F.T. Wood : A Remedial English Grammar for Foreign Students.(Macmillan)
3. Michael Swan : Practical English Usage.(OUP, ELBS)
4. Wren & Martin : High School English Grammar & Composition. (Revised by N.D.V Prasada Rao, S.Chand & Co.)
5. W.S. Allen : Living English Structure.



**PAPER CODE SOS BCA - 204**  
**Object Oriented Programming with C++**

**Course Outcomes-**

After successful completion of this course, student will get the skill to use of object oriented programming concepts such as class, object, inheritance, encapsulation, polymorphism and stream classes which will help us to design software and to solve real life problems.

**UNIT-I**

Introduction to OOPS languages: concept, characteristics of OOP's languages, benefits of OOP's, disadvantage of OOP's. Application of OOP's., **Classes & Objects:** Specifying a Class, Creating Objects, Accessing Class members, Defining member function, Outside Member Functions as inline, Accessing Member Functions within the class, Static data member, Access Specifiers: Private, Protected and Public Members. class. Passing objects to function, Returning objects, Object assignment, This pointer.

**UNIT-II**

Constructor & Destructor : Introduction, Constructor, Parameterized constructor, Multiple constructor in a class, Constructor with default argument, Copy constructor, Default Argument, Constructing two dimensional Array, Destructor. Array, Pointers, and references: Array of objects, Pointers to object, , Pointer to class members. References: Reference parameter, Passing references to objects, Returning reference, Independent reference, The Dynamic Allocation operators New, delete.

**UNIT-III**

Function & operator overloading : Function overloading, Overloading constructor function finding the address of an overloaded function, Operator Overloading: Creating a member operator function, Creating Prefix & Postfix forms of the increment & decrement operation, Overloading the shorthand operation (i.e. +=,-= etc), Operator overloading restrictions,

**UNIT-IV**

Inheritance : Base class Access control, Inheritance & protected members, Protected base class inheritance, Inheriting multiple base classes, Constructors, destructors & Inheritance, When constructor & destructor function are executed, Passing parameters to base class constructors, Granting access, Virtual base classes . Virtual functions & Polymorphism : Virtual function, Pure Virtual functions, Early Vs. late binding

**UNIT-V**

The C++ I/O system basics : C++ streams, The basic stream classes: C++ predefined streams, Formatted I/O: Formatting using the ios members, Using manipulators to format I/O, Creating your own manipulators, -File Management: Introduction – File handling, File structure, File handling function, File types, Streams, Text, Binary, File system basics, The file pointer, Opening a file, Closing a file, Writing a character, Reading a character.

**Text & Reference Books :**

- C++ The complete reference - Herbert Schildt,- TMH Publication*
- Object Oriented Programming C++ - R. Lafore , Pearson edu.*
- Object Oriented Programming With C++ - R. Subburaj, Vikas Publishing House, New Delhi.*
- C++- E. Balguruswamy, , Tmh Public*
- Object oriented programming and C++, R.Rajaram, New Age International.*
- Mastering C++ K.R. VenuGopal, T.RaviShanker, Tata Mcgrawhill*



**PAPER CODE SOS BCA - 205  
DBMS**

**Course Outcomes-**

After successful completion of this course, student will get the skill data managing through database management systems, various models and SQL queries. Skill of students will be increase so they can easily develop databases with all the constraints which will help in storing and retrieving data easily.

**UNIT 1-Introduction:** Database system concepts, Data base system, Advantages of database systems; Data Architecture of data system: View/Schema, logical, conceptual and physical and their interrelationship DDL, DML and data dictionary, Data base administrator. Entity Relationship Model as a tool of conceptual design : Entities & Entity set, Relationship & Relationship set, Attributes, Mapping Constraints, Keys, Entity-Relationship diagram (E-R diagram) : Strong & weak entities, Generalization, Specialization, Aggregation, Reducing ER diagram to tables.

**UNIT 2- Relational, Hierarchical and Network Model** their advantages and disadvantages, storage organization for Relations. Rational Model: Structure tuple Attributes, Normalization : First, Second, Third & BCNF Normal Forms, key, primary key, Candidate key, Integrity rules : Entity integrity, Referential integrity rule.

**UNIT 3-Relational algebra:** select, project, cross product, different types of joins i.e. theta join, equi join, natural join, outer join, set operations definition of union, set difference, cartesian product, selection, intersection, relational query language.

**UNIT 4- Functional protection and crash recovery:** protection against crashes: different types of crashes; backup, journal, rollback, committed and uncommitted transactions, security on database.

**UNIT 5-transaction concept, transaction state, serializability security or database:** user identification. Physical Protection and maintenance, Transmitted of Rights. Integrity: Integrity violation, Implementation of check's in enforcing integrity; Concept of Distributed database.

**Text & Reference Books :**

1. Introduction Of Database System - C.J. Date - Addison - Wesley
2. Principles of database system - Jeffery D. Ullman Galgotia Publication
3. Database system concepts - Henry F. Korth



**PAPER CODE S0S BCA - 301**  
**Discrete Mathematics**

**Course Outcomes** - Students completing this course will get the skill to express a logic sentence in terms of predicates, quantifiers, logical connectives, Algebra of propositions as well as Set Theory. They will be skilled to evaluate Boolean functions and simplify expressions using the properties of Boolean algebra.

**UNIT-I Introduction and Preliminaries:** Logical connectives, Truth tables, Tautologies and Contradiction, Logical equivalence, Algebra of propositions. **Set Theory:** Set, Singleton set, Finite and Infinite sets, Subsets, Proper subsets, Equality of sets, Union, Intersection and Difference of sets, Universal set, De Morgan laws, Symmetric difference of sets, Generalized De Morgan laws, Cartesian product of sets.

**UNIT-II Relations:** Relation between two sets, Binary relation on a set, Types of binary relations, Equivalence relation, Equivalence class, Partition of a set, Fundamental theorem of equivalence relation, Composition of relations. **Functions:** Function or mapping, One-one, Many-one, into and onto mappings, Identity mapping, Constant mapping, Equality of mappings, Inverse of a mapping, Composition of mappings.

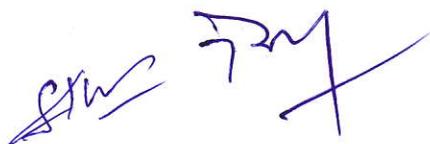
**UNIT-III Boolean algebra:** Definition and properties of Boolean algebra, a brief introduction to the application of Boolean algebra to switching theory, conversion of complicated switching circuits to simple one, Disjunctive and Conjunctive normal forms. **Graph Theory:** Introduction to graph theory, Paths and Circuits, Trees, Spanning trees, Cut-sets, Fundamental circuits and cut-sets.

**UNIT-IV Matrices:** Introduction, Expression of complex numbers in the form of a matrix, De Moivre's theorem, Elementary transformations, Elementary matrices, Equivalent matrices, Properties of equivalent matrices, Sub-matrix of a matrix, Rank and Nullity of a matrix, Row equivalence and canonical form, Normal form of a matrix.

**UNIT-V** Solution of Homogeneous and Non-homogeneous system of linear equations, Characteristic roots and Characteristic vectors of a matrix, Caley-Hamilton theorem, to find the inverse of a non-singular matrix using Caley-Hamilton theorem.

**Text & Reference Books :**

1. Discrete Mathematical Structures with Applications to Computer Science by Tremblay & Manohar.
2. Discrete Mathematics by Iyengar, Chandrasekharan, Venkatesh & Arunachalam.
3. Discrete Mathematical Structures by Kolman, Busby & Ross.
4. Graph Theory with Applications to Engineering and Computer Science by Narsingh Deo.
5. Discrete Mathematical structure by Kolman.
6. Discrete Mathematics by J.P. Sharma
7. Graph Theory by Harvey.



**PAPER CODE SOSBCA - 302**  
**Visual Basic .NET**

**Course Outcomes** - Students will get the skill to code, analysis, and execute of Event Driven Programming. Apart from it students will be able to understand Database like Connections, Data adapters, datasets, Data Reader, Connection to database with server explorer, Data binding with controls like Text Boxes, List Boxes, Data grid etc.

**UNIT 1**

Introduction to VB.NET, Event Driven Programming, NET as better, Programming Platform NET Framework, NET Architecture, CLR, The Just-In-Time Compiler, Garbage Collection,.NET Framework class library introduction VB.NET Development Environment, Creating Applications, Visual development & event drive Programming -Methods and events.

**UNIT-2**

The VB.NET Language- Variables -Declaring variables, Data Type of Variables,Arrays, Handling and Using Interfaces, Control flow statements: conditional statement, loop statement. Message box & Input box, Function creation.

**UNIT 3**

VB.NET Language Controls: Text Boxes, Buttons, Labels, Check Boxes, and Radio Buttons. List Boxes, Combo Boxes. Picture Boxes, Scrollbars, Splitters, Timer, Menus, Built-in Dialogs Image List, Tree Views, List Views, Toolbars, Status Bar and Progress bars, OpenFileDialog, SaveFileDialog, Font Dialog,

**UNIT -4**

Understanding Delegates. Class Library Overview. Creating a Class Library. Working with the Class Library Understanding Built-In Classes. Creating User-Defined Classes. Understanding Constructors and Instance Variables., Introduction to Error Types: Understanding Syntax Errors, Understanding Runtime Errors and Using Exception Handling, Understanding Logical Errors and Using Break Points.

**UNIT 5**

Database : Connections, Data adapters, and datasets, Data Reader, Connection to database with server explorer Multiple Table Connection Data binding with controls like Text Boxes, List Boxes, Data grid etc.Navigating data source Data Grid View,  
Data form wizard Data validation Connection Objects, Command Objects, Data Adapters, and Dataset Class.

**Text & Reference Books :**

1. Mastering VB.NET by Evangelos petroustos- BPB publications
2. Introduction to .NET -Worx publication
3. Introduction to .NET –Unleashed



**PAPER CODE SOSBCA - 303**  
**Introduction to Operating System**

**Course Outcomes** – After completion of the course, student will get the skill to analysis of basic elements, types of operating system, system calls, processor registers, Instruction execution and various processing. Student can understand skill of Communication techniques, Concept of Process, Memory management, Information Protection, Scheduling and Resource Management Structure.

**UNIT 1**-Computer system overview, Basic elements , functions and types of operating system Serial Processing , Batch System, multi- programmed , Batch System, Time sharing systems., System components, Operating system Services, System Calls, Processor registers, Instruction execution, Interrupts, Interrupt processing.

**UNIT 2**- Memory hierarchy, Cache memory, I/O Communication techniques , Concept of Process, Memory management, Information Protection, Scheduling and Resource Management Structure , Process description, Process state, Two state process model, Creation and termination of processes, Five state model, Suspended process, Process description, Process attributes

**UNIT 3**-. Semaphores, Classical Problem Of Synchronization, Monitors, Atomic Transactions, System Model, Deadlock Characterizations, Method for Handling Deadlocks, Deadlock Prevention, Deadlock Avoidance, Deadlock Detection, Recovery from Deadlock, Combined approach to Deadlock.

**UNIT 4**-. Process Concepts, Process State & Process Control Block, Process Scheduling, Scheduling, Criteria, Scheduling Algorithms, Multiple- Processor Scheduling Real-Time Scheduling, Critical Section Problem.

**UNIT 5**-Loading programs, Fixed portioning, dynamic portioning, Relocation, simple paging, Simple segmentation, Loading and Linking. Paging, Segmentation, Segmentation With Paging, Virtual Memory, Demand Paging, Performance of Demand Paging, Page Replacement, Page Replacement Algorithms.

**Text & Reference Books :**

Operating System Concepts - Silberschatz & Galvin, Addison Wesley Publication  
Operating System - W. Stallings, Second Edition, Prentice Hall of India



**PAPER CODE SOSBCA - 304**

**Communication Techniques**

**English Language:**

**Course Outcomes** – After completion of the course, student will get the grammar skill of English language. Student can understand Language Skills like listening, speaking, reading, and writing. Student can understand purpose, role, importance, elements of communication. Student can learn that how to prepare general and technical documents.

**UNIT 1**-Review of English Grammar; Written and Spoken Language; Common Errors in language; Punctuation (purpose, role, importance and use); OED; Language Skills(Listening, Speaking, Reading, Writing).

**UNIT 2**- Meaning what you mean; Listening: Effective and efficient listening in various situations (discussions, lectures, news, seminars, speech, telephone calls etc.); Reading: Purpose; Comprehension; Tactics and strategies for good reading; Writing: Guidelines for good writing; various writing styles (General and Technical writing styles).

**COMMUNICATION SKILLS:**

**UNIT 3**- Communication (Purpose, Role, Importance, Elements); Effective And Efficient Communication; Role Of Content, Context And Language; Spoken And Written Communication; Presentation And Delivery; Role Of Speaker And Audience; Style And Body Language.

**UNIT 4**-Planning, organization, presentation, participation, conduction and feedback of discussions, meetings, seminars etc; Effective and efficient presentation and discussion skills; Discussion and Presentation skills of conferences, meetings, seminars etc.

**UNIT 5**-General and Technical documents(correspondence (applications, letters, resumes, CV), drafts, proposals, précis, reports, summary, synopsis,.)Use of Audio-Visual Aids: OHP, Slides, Charts, Computers.

**Text & Reference Books :**

- 1.Wren & Martin - Grammar
- 2.Books Prescribed By M.P. Uchaha Shiksha Anudan Ayog Are The Text Books For This Syllabus.



**PAPER CODE SOS BCA - 305**  
**Computer Graphics & Multimedia**

**Course Outcomes** – Student will get the skill to solve the problem of Graphics Systems Applications, Display Devices, and Input Devices. Student will get the skill of utilization of algorithms like DDA Algorithm, Bresenham's Algorithm for line and circle, Mid-Point Circle Algorithm, Scan-line Polygon Fill Algorithm and Flood-Fill algorithm.

**UNIT 1**-Basics Of Graphics Systems Applications, Display Devices : Video Displays, Raster-Scan Displays, Random Scan Displays, Dvst, Flat-Panel Displays. Input Devices : Keyboards, Mouse, Trackball And Space Ball, Joysticks, Igitizers, Image Scanner, Touch Panel, Light Pens, Voice Systems Etc.

**UNIT -2**-Line drawing algorithms: DDA Algorithm, Bresenham's line Algorithm. Bresenham's Circle drawing algorithm, Mid-Point Circle Algorithm, Scan-line Polygon Fill Algorithm, Inside-Outside test, Boundary Fill algorithm, Flood-Fill algorithm. Pixel, Pixel addressing, Antialiasing.

**UNIT 3**-Clipping : Cohen-Sutherland Line Clipping Algorithm, Line Clipping Using Non Rectangular Clip Windows, Polygon Clipping, Text Clipping.

**UNIT 4**- Two-dimensional geometric transformation : Translation, Rotation, Scaling, Reflection, Shear, Matrix representation and Homogeneous coordinates. Composite transformation: Translations, Rotations, Scalings. General Pivot-Point Rotation and Scaling.

**UNIT 5** - Introduction To Multimedia: Review Of Multimedia, Multimedia Applications, Multimedia Systems Architecture, Multimedia Hardware, Multimedia Software, Representation And Operations On Various Multimedia Data Types: Text, Images, Graphics, Video And Audio, Introduction To Multimedia Authoring.

**Text & Reference Books :**

1. Computer Graphics – R.C.S. Asthana, N.K. Sinha, New Age International
2. Principles of Interactive Graphics Newman & Sproul McGraw Hill
3. Computer Graphics : Principles & Practice Second Ed. in C Foley, Van Dam, Feiner, Hughes Pearson Education, Eleventh Indian Reprint.
- 4 Computer Graphics Apurva A Desai PHI Learning, 2009
- 5 Computer Graphics Herrington S. Prentice Hall –
- 6 Computer Graphics with Multimedia A Rajaraman Narosa

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**PAPER CODE SOSBCA – 401**  
**Numerical Methods**

**Course Outcomes** - Student will get the skill to solve the common numerical methods like Arithmetic, Floating point number operations, Normalization and their consequences, Emphasis on computational Algorithms, Iterative methods, False position, and how they are used to obtain approximate solutions to otherwise intractable mathematical problems.

**Unit – I** Computer Arithmetic, Floating point number operations, Normalization and their consequences, Emphasis on computational Algorithms, Iterative methods, Zeros of a single transcendental equation and zeros of polynomials using Bisection, False position, Newton- Raphson and Secant methods, convergence of solutions.

**Unit – II** Simultaneous linear equations, Solution of simultaneous linear equations, Gauss elimination method with pivoting, Gauss – Jordan method, Jacobi's iteration method and Gauss – Seidel iteration method, Ill-conditioned equations and refinement of solutions.

**Unit – III Difference Operators and Interpolation:** Definition of Forward, Backward, Shifting, Divided difference, Central and Averaging Operators and their relationships, Newton's forward difference, backward difference and divided difference interpolation formulae, Lagrange's Interpolation formula.

**Unit – IV Numerical Differentiation and Integration:**

Numerical Differentiation using Newton's forward difference, backward difference and divided difference interpolation formulae, General Quadrature formula, Newton Cote's integration, Trapezoidal rule, Simpson's one – third and three – eight rules.

**Unit – V** Numerical Solution of Ordinary Differential equations by Euler's Method, Modified Euler's method, Taylor's series method, Picard's method, Runge Kutta, second order and fourth order methods, Predictor-corrector methods.

**Text & Reference Books :**

1. Computer Oriented Numerical Methods by V.Rajaraman. .
2. Numerical Analysis by S.S.Sastry.
3. Numerical Algorithms by E.V.Krishnamurthy
4. Numerical Methods by B.S.Grewal.
5. Numerical Methods for Scientific & Engg. Computer by Jain & Iyenger.
6. Numerical Method by Bala Guru Swamy .
7. Computer oriented Numerical Method by Salaria.
8. Numerical & Statsitcal Methods in Computer By Singh.



**PAPER CODE SOSBCA - 402**  
**Advanced Computer Architecture**

**Course Outcomes** – After completion of the course, the architectural skill of students will be increase so they can easily understand the Computer Memory System, Conductor / Main Memory, Cache Memory, External memory like magnetic disk organization, RAID, Optical memory, CD- ROM, VROM magnetic tape.

**UNIT 1**-Structure and Function, Computer Interconnection Structure, The computer system, system buses, computer function, fetch and execution cycle, interrupts, multiple interrupts by interconnection and bus design , PCI bus .

**UNIT 2**-Computer Memory System, And Their Characteristics, Semi Conductor / Main Memory , Chip Packaging Error Correction , Cache Memory And It's Mapping .

**UNIT 3**-External memory - magnetic disk organization, RAID, Optical memory, CD- ROM, VROM magnetic tape .

**UNIT 4**-Input/Output External Devices, I/O Module Programmed I/O And Interrupt Driver, I/O Interrupt Controller.

**UNIT 5**- programmable peripheral interface, DMA I/O channels and external interface. Assembly Language Programming: Detailed Study Of 8086/8088 Assembly Language, Instruction Set, Loops And Comparisons, Condition And Procedure, Arithmetic Operator Assembly Language, Illustrations Using Typical Programs Like : Table Search, Subroutines, Symbolic And Numerical Manipulations And I/O

**Text & Reference Books :**

- 1.Computer Organisation And Architecture - Stalling Williams - Phi
- 2.Mano, M.M. - Computer Sustum Architecture, Prentice Hall Of India



**PAPER CODE SOSBCA – 403**  
**Data Structure using C++**

**Course Outcomes** – After completion of the course, students will get the skill of writing algorithms in Data Structure. Student will get the skill to handle operations like searching, insertion, deletion, traversing mechanism etc. on various data structures. Student will also be able to use Graph & Their Representations.

**UNIT 1**-Introduction To Data Structure, Array, Records, Stacks Introduction To Stack & Primitive Operation On Stack, Stack As An Abstract Data Type, Multiple Stack, Stacks Application: Infix, Post Fix, Prefix And Recursion . : Introduction To Queues, Primitive Operations On The Queues, Queue As An Abstract Data Type, Circular Queue, Dequeue, Priority Queue, Applications Of Queue.

**UNIT 2**- Pointer & linked allocation, linear, circular & Doubly linked list, Operations on linked list, application of Linked list: Polynomial manipulation.

**UNIT 3**-Tree: General & Binary Tree. Conversion Of General To Binary Tree. B+ , Traversal Methods- In Order, Preorder & Post Order, Application Of Tree: Manipulation Of Arithmetic Expression.

**UNIT 4**-Graph: Graph & Their Representations. Breadth First & Depth First Search. Spanning Trees. Application Of Graphs: Pert & Related Techniques.

**UNIT 5**-Introduction to file organization; Sequential, Indexed sequential, Relative & Direct file organization. Searching: Linear & Binary Search Sorting :Concept, selection sort, Bubble sort merge Sort, Tree sort & Partition - Exchange sort.

**Text & Reference Books :**

Data Structure and Program design in C by Kruse/Leung - PHI

Fundamentals Of Data Structure, *By S. Sawhney & E. Horowitz*

Data Structure : *By Trembley & Sorrenson*

Data Structure : By Lipschuists (Schaum's Outline Series Mcgraw Hill Publication)



**PAPER CODE SOSBCA - 404**  
**Accounting & Management Control**

**Course Outcomes** – After completion of the course, student will get the skill to describe models and methods relating to reporting, communication, Rules of Journal, Simple journal entries, types, format and balancing of Cash Book. Student should be able to meaning and need of material control.

**UNIT-I** Meaning of Financial Accounts, Important concepts of Accounts, types of accounts, Rules of Journal, Simple journal entries, , Cash Book – Types, Format of Cash book, Balancing of Cash Book, Ledger, posting of entries.

**UNIT – II** Trial Balance, Adjustment Entries Relating To Closing Stock, Outstanding Expenses, Prepaid Expenses, Accrued Income, Unearned Income, Depreciation And Interests On Capital., Simple Final Accounts With The Above Adjustments.

**UNIT – III** Meaning and need of material control, purchasing of materials, inspection of materials, FIFO and LIFO methods of outgoing material, their advantages and limitations.

**UNIT – IV** Pay Master's Department, Pay Roll Accounting , Methods Of Payments Of Wages, Overview Of Computerized Method For Payroll Preparation.

**UNIT – V** Meaning and scope of financial management , functions of finance , Objectives of financial management , Mathematics of finance : present value techniques, fund from operations, importance & usefulness of statement .

**Text & Reference Books :**

1. Book Keeping by Grewal T.S.
2. Cost Accounting by S.K. Maheshwari



**PAPER CODE SOSBCA - 405**  
**Programming in Java**

**Course Outcomes** – After completion of the course, student will get the skill of object-oriented programming in Java language. Apart from this student will get the skill of using AWT components, arrays, Strings: String, and Collection Framework : Set, List, Queue, and Maps.

**UNIT-I**

**Introduction of java** : Types of java, Feature of java, C++ Vs JAVA, JAVA environment, JAVA virtual machine. Constant & Variables, Declaration of Variables, Scope of Variables, Data Types in java, Operators in java, Control statements in java.

**UNIT-II**

Basic concept of OOPS : OOPS terminology, Classes , methods , creating instance & class variable , accessing class member ,Constructor , Methods overloading , Method overriding , final classes , finalizer method, Abstract method & classes , visibility control , Interfaces :Defining interfaces , extending interfaces , implementing interfaces , accessing interfaces , Package - system package , using system package , creating package , accessing a package, adding a class to a package .

**UNIT-III**

Arrays: One Dimensional & Two Dimensional, Strings: String, stringBuffer, and stringBulder. Collection Framework : Set, List, Queue, Maps.

**UNIT-IV**

**Exception Handling-** Fundamental, types, uncaught exception, using try and catch, multiple catch, nested try, throw, throws,finally.

**Java thread model,** creating threads, extending thread class, stopping & blocking a thread, Life cycle of thread, thread exception, thread priority, synchronization- implementing and runnable interface, inter thread communication, multithreading.

**UNIT-V**

What is an applet, applet architecture, applet life cycle, a simple applet program, AWT-Working with Graphics; line, rectangles, ellipses, circles, arcs, polygons Working with colors; Working with fonts.

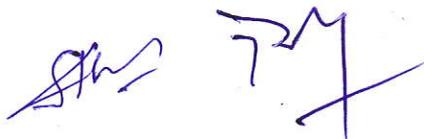
**Text & Reference Books :**

Java Complete Reference – Tmh Publications

Java Volume I & II – Pearson Education

Programming In Java, 2nd Edition, E. Balaguruswamy, ,Tmh Publications

Peter Norton Guide To Java Programming , Peter Norton, Techmedia Publications



**PAPER CODE SOSBCA – 501**  
**Differential Equations**

**Course Outcomes** – After completion of the course, student will get the skill to solve the differential equations of first order and first degree like Homogeneous Differential Equations, Reducible to Homogeneous Differential Equations, Linear Differential Equations.

**UNIT-I**

**Differential Equations of First Order and First Degree:** Homogeneous Differential Equations, Reducible to Homogeneous Differential Equations, Linear Differential Equations, Reducible to Linear Differential Equations, Bernoulli's Equation, Exact Differential Equations, Change of Variables.

**Differential Equations of First Order and Higher Degree:** Differential Equations solvable for  $p$ , solvable for  $y$ , solvable for  $x$ , Clairaut's Equation.

**UNIT-II**

**Family Of Curves:** Linear Differential Equations of Higher order with constant coefficients, Differential Equations reducible to Linear Differential Equations with Constant Coefficients, Simultaneous differential equation of first order.

**UNIT-III**

**Partial Differential Equations:** Definition and Formation. Partial Differential equation of first order, Lagrange's method, standard forms, Charpit's Method, Linear Partial Differential Equation of Higher order with Constant Coefficients.

**UNIT-IV**

Linear Differential Equations of second order, Application of Partial differential equation: Method of separation of variables , Solution of One dimensional wave equation and one dimensional heat equation.

**UNIT-V**

**Series Solution of Differential Equations:** Power series method, Bessel and Legendre functions and their properties, Recurrence relations for Besseses function & Legendre function.

**Text & Reference Books :**

1. Partial differential equation by Snadden
2. Ordinary and Partial Differential Equations by M.D.Raisinghania



**PAPER CODE SOSBCA – 502  
SOFTWARE ENGINEERING**

**Course Outcomes** – After completion of the course, students will get the skill to solve Software Crisis by understanding various Software life cycle models, and Software Requirements analysis & specifications. Students will get the skill of software design, design process, design fundamentals, design notations & specification Modularization, design structure charts.

**UNIT – I**

Introduction: Software Crisis, software engineering, Software Processes & Characteristics, Need of Software life cycle models, Waterfall, Prototype, and Spiral Models. Software Requirements analysis & specifications: Requirement elicitation techniques: Interview, form analysis, need for SRS, Characteristics of SRS.

**UNIT – II.**

Software Project Planning: Issues involved in software estimation, Size Estimation like lines of Code & Function point method, Cost Estimation Models - COCOMO, Software project management technique – Gantt Chart.

**UNIT-III**

Basic Concept of Software Design, Design process, design fundamentals, software design levels: Architectural Design, high level design, detail Design, Design notations & specification Modularization, Design Structure Charts, Pseudo Codes, Flow Charts, Coupling and Cohesion Measures, Design Strategies: Function Oriented Design, , Object Oriented Design, software design approaches: Top-Down and Bottom-Up Design. S/W Configuration Management terminology.

**UNIT - IV**

Basic concept of object-oriented analysis & Design, traditional paradigm versus object-oriented paradigm, Overview of UML: class diagram object diagram, use case diagram, sequence diagram, activity diagram, component diagram, collaboration diagram.

**UNIT – V**

Software Metrics: Software measurements: What & Why, Token Count, Halstead Software Science Measures, Design Metrics, software testing, Test cases, Software Maintenance: Types of software Maintenance, software maintenance model: Quick fix Model, taute's maintenance model, Concept of Software Re- engineering & Software Reverse engineering- Definition, purposes and objectives, benefits.

**Text & Reference Books :**

1. Software Engineering – A practitioner's approach"- R. S. Pressman, 5th Ed., McGraw Hill Int.
2. Software Engineering (Principle & Practices –Waman S. Jawadekar , Tata McGraw Hill
3. An Integrated approach to software Engineering,- Pankaj Jalote , Narosa Publication
4. Software Engineering- Shari Lawrence, Pfleeger, Pearson edu.
5. Unified software development Process- Ivar Jacobson, Grady Booch, Pearson edu.



**PAPER CODE SOSBCA - 503**

**Artificial Intelligence & Expert Systems**

**Course Outcomes** - After completion of the course, student will get the skill of expressing production system, search techniques, life cycle of expert system of better utilization of multiple resources. Student will get the skill of expressing and work on speech recognition, neural network, Fuzzy logic and also be able to work on PROLOG.

**UNIT- I**

Introduction and applications of artificial intelligence, Problem solving : Defining the problem as state space search, Production system, Problem characteristics, Problem system characteristics, Search techniques: Generate and test , Hill climbing, Best first search, A\* algorithm, Problem reduction, Expert system: Definition, Role of knowledge in expert system, Architecture of expert system.

**UNIT- II**

Expert system development life cycle: Problem selection, Prototype construction, Formalization, Implementation, Evaluation, Knowledge acquisition: Knowledge engineer, Cognitive behavior, Acquisition techniques, Knowledge representation: Level of representation, Knowledge representation schemes, Formal logic, Inference Engine, Sematic net, Frame, Scripts.

**UNIT- III**

Perception: Sensing, Speech recognition, Vision, Action, Neural networks: Introduction, Comparison of artificial neural networks with biological neural networks, Learning in neural networks, Perceptrons, Back propagation networks, application of neural networks

**UNIT- IV**

Fuzzy logic: Definition, Difference between Boolean and Fuzzy logic, fuzzy subset, fuzzy membership function, fuzzy expert system, Inference process for fuzzy expert system, fuzzy controller.

**UNIT- V**

Programming in Logic (PROLOG): Introduction, Prolog variables, Using rules, Input and Output predicates, Fail and cut predicates, Recursion, Arithmetic operation, Compound object, Dynamic database, Lists, String, File operations

**Text & reference Books**

1. David W. Rolston: Principles of Artificial intelligence and Expert System Development, McGraw Hill Book Company
2. Elaine Rich, Kevin Knight: Artificial Intelligence, Tata McGraw Hill
3. Carl Townsend: Introduction to Turbo Prolog, BPB
4. Stamations V. Kartalopoulos: Understanding Neural Networks and Fuzzy Logic, PHI
5. Dan W.Patterson, " Introduction to AI and ES", Pearson Education, 2007
6. Peter Jackson," Introduction to Expert Systems", 3rd Edition, Pearson Education, 2007
7. Stuart Russel, Peter Norvig "AI – A Modern Approach", 2nd Edition, Pearson Education 2007.



**PAPER CODE SOS BCA – 504**  
**Programming in Advance Java**

**Course Outcomes** – After completion of the course, student will get the skill to create, debug and run multi-tier and enterprise-level applications. Student will get the skill to access database through Java programs using Java Data Base Connectivity (JDBC), create dynamic web pages, using Servlet and JSP, and make use of Java Bean.

**UNIT-I**

**Started with Web Applications in java :**

Introduction to web applications, Benefits of web applications, Web Architecture Models- Model-1 Architecture, Model-2 Architecture.

Introducing MVC Architecture : Model component, View component, Controller component.

**UNIT-II**

**Introduction to JDBC :** Introducing JDBC, Communicating with database : obtaining connection, creating jdbc satement object, executing SQL statement, closing connection. Creating DSN, understanding various JDBC drivers. Creating table by using JDBC, types of statements : statement, prepared statement, callable statement, working with ResultSet.

**UNIT-III**

**Introduction to Servlet :** Needs for server side Extensions, what is servlet, advantage of servlet, understanding of servlet api :, Stage of Servlet life cycle : loading of servlet, Initializing of a servlet, Request Handling, Destroying the servlet. deploying servlet application, generic servlet class.

**UNIT-IV**

**Introduction to JSP :** Understanding of JSP, Advantage of JSP, Describing Jsp Architecture.

Jsp Life Cycle : page translation, Compilation stage, Loading and initialization stage, request handling, destroying stage.

**UNIT-V**

**Introduction to JavaBeans :** Introduction of JavaBean, advantages of using JavaBeans, Describing Tags : describing Action Tag, describing useBean Tag, describing setProperty Tag.

**Text & Reference Books:**

Java Complete Reference – Tmh Publications

Java Volume I & Ii – Pearson Education

Programming In Java, 2nd Edition, E. Balaguruswamy, ,Tmh Publications

Peter Norton Guide To Java Programming , Peter Norton, Techmedia Publications



**PAPER CODE SOSBCA - 505**

**ORACLE 8i**

**Course Outcomes** – Student will get the skill to establishing connection to database and in-depth understanding of Database Administration using the Oracle DBMS interfaces, apply the Relational Database Model to understand the Logical and Physical aspects of the DBMS architecture, and understand the concept of Transaction and Query processing.

**UNIT - I**

Different Data Base Model ,Rdbms Components – Kernel, Data Dictionary,Client/Server Computing And Oracle, Overview Of Oracle Architecture – Oracle Files, System And User Process, Oracle Memory, Role Of Db, System Data Base Object, Protecting Data .

**UNIT - II**

SQL Plus, Oracle data types, Creation, Insertion, Updation, Deletion of tables, Modification of structure of tables, Removing, Deleting, Dropping of Tables, Data Constraints, Column level & table Level Constraints.Null, Unique Key, Default key, Foreign key ,Check Integrity constraints. Defining different constraints on the table Defining Integrity Constraints in the ALTER TABLE Command, Select Command, Logical Operator, Range Searching, Pattern Matching,Oracle Function, Grouping data from Tables in SQL, Manipulation Data in SQL.

**UNIT-III**

Joining Multiple Tables (Equi Joins),Joining a Table to itself (self Joins),Subqueries Union, intereseect & Minus Clause,Creating view,Renaming the Column of a view,Granting Permissions, - Updation, Selection, Destroying view,Permission on the objects created by the user,GRANT statement,Object Privileges,Referencing a table belonging to another user,Revoking the permission given,Indexes.

**UNIT-IV**

PL/SQL, SQL & PL/SQL Differences, Block Structure, Variables, Constants, Datatype, Assigning Database Values To Variables, Select ... Into, Cursors, Using Flow Control And Loop Statement, Goto Statement, Error Handling, Built-In Exceptions, User Defined Exceptions, The Raise-Application-Error Procedure, Oracle Transaction, Locks, Implicit And Explicit Locking.

**UNIT-V**

Procedures & Functions - Concept, creation, execution, advantages, syntax, deletion,Triggers - Concept, use, how to apply database triggers, type of triggers, syntax, deleting,Import, Export,Oracle backup and recovery.

**Text & Reference Books :**

1. Ivan Bayross, "SQL, PL/SQL", BPB Publications"
2. Liebschuty, "The Oracle Cook Book", BPB Publication
3. Michael Abbey, Michael J.Corey, "Oracle a Beginners guide". TMH Publication
4. Oracle Unleashed (Chapter 1,2,3,4,5 and 9)



**PAPER CODE SOSBCA - 601  
(Probability & Statistics)**

**Course Outcomes** – At the end of the course students will get the skill to calculate probabilities, Frequency distribution and Frequency charts, Histogram, Frequency polygons, Frequency curves. Students will get the skill to measures of Central Tendency, measures of dispersion, moments, Skewness and Kurtosis, Elementary Probability Theory, Probability Distributions, Regression and Correlation and Testing of Hypotheses.

**UNIT-I**

**Introduction:** Frequency distribution and Frequency charts, Histogram, Frequency polygons, Frequency curves and Cumulative frequency distribution, Ogives. **Measures of Central Tendency:** Arithmetic mean, weighted arithmetic mean, geometric mean, harmonic mean, median, mode, quartiles, deciles and percentiles. **Measures of Dispersion:** Range, mean deviation, semi-inter quartile range for quartile deviation, absolute and related dispersion, coefficient of variation.

**UNIT-II**

**Moments, Skewness and Kurtosis:** Moments of various types, relation between moments, Sheppard's correction, Skewness and kurtosis, moment generating functions. **Elementary Probability Theory:** Sample space, events, classical definition of probability, theorems on total and compound probability, independent and dependent events, mutually exclusive events, mathematical expectation.

**UNIT-III**

**Probability Distributions:** Discrete and continuous probability distributions, basic concepts and applications of Binomial, Poisson, Rectangular, Exponential and Normal distributions.

**UNIT-IV**

**Regression and Correlation:** Regression analysis, Least square fit, polynomial and curve fitting, Linear and non-linear regression algorithms, Linear correlation, measures of correlation, coefficient of correlation, rank correlation, multiple and partial correlation for three variables.

**UNIT-V**

**Testing of Hypotheses:** Simple and composite hypothesis, errors of kind-I and kind-II, critical region, level of significance. **Tests of Significance:** Tests for simple hypotheses, Chi-square, t, F and z tests, ANOVA-one way and two-way classification.

**Text & Reference Books :**

1. Mathematical Statistics by J. N. Kapur and H. C. Saxena.
2. Mathematical Statistics by M. Ray and H. S. Sharma.
3. Statistical Methods by S.P. Gupta
4. Statistics- Theory, Methods and Applications by Sancheti and Kapoor.
5. Probability & Statistics in Engg. By Hines.
6. Probability Models for Computer Science by M. Ross.
7. Introduction to Probability by Roussars.



**PAPER CODE SOSBCA - 602**  
**Networking Concepts**

**Course Outcomes** – After completion of the course, student will get the skill to use appropriate network tools to build network topologies and familiarize with the basic taxonomy and terminology of computer networking area. Student will be able establish a solid knowledge of the layered approach that makes design, implementation and operation of extensive networks possible.

**UNIT 1**-DataCommunication System: Purpose, Components : Source, transmitter, transmission System, receiver, and destination. Data transmission: Frequency, Spectrum and Bandwidth. Time-domain and frequency domain Concepts. Relationship between data-rate and Bandwidth.

**UNIT 2**-Analog And Digital Data Transmission. Data And Signal. Analog And Digital Signaling Of Analog And Digital Data. Modem, Modulation Techniques, Codec, Digital Transmitter Etc. Transmission Impairments :Attenuation And Attenuation Distortion, Delay Distortion, Noise.

**UNIT 3**-Introduction to Network, OSI reference model, TCP/IP reference model. Transmission Media: Magnetic Media, Twisted-Pair cables, Baseband & Broadband Coaxial cables, Fiber Optics. Wireless Transmission: Radio Transmission, Microwave Transmission.

**UNIT 4**-ISDN; ATM; Data Link Layer: Services, Framing, Error Control, Error-Detecting & Correcting Codes. Data Link Protocols: Stop-And-Wait Protocol, Sliding Window Protocol. Hdlc; Static & Dynamic Channel Allocation In Lans & Mans.

**UNIT 5**-Multiple Access Protocols: ALOHA, CSMA/CD; IEEE standards 1002.3 and Ethernet, 1002.4: Token Bus; 1002.5: Token Ring. Bridges, Routers, Gateways, Routing Algorithm, Congestion control Algorithm, Internetworking, The TCP/IP Protocol ,IP Addressing, Subnets.

**Text & Reference Books :**

1. Computer Networks By Tanenbaum
2. Data&Computer Communications By Stallins.



**PAPER CODE SOSBCA - 603**  
**Introduction to ASP.net & C#**

**Course Outcomes** – After completion of the course, students will get the skill write an object oriented program using custom classes. The skill of students will be increase so they can easily build and debug well-formed Web Forms with ASP. NET Controls. Student will be able to understand ASP.NET framework, Applications Web servers, installation of IIS. Web forms AND web form controls.

**UNIT – I**

Programming in C#: Overview of C#, C# environment, datatype, type conversion, variables, constants, operators: Arithmetic Operators , Relational Operators, Logical Operators, Bitwise Operators, Assignment Operators, Misc Operators, , decision making, loops, overview of oop's: (encapsulation, inheritance, polymorphism, abstraction), class, object, methods.

**UNIT-II**

Programming in C#: Arrays, String, Structure, Enum, Operator Overloading, Interfaces, Preprocessor Directives, Namespace, Regular Expression : Character escapes, Character classes, Anchors, Grouping constructs, Quantifiers, Backreference constructs, Alternation constructs, Substitutions, Exception handling, File I/O : StreamReader, StreamWriter, StringReader, StringWriter.

C# Attributes, C# Properties, C# Reflection.

**UNIT-III**

Introduction to ASP.Net: Overview of ASP.NET framework, ASP.NET Application Life Cycle, page life cycle phases : Initialization, Instantiation of the controls on the page, Restoration and maintenance of the state, Execution of the event handler codes, Page rendering. Understanding ASP.NET Controls, Applications Web servers, installation of IIS. Web forms, web form controls -server controls, client controls, web forms & HTML.

**UNIT-IV**

Programming in ASP.Net: Adding controls to a web form, Buttons, Text Box, Labels, Checkbox, Radio Buttons, List Box, etc. Running a web Application, creating a multiform web project. Event Handling- Application and Session Events, Page and Control Events.

Validation controls: RequiredFieldValidator, RangeValidator, CompareValidator, RegularExpressionValidator, CustomValidator, ValidationSummary. States of ASP.Net : View State, Control State, Session State, Application State.

**UNIT-V**

Database connectivity in ASP.Net: Architecture of ADO.NET, Connected and Disconnected Database, Create Connection using ADO.NET Object Model, Connection Class, Command Class, DataAdapter Class, Dataset Class. Display data on data bound Controls and Data Grid. Database Accessing on web applications: Data Binding concept with web, creating data grid, Binding standard web server controls. Display data on web form using Data bound controls.

**Text & Reference Books :**

VB.NET Black Book by steven holzner –dreamtech

ASP.NET Unleashed %o C# programming – wrox publication

C# programming Black Book by Matt telles



**PAPER CODE SOSBCA - 604  
SOFTWARE TESTING**

**Course Outcomes** – After completion of the course skill of students will be increase so they can easily understand the software test life cycle, the relationship between testing, software quality and other verification techniques the theoretical limits of software testing concepts and techniques for black-box and white-box testing. Student will be able to design test case strategies, using black box approach to test case design, and random testing.

**UNIT - I:**

**Introduction:** Testing as an Engineering Activity, Testing as a Process, testing axioms, Basic Definitions Software Testing Principles, The Tester's Role in a Software Development Organization, The Defect Repository and Test Design, Developer/Tester Support for Developing a Defect Repository, Defect Prevention Strategies.

**UNIT - II:**

**Test Case Design :** Test Case Design Strategies, Using Black Box Approach to Test Case Design, Random Testing, Requirements based testing, Boundary Value Analysis, Decision tables, Equivalence Class Partitioning, State-based testing, Cause-effect graphing, Error guessing, Compatibility testing.

**UNIT - III:**

Using White Box Approach to Test design, Test Adequacy Criteria, static testing vs. structural testing, code functional testing, Coverage and Control Flow Graphs, Covering Code Logic, Paths, Their Role in White-box Based Test Design, Evaluating Test Adequacy Criteria.

**UNIT - IV:**

**Levels Of Testing :** The Need for Levels of Testing, Unit Test, Unit Test Planning, Designing the Unit Tests, The Test Harness, Running the Unit tests and Recording results, Integration tests, Designing Integration Tests, Integration Test Planning, Scenario testing, Defect bash elimination. System Testing, Acceptance testing, Performance testing, Regression Testing, testing OO systems, Testing the documentation.

**UNIT V**

**Introduction to automatic testing & tools:** Drawback of manual testing, Benefits of automatic testing, demerits of automatic testing, functional testing tools, performance testing tolls. Overview of automatic tool QTP : history, benefits, anatomy, main parts of QTP..

**Text & Reference Books :**

1. Srinivasan Desikan and Gopaldaswamy Ramesh, "Software Testing – Principles and Practices", Pearson education, 2006.
2. Ilene Burnstein, "Practical Software Testing", Springer International Edition, 2003.
3. Ron Patton, " Software Testing", Second Edition, Sams Publishing, Pearson education, 2007
4. Renu Rajani, Pradeep Oak, "Software Testing – Effective Methods, Tools and Techniques", Tata McGraw Hill, 2004.
5. Edward Kit, "Software Testing in the Real World – Improving the Process", Pearson Education, 1995.
6. Boris Beizer, "Software Testing Techniques" – 2nd Edition, Van Nostrand Reinhold New York, 1990.



**PAPER CODE SOS BCA – 605**  
**Mobile Application Development**

**Course Outcomes** – After completion of the course, student will get the skill to write simple GUI applications, use built-in widgets and components, work with the database to store data locally, and much more. Student can understand Mobile Computing- mobile Application Programming. Apart from that student can also understand the android software development platform and android framework.

**UNIT – I**

Linux introduction and file system - Basic Features, Advantages, Installing requirement, Basic Architecture of Unix/Linux system, Kernel, Shell., Linux standard directories. Commands for files and directories cd, ls, cp, md, rm, mkdir, rmdir, pwd, file, more, less, creating and viewing files using cat, file comparisons – cmp & comm, View files, disk related commands,

**Unit II-** An Introduction to Mobile Computing- mobile Application Programming, Different Platforms. Operating systems-Architecture and working of Android, iOS and Windows phone, Comparison of Android, iOS and Windows phone, Android Development Environment -Advantages and Future of Android , Android Software Development Kit for Eclipse.

**Unit III-** Android Software Development Platform - Understanding Java SE and the Dalvik Virtual Machine , The Directory Structure of an Android Project , Common Default Resources Folders , The Values Folder Leveraging Android XML , Screen Sizes, Launching Your Application.

**Unit IV-** Android Framework Overview- The Foundation of OOP: The APK File, Android Application Components, Android Activities: Defining the UI, Android Services: Processing in the Background, Broadcast Receivers: Announcements and Notifications.

**Unit V-** Views and Layouts, Buttons, Menus, and Dialogs, Graphics Resources in Android- Introducing the Drawables , Implementing Images , Core Drawable Subclasses, Using Bitmap, PNG , JPEG and GIF Images in Android . Handling UI Events-An Overview of UI Events in Android , Listening for and Handling Events, Touchscreen Events, Keyboard Events ,Context Menus ,Controlling the Focus.

**Text & Reference Books :**

1. Onur Cinar , “Beginning Android 4” , Apress Publication
2. Reto Meier, “Professional Android 4 Application Development”, Wrox
3. István Novák, Zoltan Arvai, György Balássy and David Fulop, “Beginning Windows 8 Application Development “
4. Allen Sanders and Kevin Ashley, “Professional Windows 8 Programming: Application Development with C# and XML”, Wrox Publication

