

**TEACHING AND EXAMINATION SCHEME**  
**Bachelor of Computer Applications**  
**W.E.F. 2019-2020**  
**Semester I**

Paper Name (Theory)	Lec	Exam Hours	MARKS	
			Sess	Sem
bca-101 Computer Fundamental	3	3	20	80
bca-102 Programming C Language	3	3	20	80
bca-103 Discrete Mathematics	3	3	20	80
bca-104 Multimedia Basics	3	3	20	80
<b>Total of Theory Marks</b>				<b>400</b>

Paper Name (Practical)	Pract Hours	Exam Hours	MARKS	
			Min	Max
bca-105 Lab-C Programming	3	3	18	50
bca-106 Lab-Multimedia	3	3	18	50
<b>Total of Practical Marks</b>				<b>100</b>
<b>Total of Theory &amp; Practical Marks</b>				<b>500</b>

**TEACHING AND EXAMINATION SCHEME**  
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**Semester II**

Paper Name (Theory)	Lec	Exam Hours	EXAM MARKS	
			Sess	Sem
bca-201 Data Structures	3	3	20	80
bca-202 Programming in C++	3	3	20	80
bca-203 Database management Systems	3	3	20	80
bca-204 Operating System	3	3	20	80

**Total of Theory Marks    400**

Paper Name (Practical)	Pract Hours	Exam Hours	MARKS	
			Min	Max
bca-205 Lab-C++ Programming & Data Structure	3	3	18	50
bca-206 Lab-DBMS	3	3	18	50

**Total of Practical Marks    100**

**Total of Theory & Practical Marks    500**

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**Semester III**

Paper Name (Theory)	Lec	Exam Hours	EXAM MARKS	
			Sess	Sem
bca-301 Linux	3	3	20	80
bca-302 Computer Graphics	3	3	20	80
bca-303 HTML, Java Script	3	3	20	80
bca-304 Computer Network-I	3	3	20	80
<b>Total of Theory Marks</b>				<b>400</b>

Paper Name (Practical)	Pract Hours	Exam Hours	MARKS	
			Min	Max
bca-305 Lab-Linux & Computer Graphics	3	3	18	50
bca-306 Lab-HTML, JAVA Script	3	3	18	50
<b>Total of Practical Marks</b>				<b>100</b>
<b>Total of Theory &amp; Practical Marks</b>				<b>500</b>

## Bachelor of Computer Applications Semester IV

Paper Name (Theory)		Lec	Exam Hours	EXAM MARKS	
				Sess	Sem
bca-401	Computer Network- II	3	3	20	80
bca-402	Java Programming	3	3	20	80
bca-403	MySQL	3	3	20	80
bca-404	Visual Programming	3	3	20	80
<b>Total of Theory Marks</b>					<b>400</b>

  

Paper Name (Practical)		Pract Hours	Exam Hours	MARKS	
				Min	Max
bca-405	Lab-Computer Network-II & MYSQL	3	3	18	50
bca-406	Lab-Java & Visual Programming	3	3	18	50
<b>Total of Practical Marks</b>					<b>100</b>
<b>Total of Theory &amp; Practical Marks</b>					<b>500</b>

**TEACHING AND EXAMINATION SCHEME**  
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**Semester V**

Paper Name (Theory)	Lec	Exam Hours	EXAM MARKS	
			Sess	Sem
bca-501 SQL& PL/SQL	3	3	20	80
bca-502 PHP Programming	3	3	20	80
bca-503 Programming in Python	3	3	20	80
bca-504 Data Mining	3	3	20	80
<b>Total of Theory Marks</b>			<b>400</b>	

Paper Name (Practical)	Pract Hours	Exam Hours	MARKS	
			Min	Max
bca-505 Lab-SQL& PL/SQL, PHP	3	3	18	50
bca-506 Lab-Python &Data Mining	3	3	18	50
<b>Total of Practical Marks</b>			<b>100</b>	
<b>Total of Theory &amp; Practical Marks</b>			<b>500</b>	

**TEACHING AND EXAMINATION SCHEME**  
**Bachelor of Computer Applications**  
**Semester VI**

Paper Name (Theory)	Lec	Exam Hours	EXAM MARKS	
			Sess	Sem
bca-601 Android Programming	3	3	20	80
bca-602 Data Science with R	3	3	20	80
bca-603 Cloud Computing	3	3	20	80
bca-604 Project	3	3	20	80
<b>Total of Theory Marks</b>			<b>400</b>	

Paper Name (Practical)	Pract Hours	Exam Hours	MARKS	
			Min	Max
bca-605 Lab-Android Programming, Cloud Computing	3	3	18	50
bca-606 Lab-Data Science with R	3	3	18	50
<b>Total of Practical Marks</b>			<b>100</b>	
<b>Total of Theory &amp; Practical Marks</b>			<b>500</b>	

## **Scheme of Examination (For B. C. A. – Semester Scheme)**

### **Theory:**

#### **Part A:**

1. 10 Question of 1 mark each – 10 marks
2. Answer should not exceed more than 20 words
3. All questions are compulsory

#### **Part B:**

1. 5 Questions of 2 marks each – 10 marks
2. Answer should not exceed more than 50 words
3. All questions are compulsory

#### **Part C:**

1. 3 Questions of 20 marks each – 60 marks. There will be an internal choice in each question.
2. Answer should not exceed 400 words
3. All questions are compulsory.

### **Sessional:**

There will be sessional (internal assessment) of 20 marks conducted by the department.

### **Practical:**

Practical exams shall be conducted by one internal and one external examiner of a batch of 20 students in a day.

Duration of Practical exam is 3 hours.

A Laboratory Exercise File should be prepared by each student for each practical paper and should be submitted during practical examinations.

Practical of 50 marks distribution is as under:

- a. 30 marks for practical examination exercise for 3 questions
- b. 10 marks for Viva-voce
- c. 10 marks for Laboratory Exercise File

### **Eligibility:**

10+2 with 60% marks in aggregate. Admission is strictly on the basis of merit.

## **Scheme of Examination (For B. C. A.)**

Reg. 17 (b)

The examination for the Bachelor of Computer Applications will consist of 6 semesters. The examination shall consist of (a) Theory papers (b) Laboratory / Practical work (c) seminar (d) project. Candidates will be required to pursue a regular, full time course of study at the University department for a period of three academic years in order to be eligible for appearing in the examination.

1. Eligibility for BCA is 10+2 with 60% marks in aggregate.
2. Examination:
  - i. There shall be 36 papers (24 theory and 12 practical papers including project and seminar). Theory paper shall be of 3 hours duration having 100 marks. Out of 100 marks 20 marks shall be considered as internal assessment based on internal test and seminars and 80 marks will be of examination at the end of each semester as determined by the University. The practical shall be of 50 marks assessed by external examiner. The Project work shall be of 100 marks based on project presentation and viva-voce, assessed by external examiner and 20 marks will be assessed by internal examiner. The Seminar in will be 50 marks which will be based on presentation and viva-voce assessed by external examiner
  - ii. To pass a semester a candidate shall have to score 25% marks in each subject (theory and practical) separately and also 36% marks in aggregate of all the papers prescribed for the examination.
  - iii. Due paper(s) will be applicable if a candidate obtains 36% marks in aggregate and fails in not more than two (2) papers (theory). Due paper(s) of I semester will be held along with the III semester, the due of III semester will be held along with V semester, the due paper(s) of II semester will be held along with the IV semester and due papers of the IV semester will be held along with the VI semester. The V and VI semester due paper(s) will be held in the I and II semester respectively of the next year. The chance of due paper(s) will be given thrice in each semester.
  - iv. Wherever a candidate appears at for a due paper examination he/she will do so according to the syllabus in force.
  - v. A candidate not appearing at any examination/absent in any paper of term end examination shall be deemed as fail.
3. A candidate for a pass in the examination shall be required to obtain:
  - i. At least 36% marks in the aggregate of all the papers prescribed for the examination and
  - ii. At least 36% marks in the practical(s) wherever prescribed at the examination, provided that if a candidate fails to secure at least 25% marks in each individual paper at the examination notwithstanding his/her having obtained the minimum percentage of marks required in the aggregate for that examination.

No Division will be awarded in the first, to fifth semester examinations. Division shall be awarded at the end of the sixth semester Examination on the combined marks obtained at the first to fifth semester taken together as noted below:

Passed with First Division      60% of the aggregate marks taken together of all the  
Six semester examinations

Passed with second division      48%

All the rest will be declared to have passed the examination.

Provided that if a candidate clears any paper after a continuous period of three years since he/she was admitted to the B. C. A. then for the passing marks, i.e. 25% marks, shall be taken into account in the case of such course(s).

Provided further that in case where a candidate requires more than 25% marks in order to reach the requisite minimum aggregate i.e. 36% marks, as many marks, out of those actually secured by him/her will be taken into account as would enable him/her to make up the deficiency in the requisite minimum aggregate marks.

4. The grace marks shall be given up to 1% of the total aggregate marks of theory and practical of that semester in maximum one paper.
5. Candidates reappearing at an examination in a subsequent year shall be examined in accordance with the scheme and syllabi in force and shall be entitled to the award of the degree of year in which they clear the last failing/unclear paper.

### **bca-101 Computer Fundamental**

Introduction to Computer: Definition, Characteristics, Classification of Computers, Analog Computers, Digital Computers, Hybrid Computers, Classifications of computer on the basis of size and speed, different type of computers, generation of computers.

Computer keyboard, pointing devices, mouse, track ball, touch pad, joystick, touch – sensitive screens, pen – based systems, digitizer, data scanning devices, optical recognition systems, bar code readers, optical mark readers, optical scanners, drum scanners, hand scanner, flatbed scanner, web camera, game pad, digital camera.

Hard copy devices: Printer, impact printers, daisy wheel, dot matrix printer, line printer, chain printers, comb printers, non-impact printers, DeskJet, inkjet printers, laser printer, thermal transfer printer, barcode printers.

Computer Display: CRT, LCD, projection displays, plasma display panel, display standard, monochrome display adapter, HGA, CGA, EGA, VGA, MGA, SVGA, XGA, QVGA, SXGA, UXGA

Introduction to memory, classifications, random-access memory, volatile memory, non-volatile memory, flash memory, read-only memory, secondary memory, the cache memory, auxiliary storage memory, memory hierarchy, storage devise, magnetic tape, magnetic disk, floppy disk, hard disks, CD, DVD, magneto-optical.

Number system, binary, octal, hexadecimal, addition, subtraction, multiplications, computer code: BCD, ASCII, EBCDIC code, Excess-3 code, gray code, software, User interface, system software, programming software, application software logic gates and Boolean algebra representation and simplifications by kMap.

Computer Viruses: Introduction, history, types of computer viruses, classification of viruses ways to catch a computer virus, symptoms of a computer virus.

Application of computer: Desktop publishing, sports, design and manufacturing research and design, military, robotics, planning and management, marketing, medicine and health care, arts, communications, scientific, education.

Introduction of internet, history, IP, TCP and UDP, application protocol, world wide web, how the web works, web standards, website, overview, types of websites, electronic mail, internet, e-mail header, saved message file extension, messages and mailboxes, introduction to intranet, uses, advantages, disadvantages.

Introduction to data warehouse, components of a data warehouse, different methods of storing data in a data warehouse, advantages of using data warehouse

### **bca-102 Programming C Language**

Overview of C Language: History of C, Character set, C tokens, Identifiers, Keywords, Data types, Variables, Constants, Symbolic Constants, Operators in C, Hierarchy of Operators, Expressions, Type Conversions and Library Functions.

Managing Input and Output Operation: Formatted and Unformatted I/O Functions, Decision making, branching and looping: Decision Making Statements - if Statement, if-else statement, nesting of if-else statements, else-if ladder, switch statement, ?: operator

Looping - while, do-while, for loop, Nested loop, break, continue, and goto statements. Functions: Function Definition, prototyping, types of functions, passing arguments to functions, Nested Functions, Recursive functions.

Arrays: Declaring and Initializing, One Dimensional Arrays, Two Dimensional Arrays, Multi-Dimensional Arrays - Passing arrays to functions. Strings: Declaring and Initializing strings, Operations on strings, Arrays of strings, passing strings to functions. Storage Classes - Automatic, External, Static and Register Variables.

Structures-Declaring and Initializing, Nested structure, Array of Structure, Passing Structures to functions, Unions, typedef, enum, Bit fields. Pointers – Declarations, Pointer arithmetic, Pointers and functions, Call by value, Call by reference, Pointers and Arrays, Arrays of Pointers, Pointers and Structures. Meaning of static and dynamic memory allocation, Memory allocation functions, stack, single linked list, prefix, postfix, infix, queue

<b>Duration: 3 hours</b>	<b>Max Marks: 80</b>
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### **bca-103 Discrete Mathematics**

Sets: definition and types, set operations, partition of set, cardinality, recursive definition of set.  
Functions: concept, some special functions (polynomial, exponential & Logarithmic, absolute value, floor & ceiling, mod & div functions) properties of functions, cardinality of infinite set, countable and uncountable set, pigeon hole principle, composition of function

Relations: Boolean matrices, binary relation, adjacency matrix of relation, properties of relations, operations of relations, connectivity relation, transitive closure, Warshall Algorithm, equivalence relation, equivalence class

Proof Methods: Vacuous, trivial, direct, indirect by contrapositive and contradiction, constructive & non-constructive proof, counterexample. The division algorithm, divisibility properties (prime numbers & composite numbers) principle of mathematical induction, the second principle of mathematical induction, fundamental theorem of arithmetic. Algorithm correctness: partial correctness, loop invariant, testing the partial correctness of linear and binary search, bubble and selection sorting

Graph theory: Graphs, directed, undirected, simple, adjacency & incidence, degree of vertex, sub-graph, complete graph, cycle & wheel graph, bipartite & complete bipartite graph, weighed graph, union of simple graphs. Complete graph isomorphic graphs, path, cycles & circuits Eulerian & Hamiltonian graphs. Trees: spanning trees – Kruskal's Algo, finding spanning tree using depth first search, breadth first search, complexity of graph, minimum spanning tree.

Language of Logic: Proposition, compound proposition, conjunction, disjunction, implications, converse, invers and contrapositive, bi-conditional statements, tautology, contradiction, contingency, logical equivalence, quantifiers, arguments.

### **bca-104Multimedia Basics**

Introduction to Multimedia computer and its peripheral devices, communications and entertainment; framework for multimedia systems: Advantages of MM, system components and the user interface, MM platform, hardware software, commercial tools and standard.

Images and applications, image capture, compression, standards, audio compression and decompression, audio synthesis, MIDI, speech recognition and synthesis, video capturing, compression and decompression, digital video and image compression; jpeg image compression standards; mpeg motion video compression; DVI technology; time-based media representation and delivery

Developing Applications, methodology, design, multimedia object sharing multimedia and multimedia and the law

Application of Multimedia: Intelligent Multimedia system, training and education, kiosks, multimedia in office and home.

Photoshop: Fundamentals, Opening and Importing Images, Resolution, Models and Colour Spaces, Layers. Painting Pixels: The Painting Tools, Erasing, Fills, Type. Selection And Allied Operations: Marquee selection and cropping, Lasso Selection, Paths, Combining and Transforming Selections. Adjustments and Retouching: Tonal Adjustment, Colour Adjustments, Retouching By Hand. Effects and Filters: Blurring and Sharpening, Special Effects and Distortion, Layer Effects and Layer Styles.

Flash: Animation with Interacting, Basic Concepts, Drawing, Lines and Shapes, Strokes and Fill, Shapes and Brushes, Selection, Transformation and Reshaping, Importing Artwork and Manipulating Images. Animation: Animating One Frame at a Time, Motion Tweening , Symbols and Instances , Shape Tweening , Sound.

Actions: Buttons, Button action, Frame Action, Action and Movie Clip Symbols , Actions , Browsers and Networks , Beyond the Basic Actions. Flash CS 6: Interface Elements, Panels, Tools, Layer Folders, Accessibility, Video.

<b>Duration: 3 hours</b>	<b>Max Marks: 80</b>
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### **bca-201Data Structures**

Definitions of Data Structure and Algorithm – Time and Space complexity- Algorithm notations.

Merge sort, quick sort, dynamic programming

Control structures- Variables – Data types- Arrays- String processing – Sorting and Searching- Insertion-Selection-Merge- Radix-Binary Search- Linear Search

Binary tree- Representation – Traversing – Threaded Binary tree- Binary Search tree- Insertion deletion into a binary search tree

Graph- Representation of Graph- Shortest path – Operation on Graphs- Traversing a Graph

<b>Duration: 3 hours</b>	<b>Max Marks: 80</b>
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### **bca-202Programming in C++**

Object Oriented Concepts, Tokens, Expressions and Control Structures Introduction: Basic Elements of Programming, Console I/O Operations.

Control Structures: Control and Looping Statements. Function: Function Prototyping, Call and Return by Reference, Inline Function, Default and Const Arguments, Function Overloading, Arrays, Manipulators and Enumeration.

Classes and Object, Object Oriented Methodology: Basic Concepts/Characteristics of OOP. Advantages and Application of OOP's, Procedural Programming Vs OOP

Classes and Objects: Specifying a Class, Creating Objects, Private & Public Data Members and Member Functions, Defining Inline Member Functions, Static Data Members and Member Functions. Arrays within Class, Arrays of Objects, Objects as Function Arguments, Returning Objects.

Constructors, Destructors, Operators Overloading and Inheritance. Constructors and Destructors: Introduction, Parameterized Constructors, Multiple Constructors in A Class, Constructors With Default Arguments, Dynamic Initialization of Objects, Copy Constructors, Dynamic Constructors, Const Objects, Destructors Operators Overloading: Definition, Unary and Binary Overloading, Rules for Operator Overloading.

Inheritance: Defining Derived Classes, Types of Inheritance, Constructors and Destructors in Derived Classes.

Pointers Virtual & Friend functions and file handling Pointers: Pointer to Objects, this Pointer, New and Delete Operators, Virtual Function, Friend Functions. Opening, Closing a File, File Modes, File Pointers and their Manipulation, Sequential Input and Output Operations: Updating a File, Random Access, and Error Handling During File Operations, Command Line Arguments.

Single linked lists, stack, queue, sorting, insertion, selection, bubble

**bca-203 Database Management Systems**

Overview of DBMS: Basic DBMS terminology, DBA and his responsibilities, physical and logical data independence, architecture of DBMS, distributed databases, structure design and Client/server architecture.

Entity-Relationship Model, entity, entity set, attributes, tuples, domains, keys, super and candidate key, overview of hierarchical, network and relational models, comparison of network, hierarchical and relational models

Relational Model: Storage organization for relations, relational algebra, set operators, relational operators, decomposition of relation schemes, functional dependencies, normalization up to BCNF.

Relational Query Language: DDL, DML, DCL, database integrity, domain integrity, entity integrity, referential integrity

MS-Access: Create a Table in MS Access -Data Types, Field Properties, Fieldnames, types, properties, default values, format, caption, validationrules Data Entry Add record delete record and edit text Sort, find/replace,filter/select, re-arrange columns, freeze columns. Edit a Tables- copy, delete, import, modify table structure find replace.

Setting up Relationships- Define relationships, add a relationship, set a rule for Referential Integrity, change the join type, delete a relationship, save relationship Queries & Filter –difference between queries and filter,filter using multiple fields AND,OR,advance filter Queries create Query with one table,find record with select query, find duplicate record with query,find unmatched record with query, run query,save and change query.

Introduction to Forms Types of Basic Forms: Columnar, Tabular, Datasheet, Main/Subforms, add headers and footers, add fields to form, add text to form use label option button, check box,combo box, list box Forms Wizard, Create Template.

Introduction to Reports,Types of Basic Reports: Single Column, Tabular Report Groups/Total, single table report multi table report preview report print report, Creating Reports and Labels, Wizard

### **bca-204Operating System**

Introduction to Operating Systems, goals of OS, operation of OS, resource allocator and related functions, classes of OS, batch processing, multi-processing, time sharing, distributed, real time systems, system calls, system programs, structure of OS, layer design of DOS, Unix, virtual machine OS, kernel based OS.

Process concept, interacting process, threads, fundamental of scheduling, scheduling criteria, long medium short term scheduling, scheduling algorithms , structure of concurrent system, critical section, critical region, inter-process communication, monitor and semaphores, implementation and uses.

Logical versus physical address, swapping, contiguous allocation, segmentation, paging, segmentation with paging, kernel memory allocation, page replacement algorithm, virtual memory, virtual memory with paging, demand paging, dead lock, characterization, methods for handling dead locks, prevention, avoidance, thrashing, allocation of frame, virtual memory using segmentation,

Architecture of Distributed system, inter-process communication protocol, network OS, issues in distributed design, issues of distributed file system, network structure, distributed system structure, file system, coordination.

## **bca-301Linux**

Linux Utilities – File handling utilities, Security by file permissions, Process utilities, Disk utilities, Networking commands, Filters, Text processing utilities and Backup utilities.

Sed – Scripts, Operation, Addresses, Commands, Applications, awk – Execution, Fields and Records, Scripts, Operation, Patterns, Actions, Associative Arrays, String and Mathematical functions, System commands in awk, Applications.

Shell programming with Bourne again shell (bash) – Introduction, shell responsibilities, pipes and Redirection, here documents, running a shell script, the shell as a programming language, shell meta characters, file name substitution, shell variables, command substitutions, shell commands, the environment, quoting, test command, control structures, arithmetic in shell, shell script examples, interrupt processing, functions, debugging shell scripts.

Files and Directories – File Concept, File types, File system Structure, file metadata – Inodes, kernel support for file, system calls for file I/O operations – open, create, read, write, close, lseek, dup2, file status information – stat family, file and record locking – flock function, file permissions – chmod, fchmod, file ownership – chown, lchown, fchown, links – soft links and hard links – symlink, link, unlink.

Directories – Creating, removing and changing Directories – mkdir, rmdir, chdir, obtaining current working directory – getcwd, Directory contents, Scanning Directories – opendir, readdir, closedir, rewinddir functions.

Process – process concept, Process environment – environment list, environment variables, getenv, setenv, system call interface for process management – fork, vfork, exit, wait, waitpid, exec family,

Signals – Introduction to signals, Signal generation and handling, Kernel support for signals, Kill, raise, alarm, pause, abort, sleep function.

<b>Duration: 3 hours</b>	<b>Max Marks: 80</b>
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### **bca-302Computer Graphics**

Interactive graphics, passive graphics, advantage of interactive graphics, classification of application, hardware and software requirement of computer graphics

Point, line, DDA algorithm, Bresenham's line algorithm, circle, circle generating algorithm, ellipse generating algorithm, , polynomial and spline curves, parallel curve algorithms, curve function, clippings, clipping lines.

2D transformation, matrix representation of 2D, composite transformation, translation, rotation, scaling, general pivot-point rotation, general fix scaling, reflection, shear, affine transformations and transformation functions, clipping operation, point, line, Cohen-Sutherland line clipping, polygon clipping.

### **bca-303HTML, JavaScript**

HTML - Concepts of Hypertext, Versions of HTML, Elements of HTML syntax, Head & Body Sections, Building HTML documents, Inserting texts, Images, Hyperlinks, Backgrounds and Color controls, Different HTML tags, Table layout and presentation, Use of font size & Attributes, List types and its tags, Use of Frames and Forms in web pages.

Cascading Style Sheets, introduction, levels of style sheets, style specification formats, selector forms, property value forms, font properties, list properties, color, alignment of text, the box model, background images, the <span> and <div> tags, conflict resolution.

Overview of JavaScript, object orientation and JavaScript, syntactic characteristics, primitives, operations, and expressions, screen output and keyboard input, control statements, object creation and modification, arrays, functions, constructors, pattern matching using regular expressions, errors in scripts.

JavaScript execution environment, the Document Object Model, elements access in JavaScript, events and event handling, handling events from body elements, handling events from text box and password elements, the DOM2 event model, the navigator object, DOM tree traversal and modification, positioning elements, moving elements, element visibility, changing colors and fonts, dynamic content, stacking elements, locating the mouse cursor, reacting to a mouse click, slow movement of elements, dragging and dropping elements.

Browser Management and Media Management, classes, constructors, object-oriented techniques in JavaScript

### **bca-304Computer Network-I**

OSI Model, significance of layer model, network, topology, network classification, switching and components.

Introduction to Ethernet, token ring, basic working and cable, bridges, routers, gateways, private and public networks

FDMA, TDMA, CDMA, personal communications system architecture, cordless telephony, digital enhanced cordless telecommunication.

Wireless technology: Land mobile vs satellite vs inbuilding communication system, cellular telephony, personal communication system/networks.

Perform and document fault isolation, Resolve or escalate, Verify and monitor resolution, IPv4 addressing and sub-netting IPv4 address types, Unicast, Broadcast, Multicast, private IPv4 addressing, IPv6 addressing scheme, IPv6 addressing and IPv6 Stateless Address Auto IPv6 address types, Global unicast, Unique local, Link local, Multicast, Modified EUI 64, Auto-configuration, Anycast

Wireless architecture for mobile computing, wireless LANs, end user devices, MAC protocols, IEEE 802.11, mobile IP, wireless TCP, hand of adhoc networks, unicast and multicast communication, blue tooth.

**bca-401 Computer Network-II**

## LAN Switching Technologies

switching concepts, MAC learning and aging, Frame switching, Frame flooding, MAC address table, Interpret Ethernet frame format, Troubleshoot interface and cable issues (collisions, errors, duplex, speed), Configure, verify, troubleshoot VLANs (normal/extended range) spanning multiple switches, Access ports (data and voice), Default VLAN, Configure, verify, and troubleshoot inter-switch connectivity, Trunk ports, Add and remove VLANs on a trunk, DTP, VTP (v1&v2), and 802.1Q, Native VLAN, Configure, verify, and troubleshoot STP protocols, STP mode (PVST+ and RPVST+), STP root bridge selection, Configure, verify and troubleshoot STP related optional features, PortFast, BPDU guard, Configure and verify Layer 2 protocols, Cisco Discovery Protocol, LLDP, EtherChannel, Static, PAGP, LACP, Describe the benefits of switch stacking and chassis aggregation

## Routing Technologies,

Describe the routing concepts, Packet handling along the path through a network, Forwarding decision based on route lookup, Frame rewrite, Interpret the components of a routing table, Prefix, Network mask, Next hop, Routing protocol code, Administrative distance, Metric, Gateway of last resort, routing table, Admin distance, inter-VLAN routing, Router on a stick, SVI static routing and dynamic routing, distance vector and link state routing protocols, interior and exterior routing protocols

IPv4 and IPv6 static routing, Default route, Network route, Host route, Floating static, single area and multi-area OSPFv2 for IPv4 (excluding authentication, filtering, manual summarization, redistribution, stub, virtual-link, and LSAs), single area and multi-area OSPFv3 for IPv6 (excluding authentication, filtering, manual summarization, redistribution, stub, virtual-link, and LSAs), EIGRP for IPv4 (excluding authentication, filtering, manual summarization, redistribution, stub), Configure, verify, and troubleshoot EIGRP for IPv6 (excluding authentication, filtering, manual summarization, redistribution, stub), RIPv2 for IPv4 (excluding authentication, filtering, manual summarization, redistribution), Troubleshoot basic Layer 3 end-to-end connectivity issues

## WAN Technologies

PPP and MLPPP on WAN interfaces using local authentication, PPPoE client-side interfaces using local authentication, GRE tunnel connectivity, Describe WAN topology options, Point-to-point, Hub and spoke, Full mesh, Single vs dual-homed, Describe WAN access connectivity options, MPLS, Metro Ethernet, Broadband PPPoE, Internet VPN (DM, site-to-site, client), single-homed branch connectivity using eBGP IPv4 (limited to peering and route advertisement using Network command only), Describe basic QoS concepts, Marking, Device trust, Prioritization, Voice, Video, Data, Shaping, Policing, Congestion management

## Infrastructure Services

Describe DNS lookup operation, Troubleshoot client connectivity issues involving DNS, DHCP on a router (excluding static reservations), Server, Relay, Client, TFTP, DNS, and gateway options, Troubleshoot client- and router-based DHCP connectivity issues, basic HSRP, Priority, Preemption, Version, source NAT, Static, Pool, PAT, Configure and verify NTP operating in a client/server mode

## Infrastructure Security

port security, Static, Dynamic, Sticky, Max MAC addresses, Violation actions, Err-disable recovery, Describe common access layer threat mitigation techniques, 802.1x, DHCP snooping, Non-default native VLAN, IPv4 and IPv6 access list for traffic filtering, Standard, Extended, Named, Verify ACLs using the APIC-EM Path Trace ACL analysis tool, basic device hardening, Local authentication, Secure password, Access to device, Source address, Telnet/SSH, Loginbanner, Describe device security using AAA with TACACS+ and RADIUS

### **bca-402Java Programming**

Introduction to Java, history, characteristics, Object Oriented Programming, data types, variables, arrays, difference between Java and C++Control statements: Selection, iteration, jump statements, operators

Classes and Methods: Introducing classes, Class fundamentals, Declaring Objects, Assigning object reference variables. Introducing method , Constructors, The this Keyword, Garbage Collection-Finalize() method, Overloading methods, Using objects as parameters, Argument Passing , Returning Objects, Recursion , static and final keyword , Nested and Inner Classes , String Class ,Command Line arguments.

Inheritance, Packages, Interfaces: Inheritance Basics , using super, method overriding , Dynamic method dispatch , abstract classes , Using final with inheritance , Packages , Access Protection, Importing packages ,Interfaces.

Exception Handling, Multithreading, Applet : Exception handling fundamentals, Types, Using try, catch, throw, throws and finally , Java thread model , Creating a Thread , Creating multiple threads,Thread priorities , synchronization , Inter-thread communication , Applet Basics , Applet Skeleton, HTML applet tag – Passing parameters to applet

I/O Streams, Utility Classes:I/O Streams- Byte Streams , Character Streams , Reading and Writing Files, Legacy Classes and Interface: Vector, Stack, The Enumeration Interface, Utility classes: StringTokenizer, Date, Calendar,Random, Scanner

Javax.Swing Package : JButton , JLabel,JTextField , JPasswordField, JRadioButton, JCheckBox, JComboBox ,JList,JToggleButton,JSpinner, JTabbedPane, JTable,JToolBar ,JToolTip , JFrame , JPanel , JDialog , JSlider, Introduction to Event Handling: Event Classes – Event Listener interfaces

<b>Duration: 3 hours</b>	<b>Max Marks: 80</b>
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**bca-403MySQL**

MySQL Overview: Introduction, connecting to and disconnecting from the server , Entering queries , Creating and using a database , Creating and selecting a database , creating a table , loading data into a table , Retrieving information from a table , selecting all data , selecting particular rows , selecting particular columns , sorting rows , date calculations , working with NULL values , pattern matching , counting rows , using more than one tables.

<b>Duration: 3 hours</b>	<b>Max Marks: 80</b>
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### **bca-404 Visual Programming**

Introduction: Need of Visual languages, integrated development environment (IDE), advantage of Visual Basic, characteristics and features of Visual Basic, characteristics and features of Visual Basic – IDE, Projects, user interface, objects oriented, visual development and event-driven programming, forms/graphic controls, data processing, sharing with windows and internet applications.

Visual Basic Programming and tools: An introduction of Visual Basic programming, simple program construction, statements, input/outputs, comments, editor, subroutines, controls flow statements, objects and variants.

Designing user interface – elements of user interface, understanding forms, menus and toolbars, designing menus and toolbars, building dynamic forms, drag and drop operations, working with menus, customizing the toolbars.

Controls – textbox, combo box, scroll bar and slider control operations, generating timed events, drawing with Visual Basic using graphics controls, coordinate systems and graphic methods, manipulating colors and pixels with Visual Basic.

Database Programming with Visual Basic – data access methods, creating, reading and writing text files, data controls, creating queries.

<b>Duration: 3 hours</b>	<b>Max Marks: 80</b>
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### **bca-501SQL and PL/SQL**

Introduction to SQL, Basics of SQL Types of SQL Statements, DDL, DML, DQL, DCL and TCL, Create Database, Datatypes, Exploring DDL Statements on Table, DDL and DML Statements, Create, Alter and Drop Table Insert, Update and Delete Statement Truncate Statement, Working with Queries (DQL), Select Statement, Usage of , Distinct, Null etc...keywords, Using String and Arithmetic Expressions, Exploring Where Clause with Operators, Using Advanced Operators, Sorting data using Order By clause, Working with basic of Sub Queries, Aggregate Functions, Using functions in Queries, Count, Sum, Min, Max, Avg Group By and Having Clause, Using Group By with Rollup and Cube, Joins and Set Operations, Introduction to Joins Cross Joins, Inner Join, Outer Join, Self join, Co-related Sub Queries, Set Operations using Unions, Intersect and Except, Implementation of Data, integrity, Entity integrity, Domain integrity, Referential integrity, Types of constraints, Working with Constraints, Unique, Not NULL, Primary Key, Default Check Foreign Key, Implementing Views, Introduction & Advantages of Views, Creating, Altering, Dropping Views, Advance Options while Creating a View, Data Control language (DCL), Creating Users & Roles, Granting & Revoking of Roles & privileges, Working with Indexes, Introduction Clustered and Non Clustered Index, Creating and Dropping Indexes,

Fundamentals Introduction to PL/SQL, Benefits of PL/SQL, Creating PL/SQL Blocks, Defining Variables and Datatypes, Using Variables in PL/SQL, Recognizing PL/SQL Lexical Units, Recognizing Data Types, Using Scalar Data Types, Writing PL/SQL Executable Statements, Nested Blocks and Variable Scope, Good Programming Practices, Using SQL in PL/SQL, Review of SQL DML, Retrieving Data in PL/SQL, Manipulating Data in PL/SQL, Using Transaction Control Statements, Program Structures to Control Execution Flow, Conditional Control: IF Statements, Conditional Control: CASE Statements, Iterative Control: Basic Loops, Iterative Control: WHILE and FOR Loops, Iterative Control: Nested Loops, Using Composite Datatypes, User-Defined Records, Indexing Tables of Records, Using Cursors and Parameters, Introduction to Explicit Cursors, Using Explicit Cursor Attributes, Cursor FOR Loops, Cursors with Parameters, Using Cursors for UPDATE, Using Multiple Cursors, Exception Handling, Handling Exceptions, Trapping Oracle Server Exceptions, Trapping User-Defined Exceptions, Recognizing the Scope of Exceptions, Using and Managing Procedures, Creating Procedures, Using Parameters in Procedures, Passing Parameters, Using and Managing Functions, Creating Functions, Using Functions in SQL Statements, Review of the Data Dictionary, Managing Procedures and Functions, Creating Packages, Managing Package Concepts, Advanced Package Concepts, Getting the Best out of Packages, Persistent State of Package Variables, Using Oracle-Supplied Packages, Improving PL/SQL Performance, Using Dynamic SQL, Improving PL/SQL Performance, Using and Managing Triggers, Introduction To Triggers, Creating DML Triggers, Creating DDL and Database Event Triggers

<b>Duration: 3 hours</b>	<b>Max Marks: 80</b>
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### **bca-502PHP Programming**

Basics of PHP: Introduction to PHP, what does PHP do? ,history of PHP , language basics ,data types , variables , expressions and operators , flow control statements , including code , embedding PHP in web pages.

Functions & Strings: Calling a function, defining a function, variable scope, function parameters, return values, variable functions, anonymous functions. Strings: Accessing individual characters, cleaning strings, encoding and escaping, comparing strings, manipulating and searching strings, regular expressions.

Arrays & Objects: Indexed Vs associative arrays, identifying elements of an array, storing data in arrays, multidimensional arrays, extracting multiple values, converting between arrays and variables, traversing arrays, sorting. Objects: Creating an object, accessing properties and methods, declaring a class, introspection.

MySQL databases in PHP: Introduction, connecting to a MySQL database, querying the database, Retrieving and displaying the results, modifying data, deleting data.

<b>Duration: 3 hours</b>	<b>Max Marks: 80</b>
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**bca-503 Programming in Python**

Programming basics and strings, numbers and operators, variables, making decisions

Functions, classes and objects, organizing programs, files and directories

Building modules, text processing,

Writing a GUI with Python, Accessing Databases

Python with XML, Network Programming, Programming with C, Numerical Programming,

Web Application and Web Services, Integrating Java with Python

<b>Duration: 3 hours</b>	<b>Max Marks: 80</b>
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**bca-504 Data Mining**

Introduction to data mining, DM techniques, issues and challenges in Dm, Applications, association rules, Prior, Partition, Pincer-Search, Dynamic Itemset counting, FP-tree growth, Incremental, Boder Algorithm

Clustering Techniques, portioning, k-Medoid algorithm, Hierarchical, categorical clustering algorithm, Decision tree, best split, splitting indices and criteria, decision tree construction algorithm, CART, ID3, C4.5, CHAID, Decision tree construction with presorting, rain Forest, approximate methods, Boat, Pruning Technique

<b>Duration: 3 hours</b>	<b>Max Marks: 80</b>
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**bca-601 Mobile Application Development**

Introduction to mobile communication and computing: Introduction to mobile computing, Novel applications, limitations and GSM architecture, Mobile services, System architecture, Radio interface, protocols, Handover and security. Smart phone operating systems and smart phones applications

Fundamentals of Android Development: Introduction to Android., The Android 4.1 Jelly Bean SDK, Understanding the Android Software Stack, Installing the Android SDK, Creating Android Virtual Devices, Creating the First Android Project, Using the Text View Control, Using the Android Emulator, The Android Debug Bridge (ADB), Basic Widgets Understanding the Role of Android Application Components, Event Handling , Displaying Messages Through Toast, Creating and Starting an Activity, Using the Edit ext Control.

The Android Debug Bridge (ADB), basic widgets understanding the role of Android Application Components, event handling, displaying messages through toast, creating and starting an activity, using the Edit ext Control Building Blocks for Android Application Design, Laying Out Controls in Containers, utilizing resources and media

Using Selection Widgets and Debugging Displaying and Fetching Information Using Dialogs and Fragments Advanced, Android Programming: Internet, Entertainment, and Services, Implementing drawing and animations, displaying web pages and maps, communicating with SMS and emails, creating and using content providers: creating and consuming services, publishing android applications

<b>Duration: 3 hours</b>	<b>Max Marks: 80</b>
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**bca-602 Data Science with R**

Introduction- Basic elements of R, data input and output, objects, attributes, number , vectors , array, matrix, lists,

Reading data from files , controls statements, loops , functions, R scripts, data science overviews, data visualisation using graphics in R, GGplot 2, File format of graphics output, introduction to hypotheses, types of hypothesis, data sampling, confidence and significance level, hypothesis tests, parametric test, non-parametric test,

Introduction to Regression Analysis, types of regression analysis, nonlinear regression, cross validation, principal component analysis, factor analysis, classification its types, logistics , regression, support vector machine, k-nearest neighbour, Naïve Bayes classification, decision tree classification, random forest classification, evaluating classifier model, introduction clustering, clustering methods, association rules, Appriori algorithm

<b>Duration: 3 hours</b>	<b>Max Marks: 80</b>
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### **bca-603Cloud Computing**

Cloud Computing Introduction, From, Collaboration to cloud, working of cloud computing, pros and cons, benefits, developing cloud computing services, Cloud service development, discovering cloud services.

Centralizing email communications, cloud computing for community, collaborating on schedules, collaborating on group projects and events, cloud computing for corporation, mapping schedules managing projects, presenting on road

Collaborating on calendars, Schedules and task management, exploring on line scheduling and planning, collaborating on event management, collaborating on contact management, collaborating on project management, collaborating on word processing, spreadsheets, and databases

Evaluating web mail services, Evaluating instant messaging, Evaluating web conference tools, creating groups on social networks, Evaluating on line groupware, collaborating via blogs and wikis

Understanding cloud storage, evaluating on line file storage, exploring on line book marking services, exploring on line photo editing applications, exploring photo sharing communities, controlling it with web based desktops.

# MANUAL FOR PREPARATION OF DISSERTATION THESIS

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## 1. GENERAL

The manual is intended to provide broad guidelines to the BCA candidates in the preparation of the thesis. In general, the thesis shall report, in an organized and scholarly fashion, an account of original research work of the candidate leading to the discovery of new facts or techniques or correlation of facts already known (analytical, experimental, hardware oriented, etc.)

## 2. NUMBER OF COPIES TO BE PREPARED

At least four copies are to be prepared, one each for External Examiner, Guide, Departmental Library and self. The copies should be submitted to the Controller of Examination through the Head of the Department before the due date.

## 3. ARRANGEMENT OF CONTENTS OF THESIS

The sequence in which the thesis material should be arranged and bound should be as follows:

1. Title page
2. Bonafide Certificate
3. Abstract
4. Acknowledgement
5. Table of Contents
6. List of Tables
7. List of Figures
8. List of Symbols, Abbreviations or Nomenclature (Optional)
9. Chapters
10. References
11. Appendices

The Tables and Figures shall be introduced in the appropriate places.

## 4. PAGE DIMENSIONS AND MARGIN

The thesis should be prepared on good quality white paper preferably not lower than 80gsm. Standard A4 size paper should be used for preparing the copies. The final thesis should have the following page margins:

Top edge	: 30 to 35 mm
Left side	: 35 to 40 mm
Bottom edge	: 25 to 30 mm
Right side	: 20 to 25 mm

Tables and figures should conform to the margin specifications. Large size figures should be photographically or otherwise reduced to the appropriate size before insertion.

## 5. MANUSCRIPT PREPARATION

The headings of all items 2 to 11 listed in section 3 should be typed in capital letters without punctuation and centered 50mm below the top of the page. The text should commence 4 spaces below this heading.

- 5.1 Title Page – A specimen copy of the title page is given in Appendix 1.
- 5.2 Bonafide Certificate – A specimen copy of the bonafide certificate is given in Appendix 2.

- 5.3 Abstract – Abstract should be an essay type of narrative not exceeding 600 words, outlining the problem, the methodology used for tackling it and a summary of the findings.
- 5.4 Acknowledgement – It should be brief and preferably should not exceed one page when typed double spacing.
- 5.5 Table of Contents – The table of contents should list all material following it as well as any material which precedes it. The title page, bonafide certificate and acknowledgement will not find a place among the items listed in the table of contents. One and a half spacing should be adopted for typing the matter under this head.
- 5.6 List of Tables – The list should use exactly the same captions as they appear above the tables in the text. One and a half spacing should be adopted for typing the matter under this head.
- 5.7 List of Figures – The list should use exactly the same captions as they appear below the figures in the text. One and a half spacing should be adopted for typing the matter under this head.
- 5.8 List of Symbols, Abbreviations and Nomenclature – One and a half spacing should be adopted for typing the matter under this head. Standard symbols and abbreviations should be used.
- 5.9 Chapters – The chapters may be broadly divided into 3 parts:
- i. Introductory chapter,
  - ii. Chapters developing the main theme of the thesis,
  - iii. Results, Discussions and Conclusions.

The main text will be divided into several chapters and each chapter may be further divided into several divisions and sub-divisions.

- Each chapter should be given an appropriate title.
- Tables and figures in a chapter should be placed in the immediate vicinity of the reference where they are cited.
- Footnotes should be used sparingly. They should be typed single space and placed directly underneath in the very same page which refers to the material they annotate.

- 5.10 List of References – When works of other researchers are used either directly or indirectly the origin of the material thus referred to as appropriate places in the thesis should be indicated. A paper, a monograph or a book may be designated by the name of the first author followed by the year of publication, placed inside brackets at the appropriate place of reference. The citation may assume any one of the following forms:

Examples of citation

- i. An improved algorithm has been adopted in literature (Tsychiya 1980)
- ii. Jankins and Walts (1968) have dealt at length with this principle.
- iii. The problem of mechanical manipulators has been studied by Shin et al (1984) and certain limitations of the method used has been pointed out by Shin et al (1984 a)

The listing should be typed 4 spaces below the heading REFERENCES in alphabetical order in single spacing left-justified. The reference material should be listed in the alphabetical order of the first author. The name(s) of the author(s) should be immediately followed by the year and other details. A typical illustrative list is given below.

## REFERENCES

1. Ariponnammal S. and Natarajan S. (1994) 'Transport Phenomena of Sm Sel-x Asx', Pramana Journal of Physics, Vol. 42, No.5, pp.421-425.
2. Barnard R.W. and Kellogg C. (1980) 'Applications of Convolution Operators to Problems in Univalent Function Theory', Michigan Mach. J., Vol 27, pp 81-94.
3. Jankins G.M. and Walts D.G. (1968) 'Spectral Analysis and its Applications', Holder Day, San Francisco.
4. Shin K.G. and McKay N.D. (1984) 'Open Loop Minimum Time Control of Mechanical Manipulations and its Applications', Proc. Amer. Contr. Conf., San Diego, CA, pp.1231-1236.

5.11 Appendices – Appendices are provided to give supplementary information, which if included in the main text may serve as a distraction and cloud the central theme under discussion.

- Appendices should be numbered using Arabic numerals, e.g. appendix 1, Appendix 2, etc.
- Appendices, tables and references appearing in appendices should be numbered and referred to at appropriate places just as in the case of chapters.

5.12 Tables and Figures – The word table means tabulated data in the body of the thesis as well as in the appendices. All other material used in the body of the thesis and appendices such as charts, graphs, maps, photographs and diagrams may be designated as figures.

- A table or figure including caption should be accommodated within the prescribed margin limits and appear on the page following the page where their first reference is made.
- Tables and figures half page or less in length may appear on the same page along with the text. However, they should be separated from the text both above and below by triple spacing.
- All tables and figures should be prepared on the same paper or material used for the preparation of the rest of the thesis.
- Two or more small tables or figures may be grouped if necessary in a single page.
- Photographs, if any, should be included in colourxerox form or as colour printouts of scanned images. More than one figure can be included in a page.

## 6. TYPING INSTRUCTIONS

6.1 General Uniformity of the font (say, Times New Roman) in the entire thesis shall be observed. A sub-heading at the bottom of a page must have at least two full lines below it or else it should be carried over to the next page. The last word of any page

should not be split using a hyphen. Double spacing should be used for typing the bonafide certificate and acknowledgement. One and a half spacing should be used for typing the general text. Single spacing should be used for typing:

- i. Long Tables
- ii. Long quotations
- iii. Foot notes
- iv. Multiline captions
- v. References All quotations exceeding one line should be typed in an indented space - the indentation being 15mm from either margins.

## 6.2 Chapters:

The format for typing chapter headings, division headings and sub division headings are

explained through the following illustrative examples.

Chapter heading:	CHAPTER 1
	INTRODUCTION
Division heading :	1.1 OUTLINE OF THESIS
Sub-division heading:	1.1.2. Literature review

The word CHAPTER without punctuation should be centered 50mm down from the top of the page. Two lines below, the title of the chapter should be typed centrally in capital letters. The text should commence 4 lines below this title. The division and sub-division captions along with their numberings should be left-justified. The typed material directly below division or sub-division heading should commence 2 spaces below it. Within a division or sub-division paragraphs are permitted. Every paragraph should commence 3 spaces below the last line of the preceding paragraph.

## 7. NUMBERING INSTRUCTIONS

### 7.1 Page Numbering

All page numbers (whether Roman or Arabic) should be typed without punctuation on the upper right hand corner 20mm from top with the last digit inline with the right hand margin. The preliminary pages of the thesis (such as title page, acknowledgement, table of contents, etc.) should be numbered in lower case Roman numerals. The title page will be numbered as (i) but this should not be typed. The page immediately following the title page shall be numbered (ii) and it should appear at the top right hand corner as already specified. Pages of main text, starting with Chapter 1 should be consecutively numbered using Arabic numerals.

7.2 Numbering of Chapters, Divisions and Sub-8 Divisions. The numbering of chapters, divisions and sub-divisions should be done using Arabic numerals only and decimal notation should be used for numbering the divisions and sub-divisions within a chapter. For example, sub-division 4 under division 3 belonging to Chapter 2 should be numbered as 2.3.4. The caption for the sub-division should immediately follow the number assigned to it. Every chapter beginning with the first chapter should be serially numbered using Arabic numerals.

7.3 Numbering of Tables and Figures Tables and figures appearing anywhere in the thesis should bear appropriate numbers. The rule for assigning such numbers is illustrated through an example. Thus, if a figure in Chapter 3, happens to be the fourth then assign Fig. 3.4 to that figure. Identical rules apply for tables except that

the word Fig. is replaced by the word Table. If figures (or tables) appear in appendices then figure 3 in Appendix 2 will be designated as Fig. A2.3. A table may be continued into the next page, but no line should be drawn underneath an unfinished table. The top line of the table continued into the next page should, for example, read Table 2.1 (continued) placed centrally and underlined.

- 7.4 Numbering of Equations: Equations appearing in each chapter or appendix should be numbered serially, the numbering commencing afresh for each chapter or appendix. Thus, for example, an equation appearing in Chapter 2, if it happens to be the eighth equation in that chapter should be numbered (2.8) thus: ... (2.8) while referring to this equation in the body of the thesis it should be referred to as Eqn. 2.8.

## **8. BINDING SPECIFICATIONS**

The thesis should be bound using flexible cover of thick white or blue art paper. The cover should be printed in black letters and the text for printing should be identical to what has been prescribed for the title page.

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