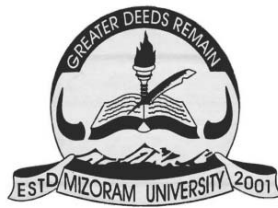# Mizoram University

Aizawl – 796 004

REVISED

Course Structure & Syllabi

for

Bachelor of Computer Applications (BCA)

(October 2013)

PREFACE

The Bachelor of Computer Application (BCA) course commenced in 2007 under Mizoram University. Since then there had not been any revision in the course till date. It is a known fact that there is very rapid changes and advancement taking place in IT sectors which therefore requires revisions in the subject like BCA so that our young and fresh minds will be able to keep pace with the changing world of IT software development. This will enable our young graduates in BCA to face the ever developing and challenging IT sectors. With this in mind, the task of revision of BCA course was under taken by the Chairman of BOS in Computer Application (BOS-CA) since 2012. With the sincere efforts of all the members of BOS-CA, the BCA syllabus was thoroughly revised and approved in the BOS-CA which was held on 27th September, 2013. This revised syllabus is targeted to be implemented from the new session of 2014.

BOS-CA Chairman takes this opportunity to thank all the members for actively involved in the revision of the BCA syllabus. He also thanks all the faculty members teaching BCA course in Mizoram who have also contributed to the development of this revised syllabus. Ms. Malsawmdawngliani, Asst. Prof., Department of BCA, Govt. Zirtiri Residential Science College, Aizawl, has immensely contributed in framing of this syllabus. In fact she as coordinator has put in all hard works with sincerity along with her other colleagues to make this syllabus a success. All the members of the BOS-CA and faculty teaching BCA course thank Hon'ble Vice Chancellor Prof. R. Lalthantluanga for granting permission to hold the BOS-CA meeting three times with almost the same agenda.

It is hoped that our young students in Mizoram opting to study BCA course will be highly benefited.

Prof. R. K. Thapa
Dean & Chairman
Board of Studies in Computer Application
Aizawl Dated 30th October, 2013   Mizoram University

CONTENTS

3 YEARS DEGREE BACHELOR OF COMPUTER APPLICATION

MIZORAM UNIVERSITY
SYLLABUS FOR
3 YEARS DEGREE BACHELOR OF COMPUTER APPLICATIONS (BCA)

INTRODUCTION

OBJECTIVE:

The knowledge and skills required to plan, design and build complex application software system, which are very much needed in all industry sectors including business, health, education and the arts. The basic objective of BCA Course is to provide young minds with the required knowledge and necessary skills to get rewarding careers into the ever changing world of Information technology.

THE JOB OPPORTUNITIES ARE:

The graduates could begin their career as Junior Programmer and then matured as Sr. Programmer, System Analysts, etc. They may seek entrepreneurial roles in the computer world as independent business owners, software authors, consultants, or suppliers of systems and equipments. Career opportunities exist in such areas as management, software and hardware Industries, technical writing, IT Training Institutes, Software consultancy & Technical Support.

Application areas include transaction processing (such as order processing, airline/railway/banking), accounting functions, decision support and data communications.

The BCA programme will be a full time three years (six semesters) Bachelor's Degree in Computer Application. The institutes should organize training programme/project in the final year by interacting with software company and consultancy within in and outside the state.

RULES AND REGULATIONS

Short Title and Introduction

These regulations shall be called "Revised Regulations for Bachelor of Computer Applications (BCA) Program, as approved by the 25th Academic Council of Mizoram University held on 3rd December 2013. These shall come into force from the Academic year 2014. These regulations are subject to modifications as deemed whenever necessary by the Academic Council of the Mizoram University.

1. **<u>Programme</u>**: The Bachelor of Computer Applications (BCA) Program shall consist of 6 (six) semesters. While pursuing the course, the students are not allowed to pursue any other programme within or outside the University.

2. **Duration**: The minimum duration of the BCA Program is 6 (Six). The students are required to complete the BCA Course within a maximum of 5 years (10 semesters) failing which they shall have to seek fresh admission.

3. **Medium of instruction**: English is the only medium of instructions.

4. **Eligibility of admission** : A candidate seeking admission to the BCA Course must have passed 10+2 (any stream) securing not less than 50% marks in aggregate (5% relaxation to ST/SC candidates) from the Central Board of Secondary Education or any other equivalent examination recognized by the Mizoram University *preferably* with Mathematics as one of compulsory or optional course, or any other vocational course related to the computer stream having either Computer Science or Computer Engineering as compulsory/optional course.

5. **Commencement of the Course**: As notified by the Mizoram University.

6. **Working days in academic year**: Each semester shall consist not less than 90 effective teaching days. This will be as notified by the Mizoram University.

7. **Eligibility for appearing at the University Examination**: Candidates having attendance less than 75% in any semester both in theory and practical courses *separately* are not eligible to appear in that semester examination. A maximum of 15% relaxation in attendance shall be considered as per the Mizoram University rules.

8. **Examination :**

    a. **All Students in the first semester must clear Mathematics-I (Bridge course) paper in first attempt failing which he/she shall discontinue the program and may seek for fresh admission.**

    b. There shall be no supplementary examination for any course. However, students are allowed to clear any course with maximum of two extra attempt. This will be arranged with the respective (i.e., Odd or Even) end semester examination.

    c. The pass marks for each course is 40% both in the Internal and End-semester Examinations, separately. For clearing a semester the minimum SGPA is 5.0 and similarly, for clearing the course the overall CGPA required is 5.0.

d. A minimum of 5 SGPA (Semester Grade Point Average, defined at Point #11) is required to clear/pass a semester. Similarly, a minimum of 5 CGPA required to clear the BCA program.

f. The duration of end semester examination will be 3 hours.

9. Re-evaluation will be allowed as per Mizoram University regulations.

10. **Grading System:**

Based on overall performance of the student in each semester, the Grade shall be awarded on a scale of Ten (10) point grade as per following scheme:

Marks Range (Out of 100)	Grade	Grade Points	Description of Performance
100-91	A+	10	Outstanding
90-81	A	9	Excellent
80-71	B+	8	Very Good
70-61	B	7	Good
60-50	C+	6	Average
49-40	C	5	Below Average
< 40	Not to be considered for Awarding grades		

At the end of each end-semester examination, a student shall be awarded a Semester Grade Point Average (SGPA) which shall be calculated as:

$$SGPA = \sum_{i=1}^{n} c_i g_i / \sum_{i=1}^{n} c_i$$

Where, n=Total number of papers in the semester.

C_i=Number of credits in the ith paper.

g_i=Grade points earned in the ith paper.

At the end of BCA programme, a student shall be awarded a Cumulative Grade Point Average (CGPA) which shall be calculated as

$$CGPA = \sum_{i=1}^{m} C_i S_i / \sum_{i=1}^{m} C_i$$

where, m=Total number of semesters in the programme.

S_i=SGPA in the ith semester.

C_i=Total number of credits in the ith semester.

If the comparison of the performance of a student of Mizoram University with those from the other Universities/Institute, if required, the following formula for converting CGPA to percentage of marks shall be used:

Equivalent Percentage= 10 X CGPA-5, for CGPA up to 9.

Equivalent Percentage= 15 X CGPA-50, for CGPA above 9.

11. **Award of Division:**

On the basis of the CGPA, the result of each student shall be declared as follows:

CGPA 8.0 and above   Passed in First Division with Distinction.

CGPA 7.0 – 7.9   Passed in First Division.

CGPA 6 and   6.9   Passed in Second Division.

CGPA 5 – 5.9   Passed in Third Division

CGPA Below 5   Failed.

12. **Award of Rank:**

Rank of a student will be awarded as per Mizoram University rules.

13. **Re-examinations/Improvement facilities**

This will be as per Mizoram University existing regulations.

14. **Assessment**

Theory: For each Theory paper, there will be 25/75% assessment for Internal/External examinations, respectively. In each semester examination, out of total 100 marks, Theory question paper will be set for 75 marks and remaining 25 marks will be set for internal examinations. The project in the final semester will be assessed for total marks of 300 but will be converted into a scale of 100 point. Internal assessment includes Terminals, Practical skills, Assignment, Presentations, Performances, Attendance etc.

Practical :   The marks distribution for Practical papers will be followed as:

The breakup of marks for the Internal and External Exam will be as under:

Internal Assessment(Practical)	
Internal Test	15 marks
Practical skills/performances etc.	10 marks
Total	25 marks
External(Practical)	
Laboratory Record	10 marks
Viva Voce	15 marks
Program Development and Execution	50 marks
Total	75 marks

Teaching Scheme(per week) in each Paper		
Theory(hrs)	Demonstration(hrs)	Practical(hrs)
3	1	4

15. Revision of Syllabus: Major/Minor Revision of the syllabus will be allowed as per Mizoram University regulations.

16. Question pattern: The question pattern will contain Very Short (Multiple choice), Short answer and Descriptive types. The distribution of marks will be as follows:

a) Theory papers (Full marks: 75 Marks)

Part A – Objective (25 marks)

Section –I (15 marks**)**

i) Multiple choice : 10 Questions of 1 mark each (10X1=10 marks).

ii) True or False: 5 Questions of 1 mark each (5X1=5 marks).

Section-II (10 marks)

Short Answer – 5 Questions of 2 marks each (5X2=10 marks)

Part B – Descriptive (50 marks)

5 out of 10 questions to be answered each will carry 10 marks. 2 questions must be taken from each Unit.

b) Practical Papers (Full Marks: 75)

Section A: 2 out of 3 practicalsto be conducted each of 15 marks (2X15=30 Marks).

Section B: 1out of 2 practicals to be conducted each of 20 marks (1X20=20 marks).

Section C: Viva (15 marks), Practical Record (10 marks).

c) Final Project Work (Full Marks:300, this will be converted into a scale of 100 point)

External (225 marks)

i)	Project Record	:	25 marks
ii)	Project Development and execution	:	110 marks
iii)	Viva	:	55 marks
iv)	Presentation	:	35 marks

Internal (75 marks)

Internal marks distributions will be made by teachers of the concerned colleges for the purpose of the final project work evaluation.

17. **Removal of Discrepancy/Difficulties:**

Notwithstanding anything contained in this Regulation, any discrepancy/difficulty arising in interpretation of, or giving effect to, any provision of this regulation, shall be referred to the Vice-Chancellor, whose interpretation or decision thereon shall be final.

COURSE STRUCTURE AND MARKS DISTRIBUTION

3 YEARS DEGREE BACHELOR OF COMPUTER APPLICATION

Paper Code	Name of Paper	Max. Marks Scale		Total	Credit per week			Course Credit	Exam (hrs)	
		Int.	Ext.		L	T	P		T	P
	1st Semester	Int.	Ext.	**Total**	L	T	P		T	P
BCA101	English Language & Communication Skills	25	75	**100**	2	1	0	**3**	3	-
BCA102	Mathematics-I (Fundamentals of Mathematics)	25	75	**100**	3	1	0	**4**	3	-
BCA103	Introduction to Information Technology	25	75	**100**	2	1	0	**3**	3	-
BCA104	Digital Computer Fundamentals	25	75	**100**	2	1	0	**3**	3	-
BCA105	Programming Language through C	25	75	**100**	2	1	0	**3**	3	-
BCA103P	PC Applications and Internet Technology (Practical)	25	75	**100**	0	0	3	**3**	-	3
BCA105P	Programming in C (Practical)	25	75	**100**	0	0	3	**3**	-	3
				700	**11**	**5**	**6**	**22**		
	2nd Semester									
BCA201	Personality and Soft Skills Development	40	60	**100**	2	0	1	**3**	3	3
BCA202	Mathemetics –II (Discrete Mathematics)	25	75	**100**	3	1	0	**4**	3	-
BCA203	Data Structure using C	25	75	**100**	2	1	0	**3**	3	-
BCA204	System Analysis and Design	25	75	**100**	2	1	0	**3**	3	-
BCA205	Accounting and Financial Management	25	75	**100**	2	1	0	**3**	3	-
BCA203P	Data Structure using C(Practical)	25	75	**100**	0	0	3	**3**	-	3
BCA205P	Tally ERP 9.0(Practical)	25	75	**100**	0	0	3	**3**	-	3
				700	**11**	**4**	**7**	**22**		
	3rd Semester									
BCA301	Management Information Systems	25	75	**100**	2	1	0	**3**	3	-
BCA302	Mathematics-III (Numerical Analysis)	25	75	**100**	3	1	0	**4**	3	-
BCA303	Operating Systems	25	75	**100**	2	1	0	**3**	3	-
BCA304	Object Oriented Programming in C++	25	75	**100**	2	1	0	**3**	3	-
BCA305	Computer Organisation and Architecture	25	75	**100**	2	1	0	**3**	3	-
BCA303P	Unix and Shell Programming (Practical)	25	75	**100**	0	0	3	**3**	-	3
BCA304P	C++ Programming (Practical)	25	75	**100**	0	0	3	**3**	-	3
				700	**11**	**5**	**6**	**22**		
	4th Semester									
BCA401	Environment and Ecology	25	75	**100**	2	1	0	**3**	3	-
BCA402	Database Management Systems	25	75	**100**	2	1	0	**3**	3	-
BCA403	Computer Networking	25	75	**100**	3	1	0	**4**	3	-
BCA404	Software Engineering	25	75	**100**	2	1	0	**3**	3	-
BCA405	GUI Programing	25	75	**100**	2	1	0	**3**	3	-
BCA402P	Oracle Laboratory (Practical)	25	75	**100**	0	0	3	**3**	-	3
BCA405P	Programming with VB 2010 with Mini Project(Practical)	25	75	**100**	0	0	3	**3**	-	3
				700	**11**	**5**	**6**	**22**		

5th Semester										
BCA501	Introduction to Java Programming	25	75	**100**	2	1	0	**3**	3	-
BCA502	Computer Graphics and Multimedia	25	75	**100**	2	1	0	**3**	3	-
BCA503	Microprocessors	25	75	**100**	2	1	0	**3**	3	-
BCA504	Software Project Management	25	75	**100**	2	1	0	**3**	3	-
BCA501P	Java Programming (Practical)	25	75	**100**	0	0	3	**3**	-	3
BCA503P	Assembly Language Programming (Practical)	25	75	**100**	0	0	3	**3**	-	3
BCA5E1 BCA5E2 BCA5E3	**Elective – I (*any one*)** Introduction to e-Governance Computer Network Security Data Mining and Warehousing	25	75	**100**	3	1	0	**4**	3	-
				700	**11**	**5**	**6**	**22**		
6th Semester										
BCA6E1 BCA6E2 BCA6E3 BCA6E4	**Elective – II (*any one*)** Operation Research Theory of Computing Fundamentals of TCP/IP IT Acts and Cyber Laws	25	75	**100**	3	1	0	**4**	3	-
BCA6E5 BCA6E6 BCA6E7 BCA6E8	**Elective – III (*any one*)** Artificial Intelligence Internet and e-Commerce Simulation and Modeling Analysis and Design of Algorithms	25	75	**100**	3	1	0	**4**	3	-
BCA601P	**Project Work**	100	200	**300***	0	0	8	**8**	-	6
				500	**6**	**2**	**8**	**16**		
			Grand Total	**4000**				**126**		

*This will be converted into a scale of 100 point.

Theory Credit -   **88**
Practical Credit -   **38**

L=Lecture, T= Tutorial, P = Practical

Note: *Choice of Elective(s) would be available based on the availability of Faculty in the College/Institution.*

BCA101: ENGLISH LANGUAGE & COMMUNICATION SKILLS

Marks Scale: 100 marks (End Sem. Exam: 75+Int.: 25)   **Credit: 3**
                                                                           (2- 1- 0)

Unit 1 : Introduction to Language Communication   **(10L)**
Importance of English Language, Basics of Communication – Process of Communication, Components of Communication, factors of Communication; Barriers to Communication – Physical, Psychological, Semantics, Organizational and Interpersonal Barriers; How to overcome Barriers.

Unit 2: Communication Skills in English   **(10L)**
Language Skills- Reading Skills and Listening Skills; Verbal Communication- Vocal Communication techniques and Oral Presentation; Non Verbal Communication- Personal appearance; Facial Expression, Movement, Posture, Gesture, Eye Contact.

Unit 3 : Effective Writing   **(10L)**
Writing Abstracts and Summaries; Note Making; Report Writing- Structure and Layout, Elements of Structure, Front Matter, Main Body, Back Matter;Laboratory Reports.

Unit 4 : Grammar 1   **(10 L)**
Parts of Speech, Definition & Identification of 'Subject' and 'Predicate', Phrases & Clauses, Tense – Types of Tenses & their use.

Unit 5: Grammar 2   **(10L)**
Voice – Active voice and Passive voice, Concept of Concord – What is Concord? Subject - Verb Agreement; Reported Speech – Direct and Indirect Speech.

Recommended Books:
1. R.C.Sharma& Krishna Mohan:*Business Correspondence & Report Writing, A Practical Approach to Business and Technical Communication*, Tata McGraw Hill (2002).
2. ArunaKoweru:*Professional Communication*, Tata McGraw Hill Pub. Co. Ltd. (2008).
3. Wren & Martin:*English Grammar and Composition,* S. Chand Publisher (2011).

BCA 102: MATHEMATICS - I (BRIDGE COURSE)

Marks Scale : 100 marks (End Sem. Exam : 75 + Int. : 25)   **Credit : 4**
                                                                                (3-1-0)

Unit 1: Basic Numeracy   **(10 L)**

Test for Divisibility of Numbers; General Properties of Divisibility; Division and Remainder Rules; Principle of Prime Factorization; Difference between HCF and LCM; Definition and Comparison of Fractions; Insertion of any number of Fractions in between two given Fractions; Operation Order Sequence (VBODMAS); Algebraic Formula; Percentage and their Inter-conversion; Average; Ratio and Proportion. Binomial Theorem and expansions.

Unit 2 : Sequence and Series   **(10 L)**

Definition of Sequence, Series and Progression; Definition of Arithmetic Progression (AP); nth term of an AP; sum of n terms of an AP; Arithmetic Mean (AM); Properties of AP; Definition of Geometric Progression (GP); nth term of a GP; Sum of n terms of a GP; Geometric Mean (GM); Properties of GP; Definition of Harmonic Progression (HP); Harmonic Mean (HM); Relations between AM, GM and HM.

Unit 3 : Matrix and Determinant   **(10 L)**

Matrices: Definition of a Matrix; Various Types of Matrices; Operations on Matrices; Symmetric and Skew-Symmetric Matrices; Row Operations, Column Operations; Inverse of a Matrix by Elementary Row Operations.

Determinants: Concept of Determinant; Minors and Co-factors in Determinants; Expansion of a Determinant; Properties of Determinants.

Unit 4 : Differential Calculus   **(10 L)**

Basic Formulae of Differentiation; Differentiation from the First Principle; Derivative of the Product of Functions, Quotient of two functions, Function of a function (Chain Rule).

Derivatives of Exponential functions, Logarithmic functions, Inverse Trigonometric functions; Differentiation by Trigonometrical Transformations; Differentiation of Implicit functions; Differentiation using Logarithms.

Unit 5 : Integral Calculus   **(10 L)**

Indefinite Integral: Basic Formulae and Standard results of Integration; Integration by Substitution; Integration using Trigonometric Identities; Integration by Parts.

Recommended Books :

1. Arun Sharma & M.K. Bhagat : *General Studies Paper II for Civil Services Preliminary Examination*, Tata McGraw Hill Education Private Limited (2013).
2. R.S. Aggarwal : *Senior Secondary School Mathematics for Class 11*, BharatiBhawan (Publishers & Distributors).
3. Aggarwal, R. S. : *Senior Secondary School Mathematics for Class 12*, BharatiBhawan (Publishers & Distributors).
4. Parmanand Gupta : *Comprehensive Mathematics for Class XI Part A*, Laxmi Publications (P) Ltd, New Delhi.
5. Shanti Narayanan :*A Textbook of Matrices*, S. Chand & Company, 9th Edition (1997).
6. B.C. Das & B. N. Mukherjee : *Differential and Integral Calculus*,?

BCA103: INTRODUCTION TO INFORMATION TECHNOLOGY

Marks Scale: 100 marks (End Sem. Exam: 75 + Int.: 25)   **Credit: 3**
                                                                       (2- 1- 0)

UNIT – 1   **(10L)**
Computer: Definition of computer, characteristics, computer generation & evolution of computers, Classification of Computers, Distributed Computer System, Parallel Computers, computer organization & block diagram representation, storage devices.
Memory: Concept of primary & secondary memory, RAM, ROM, types of ROM, flash memory, Magnetic Hard disk, floppy Disk, Drives, Compact Disk Read Only Memory, Magnetic Tape Drives.

UNIT –2   **(10 L)**
Computer Language: Low level and high level languages, assemblers, compilers, interpreters, linkers, algorithms, flow charting, decision tables, pseudo code.
Software concepts: Definition, types of software: system & application software packages, hardware & software.

UNIT –3   **(10 L)**
Overview of Operating System: Definition, functions of operating system, concept of multiprogramming, multitasking, multithreading, multiprocessing, time-sharing, real time, single-user & multi-user operating system.
Computer Virus: Definition, types of viruses, characteristics of viruses, anti-virus software.

UNIT – 4   **(10 L)**
Network: Basic elements of a communication system, Data transmission modes, Data Transmission speed, Data transmission media, Digital and Analog Transmission, Network topologies, Network Types (LAN, WAN and MAN), OSI & TCP/IP Model, Network, Client and Servers, Host & Terminals, TCP/IP.

UNIT – 5   **(10 L)**
Internet: Definition, World Wide Web, Uniform Resource Locator, Web Browsers, IP Address, Domain Name, Internet Services Providers, Internet Security, Search Engines, Net Etiquette, Internet Services, Intranet, Extranet. E-mail, advantages and disadvantages of Email, format of email addresses, influences or impacts of internet to society, education, research etc. Cybercrimes, Hacker, Cracker .

Recommended Books:

1. P. K. Sinha&PritiSinha : *Computer Fundamentals*, BPB Publications (2009).
2. Alex Leon & Mathews Leon : *Fundamentals of Information Technology*, LeonTechworld (1999).
3. Vikas Gupta : *Comdex Computer Kit*, Wiley Dreamtech, Delhi (2004).
4. V. Rajaraman : *Introduction to Computers*, PHI (1998).
5. Alex Leon & Mathews Leon : *Introduction to Computers*, Vikas Publishing House (2001)
6. Peter Norton : *Introduction to Computers*, 4th Edition, TMH (2001).

BCA 104- DIGITAL COMPUTER FUNDAMENTALS

Marks Scale: 100 marks (End Sem. Exam: 75 + Int.: 25)   **Credit: 3**
                                                                              (2- 1- 0)

UNIT 1:   **(10 L)**
Introduction to Number system and Codes – Digital computers and Digital Systems, Binary Numbers, Octal and Hexadecimal numbers, Number Base Conversion- different number systems and their conversions (Decimal, Binary, Octal, Hexadecimal), Complements- r's complement and (r-1)'s complement, Binary Codes- Decimal Codes, Error Detection Codes, Alphanumeric Codes. Binary Storage and Registers. Binary Logic (Definition, Switching Circuits and Binary Signals, Logic Gates), Integrated Circuits.

UNIT 2:   **(10 L)**
Boolean algebra and Logic Gates – Basic Definition, Basic theorems and properties of Boolean algebra, Boolean functions, Canonical and Standard forms, Other logic operations, Digital logic gates, Universal property of NAND gate and NOR gate, De- Morgan's theorems, Simplification of Boolean algebra, Karnaugh map- two, three and four variable maps, Sum of Product and Product of Sum simplification.

UNIT 3:   **(10 L)**
Combinational Logic – Introduction, Design procedure, Adders (half and full), Subtractor (half and full), Parallel binary adders, Decoder, Encoder, Multiplexer, De-multiplexer, Programmable Logic Array (PLA).

UNIT 4:   **(10 L)**
Sequential Logic- Flip-Flops - RS flip-flops, D flip-flops, JK flip-flops. T flip-flops, Trigerring of flipflops- Master slave flip-flop, edge trigger flipflop.
Registers and Counters – Register, Shift Register, Asynchronous counters -Four bit ripple counter, Synchronous counter- Binary Counter, BCD Counter.

UNIT 5:   **(10 L)**
Register- Transfer Logic – Introduction, Interregister transfer- Bus Transfer, Memory Transfer, Arithmetic, Logic and Shift Microoperations, Fixed point binary data, Overflow, Arithmetic Shift, Decimal data, Floating point data, Instruction codes- Instruction code formats, Macrooperations versus Microoperations, Design of Simple Computer.

Recommended books:
1. M. Morris Mano : *" Digital Logic and Computer Design"*, Eastern Economy Edition, Prentice Hall of India (2003).
2. Brown Malvino : *"Digital Computer Electronics"*, 3rd Edition, Tata McGraw Hill (1995).
3. Paul Albert Malvino and Donald P Leach : *"Digital Principles and Applications",* 4th Edition, TMH (2000).
4. Malvino, Paul Albert and Leach, Donald P : *"Digital Computer Fundamentals"*, 3rd Edition, TMH, (1995).
5. Thomas C Bartee : *"Digital Computer Fundamentals"*, 6th Edition, TMH (1995).
6. Thomas L Floyd : *"Digital Computer Fundamentals"*, 3rd Edition, University Book Stall (1997).

BCA105: PROGRAMMING LANGUAGE THROUGH 'C'

Marks Scale: 100 marks (End Sem. Exam: 75 + Int.: 25)   **Credit: 3**
                                                                            (2- 1- 0)

UNIT 1   **(10L)**
Overview of C: Importance of C, sample C programs, basic structure of C programs, programming style, executing C program. Character set, C tokens, keywords and identifiers, constants, variables, data types, declaration of variables, assigning value to variable, defining symbolic constants.
Operators and Expression: Operators - arithmetic, relational, logical, assignment, increment-decrement, conditional, bit-wise and special. Arithmetic expressions, evaluation of expressions, precedence of arithmetic operators, type conversions in expressions, operator precedence and associativity.
Managing Input and Output Operators:
Formatted input/output-more about printf() and scanf() functions. Unformatted input – getchar(), getch(), getche(), gets(). Unformatted output – putchar (), puts ().

UNIT 2   **(10 L)**
Overview of C: Decision making with IF statement: simple IF statement, the IF-ELSE statement, nesting of IF …ELSE statements, the ELSE IF ladder. The switch statement, break, continue, goto statements, enum.
Decision Making and Looping: Looping statements - WHILE, DO….WHILE and FOR. Nesting and Jumps in loops, Infinite loop
.
UNIT 3   **(10 L)**
Functions: Definition, prototype of a function, standard library functions, User-Defined Functions, Need for user-defined functions, return values and their types, category of functions: no arguments and no return values, arguments but no return values, arguments with return values. Handling of non-integer functions, calling a function-call by value and call by reference, recursion and iteration, storage classes of variables-automatic, static, register and external, their scopes and lifetime.
Arrays: Definition, declaration and initialization: One-dimensional arrays, two-dimensional arrays. Multidimensional arrays. Sorting: Bubble and insertion sort. Linear search.

UNIT 4:   **(10 L)**
Handling of Character Strings: Declaring and initializing string variables, reading string from terminal, writing string to screen, string concatenation, comparison of two strings, string handling functions.
Pointers: Definition, accessing the address of variable, declaring and initializing pointers, accessing a variable through its pointer, pointers and arrays, arrays of pointers, pointers and functions.

UNIT 5 :   **(10 L)**
Structures and Unions: Structure definition, structure initialization, user-defined data types, arrays of structures, arrays within structures, structures within structures, structures and functions, pointers and structures. Self-referential structures, union, tydef.
File Management in C: File concept, various operations on files – Defining, opening, closing, input/output operations on files, command line arguments.

Recommended Books:

1. E. Balagurusamy : *Programming in ANSI C*, Tata McGraw Hill Publications (2004).
2. Ashok. N.Kamthane : *Programming with ANSI and Turbo C*, Pearson Education (2006).
3. B. Kernigan and D. Ritchie : *The ANSI C Programming Language*, PHI Publications (1988).
4. Byron Gottfried : *Programming with C*, Tata McGraw Hill Publications (2010).

BCA103P- PC APPLICATIONS AND INTERNET TECHNOLOGY (Practical)

Marks Scale: 100 marks (End Sem. Exam: 75+Internal: 25)   **Credit: 3**
                                                                       (0- 0- 3)

A.	**Record Book**	**(10 marks)**
B.	**Viva Voce**	**(15 marks)**
C.	**Practical**	**(50 marks)**

UNIT 1 - Windows Basic and DOS
Personalizing Windows - Backgrounds, Themes, Working with Files and Folders, Windows Accessories - Paint, Notepad, Wordpad, etc. Windows Tools - Disk Cleanup, Defragmenter, System Restore, etc.

Important DOS commands, Internal Commands - CD, Cls, Color, Copy, Date, Del, Dir, Echo, Exit, Goto, Md, Move, Pause, Prompt, Rd, Ren, Time, Ver, Vol; External Commands - Append, At, Attrib, Chkdsk, Edit, Help, Ipconfig, Label, More, Netstat, Shutdown and creating Batch Files.

UNIT 2 - Microsoft Word 2010
Word Introduction, The Workplace, Typing and Editing, Bullets and Numbering, Finding and Replacing, AutoCorrect, Formatting Text and Paragraphs, Header and Footers, Sorting Lists, Working with Tables and Using Formulae in Tables, Graphics and Multimedia, Page Design and Layout, File Management, Opening, Saving, and Protecting Documents, Printing, Mail Merge

Practical may be given for
- Creating the documents with Special effects like font, color, underline, bold, different size,
- Find and Replace operations like cut, paste, copy clipboard.
- Inserting Pictures, Bullets & Numbering
- Paragraphs, bullets, indentation
- Printing the documents, it includes paper-size, margins, header and footer, page no.
- Creating a table.
- Mail merge, spell-check, drawing table.

UNIT 3 - Microsoft Excel 2010
Introduction to Excel, Working in Workbooks and Worksheet, Entering Data, Using Formulas and Functions to Calculate Values, Editing a Worksheet, formatting a Worksheet, Creating Charts, (graphs), Chart Types, Formatting Chart, Data sorting and filtering Data in a List, Adding Comments to Documents, Recording and Using Macros, Saving and Protecting a Workbook.

Practical may be given for
- Creating Worksheets.
- Printing, Inserting, Deleting, Copying, Moving worksheets.
- Formulas, Built-in functions.
- Graph-Plotting facilities.
- Formatting cells, Worksheets etc.
- Protection facility
- Macro facility

UNIT 4 - PowerPoint 2010 and Access 2010
PowerPoint Basics, Creating New Slide, Inserting and Deleting slides, Slides Layout, Inserting sound, picture and multimedia objects, creating different charts, Setting and Editing Slide Designs, Setting Transition Effects, Choosing Animations, Setting Custom Animations, Rehearsing and Viewing Slide Shows.

Access Basics, Creating Tables, Setting Primary Keys, Table Relationships, Creating Views, Using Operators in Queries, Creating Access Forms, Creating Reports.

UNIT 5 - HTML

HTML 5 Documents Basics, DOCTYPE, Head, Body, and Body, CSS Styles, Headings and Heading Styles, Page Divisions: div for Structure and Layout, Paragraph and Text Styles, Links and Link Styles, Multimedia, Images, and Image Styles, Lists and List Styles, Tables and Table Styles, Forms and Form Styles.

Practical Demonstration of the followings:
1. Demonstration of complete HTML programming with suitable example
2. Develop an HTML document for a web page for a personal information background color, text color and background image. The design should focus on Personal Identification i.e. Name, Address, Father/Mother's name, Address, Education information, Field of Interest.
3. Develop an HTML document for a web page of your favorite News Paper. Design the page with an attractive color combination, with suitable headings and horizontal rules.
4. Write an HTML document with an example of Ordered List and Unordered List.
5. Write an HTML document with an example of Table format to print your Bio-Data.

Recommended Books:

1. The AGI Training Team : *Microsoft Office 2010 Digital Classroom*, Wiley Publishing Inc (2011).
2. Thomas. A. Powell : *The Complete HTML and CSS References*, 5th Edition, McGraw Hill (2010).
3. Brian P. Hogan : *HTML5 and CSS3 - Develop with Tomorrow's Standards Today*, The Pragmatic Bookshelft (2011).

Note:*The above lists of experiments are suggestive of the standard. Department may modify, add or delete any experiment whenever it considered necessary*

BCA105P- PROGRAMMING IN 'C' (PRACTICAL)

Marks Scale: 100 marks (End Sem. Exam: 75+Internal: 25)   **Credit: 3**
                                                                     (0- 0- 3)

    A. **Record Book**   **(10 marks)**
    B. **Viva Voce**   **(15 marks)**
    C. **Practical**   **(50 marks)**

List of Minimum Practical to be performed:
1.   Write a program to find the average of six subjects and display the results as follows:

AVERAGE	RESULT
>75 &&<100	Distinction
>60 &&<75	First Division
>49 &&<60	Second Division
>34 &&<50	Third Division
If marks in any subject less than 35	Fail

2.   Write a C program to find the sum of digits of accepted no.
3.   Write a C program to find the sum of first 100 natural nos.
4.   Write a C program to find the sum of first 100 odd nos. and even nos.
5.   Write a C program to display first 25 Fibonacci nos.
6.   Write a C program to check whether the given number is prime or not.
7.   Write a C program to find factorial of the given number.
8.   Write a C program to reverse the accepted number.
9.   Write a program to find the largest and smallest number in an array.
10.   Write a C program to find whether the accepted string number is palindrome or not.
11.   Write a C program to convert decimal number to its equivalent binary number.
12.   Write a C program to arrange the accepted numbers in ascending order and descending order.
13.   Write a program to search for an item in n number of elements using linear search
14.   Write a C program to arrange the accepted numbers in ascending order or descending order. Use:
    a)   Bubble sort
    b)   Selection Sort
15. Write a program to input two matrices A and B and perform the following operations:
    a)   Addition
    b)   Subtraction
    c)   Multiplication
    d)   Transpose
16. Write a recursive program to:
    a)   Find the factorial of a given number
    b)   Print the Fibonacci sequence upto n terms.
17. Convert given line into upper case or lower case character as user want.
   (Use switch statement for the choice of case.)
18. Count How many Characters, Words, lines, spaces, tabs into given text.
19. Print detail of students like R-no, name, address, city, phone on screen. (Use structure.)
20. Swap the values of two different no using UDF & pointer.
21. Create one text file store some information into it and print the same information on terminal.
22. You have given a file which contains some integers. From this file create another two files
one for odd and second for even numbers. Print the result of both files.
23. Create one file and insert some information using fprintf() and fscanf() function.

24. Display the following format on screen.
C
CP
CPR
CPRO
.
CPROGRAMING
.
.
CPRO
CPR
CP
C
25. Display the following format on screen
1
1   2   1
1   2   3   2   1
1   2   3   4   3   2   1
26. Display the following format on screen
1
2   3
4   5   6
7   8   9   10

Note:*The above lists of experiments are suggestive of the standard. Department may modify, add or delete any experiment whenever it considered necessary*

BCA201: PERSONALITY & SOFT SKILLS DEVELOPMENT

Marks Scale: 100 marks (End Sem. Exam: 60+Internal: 40)   **Credit: 3**
                                                                               (2- 0- 1)

Unit 1: Introduction to Personality Development   **(10L)**
Basics of Personality Development and its importance- Definition, Components and Scope, Communication Skills and Personality Development.

Unit 2 : Grooming Personality   **(10L)**
Motivation, Leadership skills and team building, Goal setting, Time Management and Effective planning.

Unit 3: Element of a letter   **(10L)**
Email Communication- introduction, techniques for writing effective e-mail, email etiquette, Letter Writing-Job Application letters, writing Resume.

Unit 4: Business Letter   **(10L)**
Business Letters- Letter of Enquiry, quotations, order and acknowledgement letters, complaint and adjustment letters.

Unit 5: Oral Communication(Practical to be conducted in the College)   **(10 L) (1Credit)**
Facing Interview-Viva Voce, Different forms of classroom interaction-seminar, paper presentation, Group Discussion, Public Speaking.

Recommended Books:

1. Rajiv K Mishra : *Personality Development*, Rupa & Co. (2004).
2. Wallace and Masters : *Personal Development for Life Work*, 9th Edition, Thomson (2005).
3. Ashish Dutta : *All about Body Language*, Goodwill Publishing House (2008).
4. R.C. Sharma-Krishna Mohan : *Business Correspondence and Report Writing,* Tata McGraw Hill Pub. Co. Ltd (2002).
5. Aruna Koneru : *Professional Communication*, Tata McGraw Hill Pub. Co. Ltd. (2008).

BCA 202: MATHEMATICS - II (DISCRETE MATHEMATICS)

Marks Scale : 100 marks (End Sem. Exam : 75 + Int. : 25)   **Credit : 4**
                                                                        (3-1-0)

Unit 1 : Set Theory& Boolean Algebra   (10 L)

Introduction of set; Sets and Elements; Universal Set and Empty Set; Subsets; Venn Diagrams; Set Operations; Boolean algebra : partial oedering, lattice and algebraic systems, principle of duality, basic properties of algebraic systems defined by lattices, distributive and complemented lattices, Boolean lattices and Boolean algebra, uniqueness of finite Boolean algrbra, Boolean functions and Boolean expressions.

Unit 2 : Logic and Propositional Calculus   (10 L)

Introduction; Propositions and Compound Propositions; Basic Logical Operations; Propositions and truth Tables; Tautologies and Contradictions; Logical Equivalence; Algebra of Propositions; Conditional and Biconditional Statements; Arguments; Logical Implication; Propositional Functions, Quantifiers; Negation of Quantified Statements; Normal Forms; Predicate Logic.

Unit 3 : Combinatorial Analysis   (10 L)

Permutations and Combinations: Factorial Notation; Fundamental Principle of Counting; Permutations (including practical problems); Combinations (including practical problems).

Binomial Theorem: Binomial Coefficient and Pascal's Triangle; Binomial Theorem for Positive Integral Index; Observations in a Binomial Expansion – general term, middle terms, pth term from the end and the beginning, coefficient, independent term.

Unit 4 : Group Theory   (10 L)

Group theory: definitions of semi-group, monoid, group, permutation group and simple examples. Cosets, Lagrange's theorem, normal subgroup, homomorphism, Burnside's theorem (statement only) and its simple applications, codes and group codes.

Unit 5 : Graph Theory   (10 L)

Graphs and Multigraphs; Subgraphs, Isomorphic and Homeomorphic Graphs; Paths and Connectivity; Cutpoints and Bridges; Eulerian and Hamiltonian Graphs;Labeled and Weighted Graphs; Complete, Regular and Bipartite Graphs; Tree; Spanning Trees; Minimum Spanning Trees; Planar and Nonplanar Graphs; Graph Colorings; Linked Representation of a Graph (Adjacency Matrix and Incidence Matrix).

Recommended Books :

1. C.L.Liu : *Elements of Discrete Mathematics*, 3Ed, TMH (2008).
2. J. P. Trembly &R. P. Manohar : *Discrete Mathematical Structure with Applications to Computer Science*, McGraw Hill International Edition (1997).
3. S. Lipschutz & M. L. Lipson : *Discrete Mathematics (Schaum's Series)*,Tata McGraw Hill.
4. Vinay Kumar : *Discrete Mathematics*, BPB Publications, New Delhi.

BCA203: DATA STRUCTURES USING 'C'

Marks Scale: 100 marks (End Sem. Exam: 75 + Int.: 25)   **Credit: 3**
                                                                              (2- 1- 0)

UNIT – I: Brief Revision of C Language   **(10L)**
Dynamic memory allocation: Meaning of dynamic memory allocation, malloc, calloc, free and reallocation functions.
Pointers: Understanding pointers, declaring and initializing pointers, accessing a variable through its pointer, pointers arithmetic, pointers and arrays, arrays of pointers, pointers and functions.
Introduction to Data Structure: Primitive and Non-Primitive Data Structure, Linear and Non-Linear Data Structure, Time and Space efficiency of the Algorithm

UNIT- 2: Searching and Sorting   **(10L)**
Searching: Sequential and Binary Searches.
Sorting: Bubble, Insertion, Quick, Merge, Heap. Comparison of time complexity

UNIT- 3: Stacks and Queues   **(10L)**
Basic definitions and operations of stacks and queues.Representation of stacks and queues using arrays. Types of queues- Ordinary Queue, Circular queues, Double-ended Queue. and Priority Queue.
Applications of stacks : Conversion from infix to postfix and prefix expressions, evaluation of postfix expression using stacks. (no algorithms)

UNIT- 4 : Linked lists   **(10L)**
Introduction, operations on Singly linked lists, Linked stacks and queues, Circular linked lists, Doubly-linked list, Generalized list structure.

UNIT- 5 : Trees and Graphs   **(10L)**
Trees: Basic definitions, Binary trees: Operations on binary trees, Binary tree representations: Node representation of binary tree, internal and external nodes, Binary tree traversal methods: preorder, inorder, postorder traversal(Recursive and non-recursive), Binary search Tree.
Graph: Basic definitions, Graph representation: adjacency matrix, Adjacency lists, Adjacency multicasts, Traversal schemes: Depth first search, Breadth first search, Spanning tree: definition, minimal spanning tree, shortest path algorithms :Prims and Kruskals algorithms- basic concept.

Recommended Books:
1. Y. Langsam, M.J.Augenstein & A.M.Tanenbaum : *Data Structure using C and C++,*Prentice Hall of India (1996).
2. S. Chottopadhyay, D. Ghoshdastidar and M.Chottopadhyay : *Data Structure through C Language*, BPB Publications (2001).
3. A. M. Padma Reddy : *Systematic Approach to Data Structures using C*, United Publishers (2012).
4. Yashavant Kanetkar : *Data Structure through 'C'* , BPB Publications (2010).
5. Balagurusamy : *Programming in ANSI C*, 5th Edition, Tata McGraw Hill Publications (2011).

BCA204: SYSTEM ANALYSIS AND DESIGN

Marks Scale: 100 marks (End Sem. Exam: 75 + Int.: 25)   **Credit: 3**
                                                                          (2- 1- 0)

UNIT - I   **(10L)**

System definition and concepts: Characteristics and types of system, Manual and automated systems

Real-life Business sub-systems: Production, Marketing, Personal, Material, and Finance

Systems models types of models: Systems environment and boundaries, Real-time and distributed systems, Basic principles of successful systems

Systems analyst: Role and need of systems analyst,Qualifications and responsibilities, Systems Analyst as and agent of change,

UNIT - 2   **(10L)**

Introduction to systems development life cycle (SDLC)

Various phases of development: Analysis, Design, Development, Implementation, Maintenance

Systems documentation considerations: Principles of systems documentation, Types of documentation and their importance, enforcing documentation discipline in an organization.

UNIT – 3   **(10L)**

System Planning: Data and fact gathering techniques: Interviews, Group communication, Presentations, Site visits.

Feasibility study and its importance, Types of feasibility reports-System,Selection plan and proposal, Prototyping

UNIT - 4   **(10L)**

Systems Design and modeling: Process modeling, Logical and physical design, Design representation, Systems flowcharts and structured charts, Data flow diagrams, Common diagramming conventions and guidelines using DFD and ERD diagrams. Data Modeling and systems analysis, designing the internals: Program and Process design, Designing Distributed Systems.

Input and Output: Classification of forms: Input/output forms design, User-interface design, Graphical interfaces

UNIT - 5   **(10L)**

System Implementation and Maintenance: Planning considerations, Conversion methods, producers and controls, System acceptance Criteria, System evaluation and performance, Testing and validation, Systems qualify Control and assurance, Maintenance activities and issues.

Case study of the following systems:

(I) Inventory Control   (II) Railway Reservation System

(III) University Management System   (IV) Hospital management System

Recommended Books:

1. Elias. M. Awad : *System Analysis and Design*, 2nd Edition, Richard D Irwin (1985).
2. Perry Edwards : *System Analysis and Design,* McGraw-Hill Companies (1993).
3. James. A. Senn : *Analysis and Design of Information Systems,* McGraw-Hill Companies(1984).

BCA205: ACCOUNTING AND FINANCIAL MANAGEMENT

Marks Scale: 100 marks (End Sem. Exam: 75 + Int.: 25)   **Credit: 3**
                                                                    (2- 1- 0)

<u>ACCOUNTING</u>:

UNIT – 1 :   **(10L)**
Introduction to Accountancy: definition, objectives, advantages & limitations; Accounting Principles, Concepts & Conventions, **Double entry System**; Rules of Debit & Credit – Modern (American) Approach & Traditional rules (British Approach), Journal; Accounting equation. **Ledger Accounts**: Meaning, classifications, ledger posting from journal entries, ledger posting from Cash book,
Accounting for Cash - Cash book (three column Cash book).

UNIT-2:   **(10 L)**
Trial Balance: Meaning, special features and objectives; Preparation of trial balance, **Financial statement(with adjustment)**: Meaning of Trading, Profit & Loss a/c and Balance Sheet, *Adjustments:* Closing stock, outstanding expenses, prepaid expenses, Accrued income, advance income, bad debts, provision for bad and doubtful debt, provision for discount on debtors and creditors, Depreciation, interest on capital, interest on drawing, interest on loans.

UNIT-3:   **(10 L)**
Ratio Analysis: Meaning of Accounting ratios, objectives and limitations. Types of ratios and their usefulness – Liquidity Ratio, Current ratio, Profitability Ratio, Efficiency ratio, solvency ratios, Stock turnover ratio, Gross Profit Ratio, Net Profit Ratio, Debit Equity Ratio, Debtors turnover Ratio.

<u>FINANCIAL MANAGEMENT</u>:

UNIT-4:   **(10 L)**
Introduction to Management accounting: Meaning, objectives, nature & scope, advantages & limitations of Management accounting. Differences between Financial Accounting and Management Accounting, Management Accounting and Cost Accounting. Management Accountant's position, roles and responsibilities. **Standard costing-** Meaning, objective, advantages & limitations of Standard Costing.

UNIT- 5:   **(10 L)**
Budgeting: Definition, Budget Vs Forecasts, and Essentials of budgeting. Types of Budget – Functional, Master, Fixed, flexible Budget and zero-based budget.(Theory and simple problems), **Budgetary Control**: Meaning, objectives, advantages and limitations. **Unit Costing:** Preparation of Cost Sheet and Tender Price Statement.

<u>Recommended Books:</u>
1. N. Maheshwari: *Cost andManagement Accounting,* Sultan Chand & Sons (2013).
2. Basu & Das *: Practice in Accountancy*, Vol-I,Rabindra Library (2004).
3. N. Maheswari : *Advance Accounting*, Vikas Publication House Pvt Ltd (2009).
4. M. N. Arora : *Cost & Management Accounting,* Vikas Publishing House Pvt Limited (2009).
5. R. L. Gupta : *Advance Accounting*, Sultan Chand (1999).

BCA203P:DATA STRUCTURES USING 'C'(Practical)

Marks Scale: 100 marks (End Sem. Exam: 75+Internal: 25)   **Credit: 3**
                                                                  (0- 0- 3)

A.	**Record Book**	**(10 marks)**
B.	**Viva Voce**	**(15 marks)**
C.	**Practical**	**(50 marks)**

List of Practical to be performed:
1. Array implementation
2. Singly linked list implementation.
3. Reverse a linked list
4. Sort a Linked List
5. Double linked list
4. Stack using array
5. Stack using link list
6. Queue using Array
7. Queue using link list
8. Circular Queue using Array
9. Binary Tree: Insertion, Deletion
10. Linear Search (Sorted and Unsorted)
11. Binary Search
12. Quick Sort
13. Selection Sort
14. Insertion Sort
15. Merge Sort
16. Heap Sort

Note:*The above lists of experiments are suggestive of the standard. Department may modify, add or delete any experiment whenever it considered necessary*

BCA205P: TALLY ERP 9.0

Marks Scale: 100 marks (End Sem. Exam: 75+Internal: 25)   **Credit: 3**
                                                                 (0- 0- 3)

A.   **Record Book**   **(10 marks)**
B.   **Viva Voce**   **(15 marks)**
C.   **Practical**   **(50 marks)**

PART A:
COMPUTERISED ACCOUNTING SYSTEM:Introduction to computer-Role of computer in accounting, important aspects of computer accounting. **Data base concept for Accounting** -Introduction of data base concepts, Purpose/Need of Database, Database Elements, Database Models.

PART B:
1. Meaning of Tally, importance, benefits of tally.
2. Creating
a. New company
b. Security Controls
c. Groups
d. Ledger
e. Voucher Type
3. Modifying
a. New company
b. Security Controls
c. Groups
d. Ledger
e. Voucher Type
4. Voucher Entry
5. Generating Profit & Loss Account, Trial Balance and Balance Sheet
6. Backup & Restore.

Note:*The above lists of experiments are suggestive of the standard. Department may modify, add or delete any experiment whenever it considered necessary*

BCA301: MANAGEMENT INFORMATION SYSTEM

Marks Scale: 100 marks (End Sem. Exam: 75 + Int.: 25)   **Credit: 3**
                                                               (2- 1- 0)

UNIT – 1 : Introduction to MIS   **(10L)**
System concept, Data and Information, Types of information, Types of Information System at Management levels, MIS: Definition, Meaning and Role, System approach, The system view of business, MIS organization within the company, Management Organizational theory and the system approach, Development of organizational theory, Management and organizational behavior, Management, Information and the System approach

UNIT – 2 :Information system for decision Making   **(10 L)**
Evolution of an Information system, Decision making and MIS, MIS as a technique for making programmed decisions, Decision assisting information
Strategic and Project Planning for MIS
General business planning, MIS response, MIS Planning (general & detail)

UNIT – 3: Conceptual System Design   **(10 L)**
Define the problem, Set system objectives, Establish system constraints, Determining information needs and sources, Develop alternative conceptual design and select one, Document the system concept, Prepare the conceptual design report

UNIT – 4 :Detail System Design   **(10 L)**
Inform and involve the organization, Aim of detailed design, Project management of MIS detail design, Identifying the domain and tradeoff criteria, Defining subsystems, Sketch the detailed operating sub system and information flows, Determination of the degree of automation of each operation, Inform and involve the organization again, Input/Output and processing early system testing, Software, hardware & tools propose to an organization to operate the system, Documentation of the detailed design.

UNIT – 5 :Implementation, Evaluation and Maintenance of the MIS   **(10 L)**
Planning for the implementation, Acquiring floor space & planning space layout, Organize for the implementation, Develop procedure from implementation, Operating personal training, Computer related acquisitions, Developing forms for data collection and information, Dissemination, Developing the files, Testing the system, Cutover, Documentation of the system, Evaluation of the MIS control and the system maintenance.Pitfalls in MIS development: Fundamental weaknesses, Soft spot planning, Design problems

Recommended Books:
1. Robert. G. Murdick, Joel E. Ross and James R. Claggett : *Information Systems for Modern Management,* Prentice Hall (1984).
2. Gordan. B. Devis : *Management Information System,* Mcgraw-hill, NewYork (1974).
3. Jerome Kanter : *Managing with Information,* Prentice Hall College Div; 4thSub edition (1992).
4. Kenneth. C. Laudon : *Management Information System,* Prentice Hall; 12th edition (2011).

BCA 302: MATHEMATICS - III (NUMERICAL ANALYSIS)

Marks Scale : 100 marks (End Sem. Exam : 75 + Int. : 25)　　　　　**Credit : 4**
　　　　　　　　　　　　　　　　　　　　　　　　　　　　　　　　　　(3-1-0)

(N.B. Calculators are allowed in the examinations for this paper only)

Unit 1: Solution of Algebraic and Transcendental Equations　　　　　**(10 L)**
Introduction; Bisection method (Bolzano's method); Iteration method (method of successive approximations); Regula-Falsi method (method of False Position); Newton-Raphson method; Triangularization method (method of Factorization); Crout's method (Direct method); Gauss Elimination method; Gauss-Jordan method; Gauss-Seidel method.

Unit 2 : Calculus of Finite Differences　　　　　**(10 L)**
Introduction of Finite Differences; Factorial Notation; Shift Operator; Forward and Backward Difference Operators; Central Difference Operator; Average Operator; Relations and Properties on Operators; Differences of a Polynomial; Error Propagation in a Difference Table; Finite Integration (or Inverse Operator); Summation of Series; Monmort's Theorem.

Unit 3 : Interpolation with Equal and Unequal Intervals　　　　　**(10 L)**
Definitions of Interpolation and Extrapolation; Newton's Forward and Backward Interpolation Formula; Gauss's Forward and Backward Interpolation Formula; Definition and Properties of Divided Differences; Newton's Divided Difference Interpolation Formula; Lagrange's Interpolation Formula; Lagrange's Formula for Inverse Interpolation.

Unit 4 : Numerical Differentiation and Integration　　　　　**(10 L)**
Definition of Numerical Differentiation; Derivatives using Newton's Forward and Backward Difference Formula; Definition of Numerical Integration; Trapezoidal Rule; Simpson's One-Third Rule; Simpson's Three-Eighth Rule; Weddle's Rule; Romberg's method; Trapezoidal Rule for Double Integrals; Simpson's One-Third Rule for Double Integrals.

Unit 5 : Solution of Ordinary Differential Equations　　　　　**(10 L)**
Introduction; Order and Degree of Differential Equation; Solutions of First Order Differential Equations – Variables Separable, Homogeneous Equations, Linear Differential Equations; Numerical Solutions of Ordinary Differential Equations – Taylor's Series Method, Picard's Method, Euler's Method, Modified Euler's Method, Runge-Kutta Method (Fourth Order).

Recommended Books :

1. P. Kandasamy, K. Thilagavathy, K. Gunavathi : *Numerical Methods*, S. Chand & Company Ltd.
2. H. C. Saxena : *Finite Differences and Numerical Analysis*, S. Chand & Company Ltd.
3. E. Balagurusamy : *Numerical Methods*, Prentice Hall of India Ltd.
4. Dr. B. S. Grewal : *Numerical Methods in Engineering & Science*, Khanna Publishers.
5. M. K. Jain, S.R.K. Iyengar & R. K. Jain : *Numerical Methods for Scientific and Engineering Computation*, New Age Int. (P) Ltd.

BCA303 :OPERATING SYSTEMS

Marks Scale: 100 marks (End Sem. Exam: 75 + Int.: 25)   **Credit: 3**
                                                                   (2- 1- 0)

Unit 1: Introduction to Operating System   **(10L)**
Components of a computer system, Operating System classification- single user, multi-user, simple batch system, multi-programmed system, multitasking (time sharing system), parallel system, distributed system, real time system, clustered system, Operating System Services

Unit 2 : Process Management   **(10 L)**
Process Concept- process and program, process state, process control block, Process scheduling, scheduling queues, schedulers(short term, long term, medium term), context switch
Operation on processes- process creation, process termination, Overview of Inter-Process communication- message-passing system, naming, synchronization, buffering, Threads Overview, Multithreading models- many-to-one model, one-to-one model, many-to-many model

CPU Scheduling: Basic concepts- CPU-I/O burst cycle,CPU scheduler, preemptive scheduling, dispatcher Scheduling Criteria, Scheduling Algorithms- FCFS scheduling, SJF scheduling, Priority scheduling, Round-Robin scheduling, Multilevel queue scheduling, Multi-level feedback queue scheduling

Unit 3 : Memory Management   **(10 L)**
Background- Logical Versus Physical address space, Swapping, Partition, Paging, Segmentation, Concepts of Virtual Memory, Demand paging, Process creation.

Unit 4 : File Management   **(10 L)**
File concept- file attributes, file operation, file types, Access methods, sequential access, direct access, other access method, Directory Structure- operation to be performed on a directory, different logical structure of a directory, File protection- ACL, other protection approaches, Allocation methods: Contiguous, linked and index allocation.

Unit 5 : Deadlocks   **(10 L)**
Background concept, Deadlock Characteristics- necessary condition, resource-allocation graph, Deadlock Prevention, Deadlock Avoidance, Deadlock Detection, Deadlock Recovery, Critical section, Semaphores, Security- User Authentication, Program Threats, System Threats

Recommended Books:
1. Silberschatz Galvin : *Operating System Concept,* Wiley Publishing (2009).
2. D.M. Dhamdhere : *System Programming and Operating System,* Tata McGraw-Hill Publishing Company, Ltd; Second edition (1996).
3. Milan Milenkovic : *Operating System,* Tata McGraw-Hill (1987).
4. H. M. Deital : *An Introduction to Operating System,* Addison Wesley; Second edition (2002).
5. P. Brinch Hansen : *Operating System Principle,* Prentice-Hall, (1973).
6. W. Stalling : *Operating System,* Macmillan (1992).

BCA304 : OBJECT ORIENTED PROGRAMMING IN C++

Marks Scale: 100 marks (End Sem. Exam: 75 + Int.: 25)   **Credit: 3**
                                                                            (2- 1- 0)

UNIT-1:   **(10 L)**
Principle of OOP & Elements of C++ : Basic concepts of OOP, comparison of procedural programming and OOP, advantages of OOP. Definitions: Class, objects, concept of inheritance and encapsulation, operator overloading, dynamic binding. Basic program construction. Tokens and identifiers. Variables and constants. Data types. Console I/O. Control statements.

UNIT-2:   **(10 L)**
Function, Classes and Objects : Declaration of functions, calling functions, function definition, passing arguments and returning values. Return statement, types of functions, passing and returning structure variables. Overloaded functions, inline functions, default arguments, returning by reference; Declaration of classes and objects, class definition, declaration of members, object as date time, object as function arguments, arrays of objects, returning objects from function, structures and classes.

UNIT-3:   **(10L)**
Constructors and Destructor, Operator Overloading: Basic constructor, parameterized constructors, constructor with default arguments, dynamic initialization of objects, use of copy constructor, shallow copying and deep copying, dynamic constructors. Destructors, constraints on constructors and destructors. Overloading unary operators, overloading binary operators; Data and type conversion: Conversion between basic types, conversion between objects and basic types, conversion between objects of different classes, constraints on type conversion.

UNIT-4   **(10 L)**
Derived Classes & Inheritance, Pointers, Virtual Function: Derived classes and base class. Overriding the member functions.Classhierarchies.Inheritance. Multiple inheritance. Addresses and pointers, pointers and functions, pointers and array, pointers and string, memory management using new and delete operators. Pointers to pointers, pointers to objects.Virtual Function and polymorphism, friend function, static functions, comparison of macros and inline functions.

UNIT-5:   **(10 L)**
Streams, Exception Handling, Class Libraries: Stream class hierarchy, header files, ios flags, stream manipulators, string streams, character stream classes, object I/O, file streams, disk I/O with member function. Exception handling-try, catch, throw statement; class libraries-string and stack class, container class hierarchy, array class, date, list and queue classes. User defined classes. MFC. Templates- Generic functions, generic class, template functions, overriding of generic functions, container and nested classes.

Recommended Books:
1. E. Balagurusamy : *Object-Oriented Programming with C++,* 2nd Edition, Tata McGraw Hill (2001).
2. K.V. Venugopal, R. Kumar and T. Tavaishankar : *Mastering C++,* 1st Edition, Tata McGraw Hill (1997).

305 - COMPUTER ORGANISATION AND ARCHITECTURE

Marks Scale: 100 marks (End Sem. Exam: 75 + Int.: 25)　　　　　　　　**Credit: 3**
　　　　　　　　　　　　　　　　　　　　　　　　　　　　　　　　　　　(2- 1- 0)

Unit 1 :　　　　　　　　　　　　　　　　　　　　　　　　　　　　　　**(10 L)**
Register Transfer and Micro Operations: Register Transfer Language, Register Transfer, Bus and Memory Transfer, Arithmetic Micro Operations, Logic Micro Operations, Shift Micro Operation.

Unit 2 :　　　　　　　　　　　　　　　　　　　　　　　　　　　　　　**(10 L)**
Basic Computer Organization and Design: Instruction Codes, Computer Registers, Computer Instruction, Timing and Control, Instruction Cycle, Input- Output Interrupt, Design of Accumulator Logic.

Programming the Basic Computer: Introduction, Machine Language, Assembly Language, Assembler, Program Loops, Subroutines.

Unit 3 :　　　　　　　　　　　　　　　　　　　　　　　　　　　　　　**(10 L)**
CPU Organization: Introduction, General Register Organization, Stack Organization, Instruction Format, Addressing Modes, Data Transfer and Manipulation, Reduced Instruction Set Computer- CISC Characteristics, RISC Characteristics.

Unit 4 :　　　　　　　　　　　　　　　　　　　　　　　　　　　　　　**(10 L)**
I/O Organization: I/O Interfacing- I/O Bus and Interface Modules, I/O versus Memory bus, Isolated versus Memory mapped I/O, Asynchronous data transfer – Strobe, Handshaking,
Modes of transfer - Programmed I/O, Interrupt initiated, DMA, DMA Controller, DMA Transfer, Input/Output Processor – CPU-IOP Communication.

Unit 5 :　　　　　　　　　　　　　　　　　　　　　　　　　　　　　　**(10 L)**
Memory Organization: Memory Hierarchy, Main Memory - RAM, ROM, Auxiliary Memory- Magnetic Disk, Magnetic Tape, Cache Memory, Types of Mapping- Associative, Direct, Set-associative, Virtual Memory- Address and Memory Space, Address Mapping Using Pages, Page Replacement.

Recommended books:
1. M. Morris : *Mano-Computer System Architecture*, 3rd Edition, Pearson Education, New Delhi (2007).
2. W. Stallings : *Computer Organization & Architecture*, 9th Edition, Pearson Education, New Delhi (2012).
3. N. Carter : *Computer Architecture*, Schaums Outline Series, TMH, New Delhi(2001).

BCA303P: UNIX AND SHELL PROGRAMMING(PRACTICAL)

Marks Scale: 100 marks (End Sem. Exam: 75+Internal: 25)   **Credit: 3**
                                                                 (0- 0- 3)

A.   **Record Book**   **(10 marks)**
B.   **Viva Voce**   **(15 marks)**
C.   **Practical**   **(50 marks)**

List of Practical for Unix:
1. Write a program to print the current date, month and year; and display both the date and time in the format dd/mm/yy/hh:mm:ss.
2. Write a program to create five directory, list all the directory using the wild card * and remove the directory iteratively
3. Write a program to create a file, count the number of lines, words and characters of that file
4. Write a program to create two files and display only the lines common to two files.
5. Write a program to   i) Display all the users along with the column headers
                            ii) Identify directories and executable in a list
                            iii) Show all hidden files.
6. Write a program to calculate the sum of five digit number.
7. Write a program to calculate the area, perimeter of the rectangle, and the area & circumference of the circle. [Length and breadth of a rectangle and radius of a circle are input through the keyboard]
8. Write a shell script to calculate the profit and lost.
9. Write a program to calculate gross salary if the DA is 45% of basic salary, and House Rent Allowance is 20% of basic salary.
10. Write a program to find out whether an input integer is an odd number or even number.
11. Write a program to determine whether the year is leap or not. [Use the logical operators –a and –o]
12. Write a shell script which displays information about a given file in proper format.
13. Write a shell script which receives two file names as an argument, checking whether the two file's contents are same or not. If same, the second file should be deleted.
14. Write a program to calculate overtime pay of 10 employees. Overtime is paid at the rate of Rs 15.00 per hour for every hour worked above 35 hours.
15. Write a program to fine the factorial value of a given number.
16. Write a shell script which deletes all lines containing the word *'programming'* in the files supplied as an arguments to this shell script.
17. Write a shell script which displays a list of all files in the current directory to which you have read, write, and execute permission.
18. Write a shell script to check whether the given argument is file or a directory and display the number of lines if it is a file.
19. Write a shell script to print prime number from 1 to 100.

Note:*The above lists of experiments are suggestive of the standard. Department may modify, add or delete any experiment whenever it considered necessary*

BCA304P :C++ PROGRAMMING (PRACTICAL)

Marks Scale: 100 marks (End Sem. Exam: 75+Internal: 25)   **Credit: 3**
(0- 0- 3)

    A. **Record Book**   **(10 marks)**
    B. **Viva Voce**   **(15 marks)**
    C. **Practical**   **(50 marks)**

List of Program for C++ :
[1] Write a cpp program for static class member. (Class member should be a static variable)
[2] Write a cpp program, which show use of "static member function".
[3] Write a cpp program, which explain concept of a "array of object".
[4] Write a cpp program, which explain concept of "object as a arguments".
[5] Write a cpp program for a friend function.
[6] Write a cpp program for a function friendly to two classes.
[7] Write a cpp program, which explain concept of returning objects.
[8] Write a cpp program for class with constructors.
[9] Write a cpp program for overloaded constructors.
[10] Write a cpp program of copy constructors.
[11] Write a cpp program of implementation of destructors.
[12] Write a cpp program for implementation of unary minus operator.
[13] Write a cpp program for implementation of binary plus(+) operator.
[14] Write a cpp program for implementation of a single inheritance of public data member.
[15] Write a cpp program for implementation of a single inheritance of private data member.
[16] Write a cpp program of multilevel inheritance.
[17] Write a cpp program of multiple inheritances.
[18] Write a cpp program of hybrid inheritance.
[19] Write a cpp program of virtual base class.
[20] Write a cpp program which use constructors in derived class.
[21] Write a cpp program for implementation of pointers to objects.
[22] Write a cpp program for implementation of this pointer.
[23] Write a cpp program for implementation of virtual function.
[24] Write a cpp program of working with single file. (Creates a file with constructor function).
[25] Write a cpp program of working with multiple files (creates a file with open( ) function).

Note:*The above lists of experiments are suggestive of the standard. Department may modify, add or delete any experiment whenever it considered necessary*

BCA401: ENVIRONMENT AND ECOLOGY

Marks Scale: 100 marks (End Sem. Exam: 75 + Int.: 25)   Credit: 3
                                                             (2- 1- 0)

Unit 1 :   (10L)
Introduction & Natural Resources - Definition, Scope and importance
Renewable Resources and associated problems
1) Forest Resources : Use and over-exploitation, Deforestation
2) Water Resources : Use and over-utilisation of surface and ground water; Conflicts overwater.
3) Minerals Resources : Use and exploitation, environmental effects of extraction and using minerals resources
4) Food Resources : Changes caused by agriculture and effects of modern agriculture
5) Energy Resources : Renewable and non-renewable energy sources.
6) Land Resources : Land degradation, soil erosion and desertification

Unit 2 : Ecosystems   (10L)
1) Concept of Ecosystem
2) Structure and function of an ecosystem
3) Producers, consumers and decomposers
4) Energy flow in the ecosystem
5) Food chains, food webs and ecological pyramids

Unit 3 : Biodiversity and its Conservation   (10L)
1) Definition of Biodiversity
2) Biodiversity at national and local levels; Hot-spots of biodiversity in India
3) Threats to biodiversity : Habitat loss, poaching of wild life, man-wildlife conflicts; Endangered and endemic species of India.
4) Conservation of biodiversity :*in-situ and ex-situ* conservation of biodiversity

Unit 4 : Environmental Pollution   (10L)
1) Definition, Causes, Effects and Control measures of :-
a) Air Pollution b) Water Pollution c) Soil Pollution d) Noise Pollution e) E Waste
2) Solid Waste Management : Causes, effects and control measures of urban and industrial wastes
4) Disaster Management : Floods, Earthquakes, Cyclones and Landslides

Unit 5 :Social Issues, Development and the Environment   (10L)
1) Sustainable development. (concept only)
2) Water conservation; Rain water harvesting.
4) Shifting Cultivation and its impact, Wasteland reclamation
5) Population growth; Population explosion
6) Global Warning and Green House effects, Ozone layer depletion

Recommended Books:

1. Erach Bharucha : *Textbook of Environmental Studies for Under Graduate Courses*,University Press (India) Pvt. Ltd. Hyderabad (2005).
2. S.S Dara : *A Textbook of Environmental Studies & Pollution Control*, S.Chand& Co. New Delhi.(1997).
3. S.C. Santra : *Environmental Science*, New Central Book Agency (P) Ltd., Kolkata (2004).
4. K. C. Agarwal : *Environmental Biology*, Nidi Pub. Ltd., Bikaner (2001).
5. Erach Bharucha : *The Biodiversity of India*, Mapin Publishing Pvt. Ltd. Ahmedabad (2002).
6. W.P.Cunningham, T.H.Cooper, E.Gorhani & M.T.Hepworth : *Environmental Encyclopedia*, Jacio Pub. House, Mumbai (2001).
7. A.K.De : *Environmental Chemistry*, New Age International (2003).
8. V.H.Heywood & R.T.Watson.: *Global Biodiversity Assessment*, CambridgeUniversity Press (1995).
9. Sovan Roy : *Environmental Science: A Comprehensive Treatise on Ecology and Environment*, Publishing Syndicate (2003).
10. P.D.Sharma : *Ecology And Environment*, Rastogi Publications (2005).

BCA402: DATABASE MANAGEMENT SYSTEM (DBMS)

Marks Scale: 100 marks (End Sem. Exam: 75 + Int.: 25)   **Credit: 3**
                                                                              (2- 1- 0)

UNIT 1. Introduction, Database Architecture and Modeling   **(10 L)**
Introduction to Database, Types of Database management systems: Hierarchical, network, relational, object-oriented, object-relational and their comparison. Characteristics of data in database, advantages of using a DBMS. Data Models, schemas, and instances, DBMS architecture and Data Independence.Conceptual, logical and physical design. Design Constraints. Functional dependencies.

UNIT 2. Entity Relationship Model and Relational DBMS: **(10 L)**
ER-Diagram, Entities and attributes, Entity types, entity sets, keys and value set, , Components and symbols of ER-Diagram, examples of ER-Diagram, Enhanced Entity-Relationship (EER): Superclasses, subclasses and inheritance. Specialization and Generalization and their constraints. Introduction to relational DBMS, relational data integrity : Domain, Entity, referential, operational.

UNIT 3. Data normalization, Relational Algebra & Relational calculus :   **(10 L)**
Keys, Relationship: one-to-one, one-to-many, many-to-many, **Functional dependencies,** Introduction to Normalization, Normal forms : First, second, third, fourth, fifth form, Boyce-Codd Normal form. Relational algebra, its operations : union, intersection, difference, project, rename, Cartesian product, select, division, join. Relational Calculus: Tuple relational calculus, Domain relational calculus.

UNIT 4.Introduction to SQL.   **(10 L)**
Characteristics and advantage of SQL, data types: data types, literals, string, numeric. SQL operators: arithmetic, comparison, logical and set operators, their precedence. Table: create, modify, alter, drop. Views: and indexes. Queries and sub queries. Aggregate functions. Insert, update and Delete operations. Joints, unions, Intersections, Minus. Cursors in SQL, Embedded SQL.

UNIT 5. Back, Recovery, Database Security and Integrity   **(10 L)**
Requirement of Database security, Database users, Database Security: Dimension, risks and security requirements. Giving Privileges to protecting the data.
Database backups, Data storage, Causes of failures and its recovery. Back-up mechanism : logging, checkpointing. Recovery techniques:Deffered update, intermediate update, shadow paging. Recovery in multi-database systems.

Types of integrity constraints, Restriction on integrity constrains.,Data security risk. Complex user management requirements.Dimensions of security, Data security requirements.Databaseusers.Protecting data within the database. Granting and revoking privileges and roles. System viability factors.Authenticating users to the database.

Recommended Books:

1. A. Leon & M. Leon : *Database Management Systems*, Vikas Publication House Pvt.Ltd (2008).
2. R. Elmasri, S Navathe: *Fundamentals of Database System*,Pearson / Addison Wesley; 5th edition (2006).

BCA403: COMPUTER NETWORKING

Marks Scale: 100 marks (End Sem. Exam: 75 + Int.: 25)   **Credit: 3**
                                                                                        (2- 1- 0)

UNIT 1 : Basic concept of networking :   **(10L)**
Introduction, **Components of network**- Physical structure and topology, categories of network, OSI model, TCP/IP protocol suite, types of addressing. **Data and signals:** analog and digital signal, transmission impairment, performance. **Connecting devices:** bridges, repeaters, switches, routers, gateway.

UNIT 2 : Physical layer: **(10 L)**
Guided and unguided media. **Digital and analog transmission**: digital to analog conversion (ASK,FSK,PSK), Analog to digital conversion (only PCM). **Multiplexing:** FDM, WDM, and TDM. **Switching:** Circuit switch network, datagram network.

UNIT 3 : Data Link Layer :   **(10 L)**
Introduction : error detection and correction, **Linear Block code :**Simple parity check code, hamming codes, CRC. F**low and error control:** stop and wait, Stop-and-Wait ARQ, Go-Back-N ARQ and Selective repeat ARQ. PPP (framing, transition phase only).

UNIT 4 : Network and Transport Layer :   **(10 L)**
NetworkLayer: IPv4 and IPv6 address, Network address translation, ICMP. Routing algorithms- Flooding, Distance-vector routing, link state routing. **Transport layer**: function, process to process delivery, UDP operation, TCP (service, feature, segment, connection establishment and termination).

UNIT 5: Application layer and LAN's: **(10 L)**
Application layer: DNS, TELNET, E-mail, FTP, WWW (only architecture), HTTP, RTP. **LAN:** Ethernet (Standard, Fast and Gigabit Ethernet), IEEE 802.11 (Architecture, MAC sublayer), Bluetooth (Architecture, layer).

Recommended Books:

1. Behrouz.A.Forouzan : *Data Communication and Networking*, 4th Edition, Tata McGraw Hill Publication (2006).
2. Andrew.S.Tanenbaum : *Computer Networks*, Prentice Hall Publication , 5 edition (2010).
3. Alberto Leon-Garcia and IndraWidjaja : *Communication Network*,2nd Edition, Tata McGrawHill Publication (2003).
4. William Stalling : *Data and Computer Communication*,10th Edition, Prentice-Hall India Publication (2013).

BCA404: SOFTWARE ENGINEERING

Marks Scale: 100 marks (End Sem. Exam: 75 + Int.: 25)   **Credit: 3**
                                                                              (2- 1- 0)

UNIT-1   **(10L)**
Software Engineering: Definition, Software Process**,** Software characteristics, The changing Nature Of Software, Software Myths.
Software Life Cycle Models: Build and Fix Model, Waterfall Models, Increment Process Models, Rapid Application Development (RAD) Model, Evolutionary Process Models, Prototyping Model, Spiral Model.

UNIT-2   **(10 L)**
Software Requirements analysis & specifications: Requirements engineering, Types, Feasibility Studies. Software Prototyping. Requirement elicitation techniques like Interviews, Brainstorming, FAST, QFD, Use case approach. Requirements analysis using DFD, Data dictionaries & ER Diagrams, Requirements documentation Nature of SRS, Characteristics & organization of SRS.Requirement Validation & Management.

UNIT- 3   **(10 L)**
Software Design: Definition and objectives. Modularity: Coupling & Cohesion. Strategy ofDesign: Hybrid, Bottom-Up & Top-Down. Function Oriented and Object Oriented Design.

UNIT-4   **(10 L)**
Software Metrics: Definition. Token Count, Data Structure Metrics, Information Flow Metrics.
Software Project Planning: Size Estimation: LOC & Function Count, Cost Estimation: COCOMO. Software Risk Management.

UNIT-5   **(10 L)**
Software Testing: Definition and software Testing Fundamental. Unit Testing: White-Box Testing, Basis Path Testing, Control Structure Testing, Integration Testing: Black-Box Testing, Validation Testing, System Testing. Debugging.
Software Reliability: Basic Concept, Software and Hardware Reliability, Failure and Faults, Software Quality.
Software Maintenance: Definition and Maintenance Process. Reverse Engineering, Software Re-engineering. Documentation.

Recommended Books:

1. R. Pressman : *Software Engineering,* McGraw-Hill Science/Engineering/Math; 7 edition (2009).
2. K. K. Agarwal and Y. Singh : *Software Engineering,* New Age International (2005).

BCA405 GUI PROGRAMMING

Marks Scale: 100 marks (End Sem. Exam: 75 + Int.: 25)   **Credit: 3**
                                                                              (2- 1- 0)

UNIT 1 – Introduction and Language Basics   (10L)

An overview of the .NET framework. Common Language Runtime (CLR), Code Loading and Execution, Common Type System(CTS),Common Language Specification(CLS), MSIL. Introduction to .NET Architecture, Event-Driven Programming, components of Visual Studio 2010 IDE

Introduction to visual basic language, different data types, variable, type conversion, constant, enumerations operators, statement, scope and lifetime of variables, selection statements, looping statements, arrays. Procedures and function, parameter passing in functions.

UNIT 2 – Building Windows Applications   (10 L)

Working with simple applications and complex applications. Working with forms: Textbox, Label, Button,Listbox, Combobox, Checkbox, PictureBox, RadioButton, Panel, Scroll bar, Timer, ListView, TreeView, Toolbar, StatusBar, Link Label – their Properties, Methods and events. DialogBoxes :OpenFileDialog, SaveFileDialog, FontDialog,ColorDialog, PrintDialog. Designing menus : Menu, ContextMenu, access &shorcut keys.

Major Error Types: Syntax, Execution and logic errors. Exception, Exception handling and user defined exception. Debugging and breakpoints.

UNIT 3 – Object Orient Programming with VB.NET   (10 L)

Introduction to object oriented programming, class, object, methods and properties, creating a class, , inheritance, overloading and overriding ,polymorphism, encapsulation, constructors, interface. Access modifiers: Public, Private, Protected, Friend. Using namespace, using imports statement, creating class library.

UNIT 4 – Database Programming   (10 L)

Introduction to data access, overview of ado.net, ado.net architectures and its components. Using visual tools for data access, data form wizard. Working with Connection, Command, DataReader, DataAdapters. Working with DataSet, Data Tables, Data Columns and DataRows , Using DataView, Working with DataGridView. Reporting using Report wizard, Data binding with different controls.

UNIT 5- Web Programming   (10 L)

ASP.NET 4.0, Web form vs windows form – advantages and disadvantages. Web applications pieces. Benefits of ASP.NET web pages. Website files : global.asa, web.config. Thin-client architecture,Web forms for client and server side processing. Performing data validation, site layout, themes and navigation. Using Gridview to build data-driven web form. Deploying desktop and web application using wizard. Create a setup application

Recommended Books:

1. ThearonWillis, Bryan Newsome : *Beginning Microsoft Visual Basic 2010*, Wiley India Pvt. Ltd. (2012).
2. Evangelos Petroutsos : *Mastering Microsoft Visual Basic 2010*,Wiley India Pvt. Ltd. (2010).

BCA402P: ORACLE LABORATORY(PRACTICAL)

Marks Scale: 100 marks (End Sem. Exam: 75+Internal: 25)   **Credit: 3**
                                                                     (0 - 0- 3)

A.	**Record Book**	**(10 marks)**
B.	**Viva Voce**	**(15 marks)**
C.	**Practical**	**(50 marks)**

List of Practicals:
Q1. Create following Three Tables
I. Salesman

SNUM	SNAME	CITY	COMMISSION
1001	PIYUSH	LONDON	12%
1002	NIRAJ	SURAT	13%
1003	MITI	LONDON	11%
1004	RAJESH	BARODA	15%
1005	ANAND	NEW DELHI	10%
1006	RAM	PATAN	10%
1007	LAXMAN	BOMBAY	09%

SNUM: A Unique number assign to each salesman.
SNAME: The name of salesman.
CITY: The location of salesman.
COMMISSION: The salesman commission on order.

II. Customer

CNUM	CNAME	CITY	RATING	SNUM
2001	HARDIK	LONDON	100	1001
2002	GITA	ROME	200	1003
2003	LAXIT	SURAT	200	1002
2004	GOVIND	BOMBAY	300	1002
2005	CHANDU	LONDON	100	1001
2006	CHAMPAK	SURAT	300	1007
2007	PRATIK	ROME	100	1004

CNUM: A Unique number assign to each customer.
CNAME: The name of customer.
CITY: The location of customer.
RATING: A level of preference indicator given to this customer.
SNUM: A salesman number assign to this customer.

III. Orders

ONUM	AMOUNT	ODATE	CNUM	SNUM
3001	18.69	10/03/99	2008	1007
3002	767.19	10/03/99	2001	1001
3003	1900.10	10/03/99	2007	1004
3004	5160.45	10/03/99	2003	1002
3005	1098.25	10/04/99	2008	1007
3006	1713.12	10/04/99	2002	1003
3007	75.75	10/05/99	2004	1002
3008	4723.00	10/05/99	2006	1001
3009	1309.95	10/05/99	2004	1002
3010	9898.87	10/06/99	2006	1001

Q1.List of all orders for more than Rs. 1000

Q2. List all customers whose name begins with a letter 'C'

Q3. Count all Orders of 10th March 1999

Q4.List all customers serviced by salesman with commission above 12%.

Q5.Produce the name and rating of all customers who have above average orders.

Q6. Double the commission of all salesmen of London

Q7.Calculate the total of orders for each day.

Q8. Create a view called Big orders which stores all orders larger than Rs. 4000.

Q9. Create a view that shows all the customers who have the highest ratings.

Q10. Remove all orders of customer Chandu from the Orders table

Q2. Consider the Insurance database given below. The primary keys are underlined and the data types are specified:

PERSON	(<u>driver-id</u>:string,name:string,address:string)
CAR	(<u>Regno</u>:string,model:string,year:int)
ACCIDENT	(<u>report-number</u>:int,date:date,location:string)
OWNS	(<u>driver-id</u>:string,regno:string)
PARTICIPATED	(<u>driver-id</u>:string,<u>regno</u>:string,<u>report-number</u>:int,damage-amount:int)

1. Create the above tables by properly specifying the primary keys and the foreign keys
2. Enter at least five tuples for each relation
3. .Demonstrate how you
    a) update the damage amount for the car with a specific regno in accident with
    b) report number 12 to 25000
    c) add a new accident to the database
4. Calculate the total damage amount
5. Find the lowest and highest amount of money spent in accident.
6. Select location of accident using subquery.
7. Find the total number of people who owned cars that were involved in accidents in   2002.
8. Find the number of accidents in which cars belonging to a specific model were involved.
9. Create a VIEW called OWNERSHIP that will appear the following :
    Driver name, address, registration and location
10. Remove the model column from the CAR table.

Q3. Consider the following relations for an order processing database applications in a Company

CUSTOMER	(<u>cust</u>:int,cname:string,city:string)
ORDER	(<u>order</u>:int,odate:date,cust:int,ord-amt:int)
ORDER_ITEM	(<u>order</u>:int,<u>item</u>:int,qty:int)
ITEM	(<u>item</u>:int,unitprice:int)
SHIPMENT	(<u>order</u>:int,<u>warehouse</u>:int,ship-date:date)
WAREHOUSE	(<u>warehouse</u>:int,city:string)

1 Create the above tables by properly specifying the primary keys and the foreign keys.
2 Enter at least five tuples for each relation.
3 Produce a listing: CUSTNAME,# of orders, AVG_ORDER_AMT, where the middle column is the total no of orders by the customer and the last column is the average order amount for that customer.
4 List the order # for orders that were shipped from all warehouses that the company has in a specified city.

5 Demonstrate how you delete item #10 from ITEM table and make the field null in the ORDER_ITEM table.
6 List the orders date, items and unit price.
7 Calculate the total of orders for each day.
8 Find out which unit price is lowest.
9 Create a VIEW called Big which show all orders larger than ` 2000.
10 Select unit price in order processing using subquery.

Q4. Consider the following database of student enrollment in courses and books adopted for each course

STUDENT	(regno:string,name:string,major:string,bdate:date)
COURSE	(course:int,cname:string,dept:string)
ENROLL	(regno:string,course:int,marks:int)
BOOK_ADOPTION	(course:int,sem:int,book-ISBN:int)
TEXT	(book-ISBN:int,book-title:string,publisher:string,author:string)

1. Create the above tables by properly specifying the primary keys and foreign keys
2. Enter five tuples for each relation
3. Demonstrate how you add a new text book to the database and make this book be adopted by some department
4. Produce a list of text books in alphabetical order for courses offered by BCA department that use more than two books
5. List any department that has all its adopted books published by a specific publisher
6. Select marks of the student using sub query.
7. List out student marks in ascending order
8. Add new column position in enroll table
9. Create a view Black Market that gives the count of no. of publisher.
10. Delete the student bdate from the student table.

Q5. The following tables are maintained by a book dealer

AUTHOR	(author-id:int,name:string,city:string,country:string)
PUBLISHER	(publisher-id:int,name:string,city:string,country:string)
CATALOG	(book-id:int,title:string,author-id:int,publisher-id:int,category-id:int,year:int,price:int)
CATEGORY	(category-id:int,description:script)
ORDER-DETAILS	(order-no:int,book-id:int,quantity:int)

1. Create the above details by properly specifying the primary keys and foreign keys
2. Enter at least five tuples for each relation
3. Find the author of the book which has maximum sales
4. Demonstrate how you increase the price of books published by a specific publisher by 10%
5. List all authors whose name begins with a letter 'L'.
6. Select the price and author using subquery.
7. Select the order detail ordered by quantity.
8. Shows the total and average quantity of book order
9. Create a view called Booking which shows author name, book id, price, and year
10. Delete the quantity of book orders.

Q6. Consider the following database for a banking enterprise

BRANCH	(<u>branch-name</u>:string,branch-city:string,assets:real)
ACCOUNT	(<u>accno</u>:int,branch-name:string,balance:real)
DEPOSITOR	(<u>customer-name</u>:string,<u>accno</u>:int)
CUSTOMER	(<u>customer-name</u>:string,customer-street:string,city:string)
LOAN	(<u>loan-number</u>:int,branch-name:string,loan-number-int)
BORROWER	(<u>customer-name</u>:string,customer-street:string,city:string)

1. Create the above tables by properly specifying the primary and foreign keys
2. Enter 5 tuples for each relation
3. Find all the customers who have at least two accounts at the main branch
4. Find all the customers who have an account at all the branches located in a specified city
5. Find the average loan taken by each customer in any branch
6. Select the borrower name and balance using sub query.
7. Find the lowest and highest balance in account table.
8. Find the customer Sanjit take loan from the Noida branch.
9. Create a view called Personal loan that shows customer name, account no and loan
10. demonstrate how you delete all account tuples at every branch located in a specified city

Note:*The above lists of experiments are suggestive of the standard. Department may modify, add or delete any experiment whenever it considered necessary*

BCA405P:PROGRAMMING WITH VISUAL BASIC 2010
&MINI PROJECT

Marks Scale: 100 marks (End Sem. Exam: 75+Internal: 25)   **Credit: 3**
                                                                          (0 - 0- 3)

A.   **Internal**   **(25 marks)**
B.   **External**
  ➢ **Project Report**   **(15 Marks)**
  ➢ **Viva Voce**   **(20 Marks)**
  ➢ **Presentation**   **(10 Marks)**
  ➢ **Project**   **(30 Marks)**

1.   Develop a simple windows application that can say "Hello Mr/Ms<yourname>, Welcome to Visual Basic 2010 Programming!" when the OK button is click.
2.   Write windows application with three input boxes - two for inputting numbers and one for displaying result. Perform four basic mathematical operating such as plus, minus, multiply and divide using their respective buttons.
3.   Develop windows application for calculating simple interest where Simple Interest = (Principal x Time x Rate) / 100. Calculate the simple interest at least up to three decimal accuracy.
4.   Write a software using Visual Basic 2010 for login purpose with two input boxes for username and password and appropriate buttons. When the user click login button, the software will check the password with the password set by you and then display message box accordingly.
5.   Develop windows application having one combo box at the middle with at least 5 color names in it. When user selects any color from the list, the background color of the application has to change as per the selection using the select...case statement.
6.   Implement a program for the demonstration of Array in Visual Basic 2010 where sorting and reversing of array can be performed by the user.
7.   Develop simple Music Player for the demonstration of ArrayList where playlist items will be store in ArrayLists and the Music Player will have fully function different music player related commands.
8.   Create your own Notepad or text editor for the demonstration of different types of dialog controls such as SaveDialog, OpenDialog, FontDialog, ColorDialog, FolderBrowserDialog and PrintDialog where all dialogs must be fully functioning.
9.   Add status bar control to any of your existing application and display date and time on the status bar.
10.   Generate different reports from Address Book using Microsoft Report and Microsoft Report Viewer.
11.   Add Visual Studio 2010 Setup project to your Address Book and generate single installer and test your installer into your machine and confirm its working.
12.   Design a five page personal website using ASP.NET web project. The different pages should include Default.aspx, Resume.aspx, Contact.aspx, Gallery.aspx and About.aspx.
13.   Deploy your personal website project to IIS or any other available ASP.NET server and confirm that it's working perfectly.

14**.   MINI PROJECT**

Note:*The above lists of experiments are suggestive of the standard. Department may modify, add or delete any experiment whenever it considered necessary*

BCA501 : INTRODUCTION TO JAVA PROGRAMMING

Marks Scale: 100 marks (End Sem. Exam: 75 + Int.: 25)   **Credit: 3**
                                                                              (2- 1- 0)

UNIT - 1   **(10 L)**
Java introduction: History-Java and the Internet-Java Applets and Applications-Features of Java, Basic of OOP ,How Java differs from C and C++ , Java Program Structure, Simple Java Program, Java Tokens, Java Statements, Java Virtual Machine, Command Line Arguments, Constants, Variables, and Data Types, TypeCasting, Operators and Expressions, Decision Making and Branching.
Classes, Objects and Methods, Constructors, Static Members, Nesting of Methods, Inheritance: Extending a. Class, Overriding Methods, final Variables and Methods, Final Classes, Finalize Methods, Abstract Methods and Classes, Visibility Control

UNIT - 2   **(10 L)**
Interfaces: Introduction, Defining Interfaces, Extending Interfaces, implementing Interfaces, Accessing Interface Variables. **Packages:** Introduction, Java API Packages, Using system Packages, Naming Conventions, Creating Packages, Accessing a Packages, Using a Package, Adding a Class to a Package, Hiding Classes.Arrays, String and Vectors,StringHandling,Wrapper Classes

Unit - 3   **(10 L)**
Managing Errors and Exceptions: Introduction, Types of Errors, Exceptions, Syntax ofException Handling Code, Multiple Catch Statements, Using finally Statement, Throwing OurOwn Exceptions, Using Exceptions for Debugging.

Multithreaded Programming: Introduction, Creating Threads, Extending the Thread Class, Stopping and Blocking a Thread, Life Cycle of a Thread, Using Thread Methods, Thread Exceptions, Thread Priority, Synchronization.

UNIT - 4   **(10 L)**
Managing Input/Output Files in Java: Introduction, Concepts of Streams Stream Classes, Byte Stream Classes, Character Stream Classes, Using Streams, Other Useful I/O Classes, using the File Class, Input/Output Exceptions, Creation of Files.

Holding Collection of data: Arrays and collection classes/ interfaces,Map/ List/ Setimplementations, Collection classes, Accessing collections/ use of an Iterator.

UNIT - 5   **(10 L)**
Applet Programming: Introduction, Building Applet Code, Applet Life Cycle, Designing a Web Page, Applet Tag, Adding Applet to HTML File, Passing Parameters to AppletsEvent Handling.

AWT- AWT classes-Window fundamentals- AWT Controls, Layout Managers and Menus – Control, fundamentals-Labels-Buttons-CheckBoxes-CheckBoxGroup-ChoiceControl-Lists-   ScrollBar-TextField-TextArea-LayoutManagers-MenuBars and Menus-DialogBoxes-FileDialog- Handling events by extending AWT components.

Recommended Books:
1. Balagurusamy : *Programming with Java*, A Primer 2nd Edition, Tata McGraw Hill, New Delhi (2009).
2. Herbert Schildt : *The Complete Reference- Java*, 7thEdition, Tata McGraw-Hill Publishing Co. Limited, NewDelhi (2006).
3. H.M.Deitel & P.J.Deitel : *JAVA- How to Program*, 5thEdn, Pearson Education, New Delhi (2004).
4. P.Naughton & H. Schildt : *JAVA: The Complete Reference*, TMH, New Delhi (2005).
5. D.Jana : *Java and Object Oriented Programming Paradigm*, PHI, New Delhi (2005).

BCA502:COMPUTER GRAPHICS AND MULTIMEDIA

Marks Scale: 100 marks (End Sem. Exam: 75 + Int.: 25)   **Credit: 3**
                                                                            (2- 1- 0)

UNIT 1. Introduction and applications   **(10 L)**
History of Computer Graphics, What is CG, Types of Computer Graphics, Area of Computer Graphics,**Display Devices:** Refresh CRT, Random Scan and Raster scan monitors, Color CRT, Plasma Panel displays LCD Panels, Raster-scan System, Random scan System, Graphic software, Input/output Devices, Tablets.

UNIT 2. Drawing Geometry.   **(10 L)**
2D Transformation:2D Transformation ,Use of homogeneous coordinate Systems, Composite Transformation :Translation, Scaling, Rotation, Mirror Reflection, Rotation about an arbitrary point. Clipping and Windowing, Clipping Operation ,Line Clipping Algorithms: The Mid-Point subdivision method, Cohen-Sutherland Line Clipping Algorithms, Polygon Clipping, Sutherland Hodgeman Algorithms, Text Clipping,**3D Transformation:**3D Transformation ,Translation ,Rotation ,Scaling ,Projection, Types of projection.

UNIT 3. Output Primitives   **(10 L)**
Points and Lines, Frame buffer, Line Drawing Algorithms, Circle Generating Algorithms, Ellipse-Generating Algorithms.

UNIT 4. Conics ,Curves and Surfaces: **(10 L)**
Quadric Surfaces :Sphere, Ellipsoid and Torus, Superquadrics: Superellipse, Superellipsoid, Curve drawing, Spline Representation Cubic Spline, parametric representation, need for cubic curves, Drawing cubic Beziers curves & Surfaces, Beziers curves and B-spline curves & Surfaces B-spline curves (No derivation needed).

UNIT 5. Multimedia   & Animation   **(10 L)**
Concepts of Hypertext/hypermedia Multimedia Applications: Education, video conferencing, training, entertainment, and electronics encyclopedias.
Music and Sound: Audio Basic Concepts, Analog Vs Digital, Digital Audio Basic Concepts. MIDI Hardware, MIDI Message, MIDI File Video: Basic Concepts, Analog Video and Digital Video, Images and Graphics: Basic Concepts, Image formats, Graphics Format, File Format Image Quality and Graphic Systems. Compression: Image Compression.
Animation: Introduction to Animation, Principles of Animation, Types of Animations, Tweaking & Morphing.

Recommended Books:

1. Hearn & P.M. Baker : *Computer Graphics*, Prentice Hall India, 2nd Edition (2007).
2. Woo, Neider, Davis, Shreiner : *OpenGL Programming Guide*, Addison-Wesley Professional; 6 edition (2007).
3. T. Vaughan : *Multimedia, making it working*, Tata McGraw Hill, 8 edition (2010).
4. J.D. Foley & A VanDam : *Fundamentals of Interactive Computer Graphics*, Addison Wesley (1982).
5. S. Harringion : *Computer Graphics – A programming*, Tata McGraw Hill (1983).
6. Rajneesh Agrawal & Bharat BhushanTiwari : *Multimedia Systems*, Excel Publications (2002).

BCA503: MICROPROCESSORS

Marks Scale: 100 marks (End Sem. Exam: 75 + Int.: 25)   **Credit: 3**
                                                                              (2- 1- 0)

UNIT 1:   **(10L)**
Introduction, Historical Perspective, Organization of Microprocessor Based System, Microprocessor instruction set computer language, Microprocessor Architecture and its operations, Bus structure, Instruction Fetch, Memory Classification, ALU, MPU Block Diagram, Pin Description, Machine Cycle and Bus timings.

UNIT 2:   **(10L)**
Instruction Set and 8085 Programming Model, Data transfer operation, Addressing Mode, Arithmetic operation, Logic Operations, Looping, Counting and Indexing, Rotate, Compare, Branch Operations, stack and subroutines.

UNIT 3:   **(10L)**
Counters and Time Delays: Time Delay using one register and register pair, Tristate Devices, Buffer, Decoder, Encoder, Latched and Clocked.

UNIT 4:   **(10L)**
Interrupts: The 8085 interrupts, RST Instructions, Multiple Interrupt priority, Vectored Interrupts, DMA.

UNIT 5:   **(10L)**
Interfacing: Interfacing analog to digital (A/D) and Digital to analog (D/A), R/2R ladder and successive approximation.

Recommended Books:

1. R.S. Gaonkar : *Microproc. Architecture, Programming & Applications with 8085/8085A*, Wiley eastern Ltd (1989).
2. Intel Corp: *The 8085 / 8085A. Microprocessor Book – Intel marketing communication*, Wiley inter science publications (1987).
3. Adam Osborne, Jerry Kane, Adam Osborne and Associates : *An Intro. to Microcomputers & Some Real Microprocessor*, Galgotia (1975).
4. AjoyRay and K Bhurchandi : *Advanced Microprocessors*, Tata McGraw Hill, 3rd Edition (2012).
5. Intel Corp.: *Micro Controller Handbook*, Intel Publications (1983).

BCA504: SOFTWARE PROJECT MANAGEMENT

Marks Scale: 100 marks (End Sem. Exam: 75 + Int.: 25)   **Credit: 4**
                                                                               (3- 1- 0)

UNIT - 1   (10L)
Introduction to software project management :– Stepwise: an overview of project planning.
Project management concepts: People, process, project and product (4P), Planning software. Projects –
project schedule, PERT, Gantt Charts, S/W project plan document. System development life cycle.

UNIT - 2   (15 L)
Project teams, project monitoring and controls- Formal Technical Review (FTR),Cost estimation,
COCOMO model, S/W metrics-size oriented and functions oriented.
Using project management software tools, quality management, issue, standards and methods. ISO and
CMM, Risk management, Configuration management.

UNIT - 3   (15 L)
Software effort estimation - Activity planning.
Product Quality and Process Quality: Introduction – Software systems evolution –Product
quality – Models for software product Quality – Process Quality.
Software Measurement and Metrics: Introduction – Measurement during s/w life cycle context – Defect
metrics – Metrics for s/w maintenance – Classification of s/w metrics –Requirements related metrics –
Measurements and process improvement – Measurement principles.

UNIT –4   (5 L)
Resource allocation – Monitoring and Control – Managing Contracts.

UNIT - 5   (5 L)
Managing people and organizing teams – Software quality.

Recommended Books:

1. Bob Hughes & Mile Cotterell : *Software Project Management*, 3rdEdn, Tata McGraw Hill (2004).
2. Royce: *Software Project Management*, Pearson Education (2005).
3. Hughes:*Software Project Management*,McGraw-Hill Education; 5th Revised edition edition (2009).
4. Kelkar : *Software Project Management*, PHI Learning Pvt. Ltd. (2009).
5. Schwable: *Information System Project Mgmt.*, Vikas Pub. House (2009).
6. Kieron Conway: *SoftwareProject Management from concept to deployment with CD*, Wiley
   Dreamtech (2001).

BCA 501P: JAVA PROGRAMMING PRACTICAL

Marks Scale: 100 marks (End Sem. Exam: 75+Internal: 25)   **Credit: 3**
                                                                 (0 - 0- 3)

A.	**Record Book**	**(10 marks)**
B.	**Viva Voce**	**(15 marks)**
C.	**Practical**	**(50 marks)**

Guidelines:
* The output of the programs should be neatly formatted.
* The source code should be indented
* The programs need to be interactive
* Data validations can be done wherever applicable
* Include comments to improve the readability of the program

Use meaningful variable names
1. Demonstrating the use of methods of Math class.
2. Programs to implement the methods of String class
3. Write a program to demonstrate constructors and constructors overloading
4. Write a program to demonstrate method overloading and overriding.
5. To demonstrate abstract class.
6. To Demonstrate interfaces
7. To demonstrate inheritance
8. To demonstrate super and this
9. To demonstrate static variables and methods
10. To demonstrate Exceptions
11. To demonstrate FileInputStream and FileOutput Stream Classes
12. To demonstrate the creation of applets and passing parameters to applets
13. To demonstrate Mouse and Keyboard events in an applet
14. To demonstrate the creation of a frame.
15. To demonstrate Labels and Buttons with proper events
16. To demonstrate Checkboxes with proper events
17. To demonstrate CheckBoxGroups with proper events
18. To demonstrate Lists and TextFields with proper events
19. To demonstrate ScrollBars with proper events
20. To demonstrate MenuBars and Menus.
21. To demonstrate Dialog boxes.
22. To demonstrate Calculator.

Note:*The above lists of experiments are suggestive of the standard. Department may modify, add or delete any experiment whenever it considered necessary*

BCA 503P: ASSEMBLY LANGUAGE PROGRAMMING

Marks Scale: 100 marks (End Sem. Exam: 75+Internal: 25) **Credit: 3**
(0 - 0- 3)

A.   **Record Book**   **(10 marks)**
B.   **Viva Voce**   **(15 marks)**
C.   **Practical**   **(50 marks)**

List of Practicals:
1.   Multiplication of two 8 bit nos
2.   Division of two 8 bit nos
3.   Add two 16-bit numbers
4.   1's complement of a no
5.   2's complement of a no
6.   Swapping the nos
7.   Swappin the hexanos
8.   Rotate right a value 4 times
9.   Rotate right and store the result
10. Addition of two hexa decimal nos including carry
11. Addition of two hexa decimal nos
12. To find the no of 1's in the byte
13. Subtraction of 2 nos in memory
14. Bubble sort of 10 nos in memory
15. Add '2' 16 bit no
16. Decimal addition
17. Write an assembly language program to generate Fibonacci number.
18. Multiply two 8-bit numbers stored in memory locations 2200H and 2201Hby repetitive addition and store the result in memory locations 2300H and 2301H.

Note:*The above lists of experiments are suggestive of the standard. Department may modify, add or delete any experiment whenever it considered necessary*

ELECTIVE- I (*any one*)
BCA5E1 - INTRODUCTION TO E-GOVERNANCE

Marks Scale: 100 marks (End Sem. Exam: 75 + Int.: 25)   **Credit: 4**
                                                                              (3- 1- 0)

Unit 1. Introduction   to e-Governance   **(10L)**
E-Governance: Needs of E-Governance, Issues in E-Governance applications and the Digital Divide; Evolution of E-Governance, Its scope and content, components of e-Governance, Present global trends of growth in E-Governance, Areas of e-Government, Critical success and failure factors for e-Governance.Role of social Media in e-Governance.

Unit 2. E-Governance Approaches in India-The National e-Governance Plan   **(10L)**
Introduction to NeGP, National e-Governance Plan,NeGP vision, The framework for e- Governance, National e-Governance strategy, Major Components of National e-Governance Plan,Mission Mode Projects, Infrastructure pillars of NeGP, Capacity Building initiatives under NeGP, Brief overview of Mizoram e-Governance initiatives.

Unit 3. E-Governance Project Development and Management   **(10L)**
Introduction to e-Government Project Development,Conceptualization Phase, Architect Phase, Define Phase, Support Phase, e-Government Project Management Phase.Business Model for e-Government Projects, Public Private Partnership for e-Government.Security for e-Governance Projects.

Unit 4. Capacity Building & Change Management   **(10L)**
Capacity Building for e-Governance, Governance structure for e-Gov Projects, Change Management for e-Governance Projects. Role of Leadership in e-Governance Projects.

Unit 5. Government Process Re-engineering   **(10L)**
Process Reforms for e-Governance Projects, Tools and techniques for Government Process Re-engineering, Legal Reforms, Technology Management and Enterprise Architecture for e-Governance, Case Studies in e-Government(G2C, G2B)   .

Recommended Books:

1. C.S.R.Prabhu : *E-Governance: Concepts and Case Studies*, Prentice-Hall of India Pvt. Limited (2004).
2. Backus, Michiel : *E-Governance in Developing Countries*, IICD Research Brief, No. 1 (2001).

ELECTIVE- I
BCA5E2: COMPUTER NETWORK SECURITY

Marks Scale: 100 marks (End Sem. Exam: 75 + Int.: 25)   **Credit: 4**

                                     (3- 1- 0)

UNIT – 1   **(10L)**
Introduction: Attacks (Virus, Worms, Trojan Horses, Hoaxes, Dictionary attack, Brute Force, DOS, DDOS, Phishing, Spoofing, Man-in-the-middle, Mail bombing, Sniffers, Social Engineering), Services and Mechanism, Model for Internetwork Security.

UNIT-2   **(10 L)**
Cryptography: Plain Text, Ciphertext, Key, Symmetric key cryptography (Traditional ciphers, DES, AES), Asymetric -Key Cryptography (RSA, Diffie-Hellman).

UNIT – 3   **(10 L)**
Network Security: Confidentiality, Integrity (Message Digest, SHA-1), Authentication (MAC, HMAC), Digital signature, Entity authentication. **Symmetric-Key distribution:** KDC, Kerberos. **Public-Key distribution:** public announcement, Certification authority, X.509.

UNIT– 4   **(10 L)**
IPSecurity: AH, ESP, services, Security association, IKE, VPN. **SSL/TLS:** SSL (Services, security parameters, sessions and connections, protocols, TLS.
PGP (Security parameters, services, Key rings, Certificates). Firewalls (Packet-filter and Proxy firewalls).

UNIT– 5   **(10 L)**
Security technology: Intrusion detection and prevention system (IDPS), Port scanners, Firewall analysis tools, Operating system detection tools, Vulnerability scanners, Packet sniffers, Wireless security tools. Antivirus Software, Malicious virus remover, worm remover.

Recommended Books:

1. Behrouz A Forouzan : *Data Communication and Networking*, 4th Edition Tata McGraw Hill Publication (2003).
2. Andrew S. Tanenbaum : *Computer Networks*, 5th Edition, Prentice Hall Publication (2010).
3. Michael. E. Whitman and Herbert J. Mattort : *Principles of Information Security*, 4th Edition, Cengage Learning (2011).
4. W. Stallings : *Networks Security Essentials: Application& Standards*, Pearson Education(2000).
5. W. Stallings : *Cryptography and Network Security, Principles and Practice*, Pearson Education (2000).

ELECTIVE- I
BCA5E3: DATA MINING AND WAREHOUSING

Marks Scale: 100 marks (End Sem. Exam: 75 + Int.: 25)　　　　　　**Credit: 4**
　　　　　　　　　　　　　　　　　　　　　　　　　　　　　　　　　(3- 1- 0)

UNIT - 1　　　　　　　　　　　　　　　　　　　　　　　　　　　**(10L)**
Data Mining: Basic concept, technology and rules, platform tools, operational vs. Information systems, discussion of ethics & privacy issues with respect to invasive use. Data mining techniques: Exploration of data mining methodologies, decision tables, Decision trees, classification rules, association rules, clustering, statistical models & linear models.

UNIT - 2　　　　　　　　　　　　　　　　　　　　　　　　　　　**(10 L)**
Web Mining: Introduction to web mining techniques, web basics and HTTP, data Sources on the web, personalization, working with logs, forms and cookies, user identification and path analysis.

UNIT - 3　　　　　　　　　　　　　　　　　　　　　　　　　　　**(10 L)**
Data Warehousing: Introduction, scope, practical implications, structures and Functions, Types of data warehouses: Host based, single stage, LAN based, multistage, stationary, distributed and virtual data warehouses.

UNIT - 4　　　　　　　　　　　　　　　　　　　　　　　　　　　**(10 L)**
Data Warehouse: The building Blocks- Defining Features, data warehouses and data marts, overview of the components, metadata in the data warehouse.

Unit - 5　　　　　　　　　　　　　　　　　　　　　　　　　　　**(10 L)**
Principles of dimensional modeling: Objectives, From Requirements to data design, the STAR schema, STAR Schema Keys.
Dimensional Modeling: Updates to the Dimension tables, miscellaneous dimensions, the snowflake schema, aggregate fact tables.

Recommended Books:

1. Paul Raj Poonia: *Data Warehousing Fundamentals*, John Wiley & Sons (2006).
2. Sam Anahony: *Data Warehousing in the Real World: A practical guide for building decision support systems*, John Wiley(2004).
3. W. H. Inmon : *Building the operational data store*, 2nd Ed., John Wiley (1999).
4. Kamber and Han : *Data Mining Concepts and Techniques*, Morgan Kaufmann; 3 edition (2011).
5. Bob : *Data Warehousing*, BPB Publications (2004).

ELECTIVE- II
BCA6E1:OPERATION RESEARCH

Marks Scale: 100 marks (End Sem. Exam: 75 + Int.: 25)   **Credit: 4**
                                                                            (3- 1- 0)

Unit-1: Introduction to Operation Research   **(10L)**
Operation Research : System orientation, Use of interdisciplinary teams in OR, Necessity of OR in Business and Industry, Scope of OR in modern management, OR and Decision Making, Overview of O.R., Formulation of O.R. models, Introduction to different techniques in OR, Simulation modeling

Unit-2:Linear Programming   **(10 L)**
Linear programming : Formulation, Identification of decision variables, Constructing Objective Functions and Constraints, Assumptions, Practical Examples, Methods of Solution, Graphical Method, Simplex method(2-Phase and Big M methods, etc).

Unit-3:Duality theory and Sensitivity Analysis   **(10 L)**
Duality theory & Sensitivity Analysis : Existence of Dual of a LP problem, Economic Interpretation of Duality, Primal Dual relationships in formulation and their solutions, Sensitivity analyses or Post Optimality Analysis, Dual Simplex Method, Changes affecting feasibility, Changes affecting optimality.

Unit-4:Transportation models (TP)   **(10 L)**
Transportation Model :The transportation algorithm, Formulation as a LP problem, Determination of Initial solutions, Stepwise Improvement to obtain optimal solution, Special cases Such as Multiple, Unbalanced, Degeneracy, The assignment model, Formulation as TP, The Hungarian method of solution.

Unit-5: Network Models   **(10 L)**
Network models: Minimal spanning tree problem, Shortest route problem, Maximal flow problem, Critical Path Method (CPM), Program Evaluation and Review Technique (PERT), Network representation of simple projects, Critical path computation, Construction of time schedule.

Recommended Books:

1. Billy E. Gillett : *Introduction to Operation Research*, Tata McGraw-Hill Education (1979).
2. P.K. Gupta & D.S. Hira : *Problems in Operation Research*, S.Chand& Company Ltd (2010).
3. Frederick.S.Hiller, Gerald.J.Lieberman : *Introduction to Operations Research,* McGraw-Hill (2005).
4. Harvey. M. Wagner: *An introduction to Operational Research,* Tata McGraw-Hill Education (2008).

ELECTIVE- II
BCA6E2: THEORY OF COMPUTING

Marks Scale: 100 marks (End Sem. Exam: 75 + Int.: 25)   **Credit: 4**
                                                                            (3- 1- 0)

Unit - 1   **(10L)**
Theory of Automata: Finite Automata, Transition diagram, Acceptability of strings, DFA, NFA, Equivalence of DFA and NFA, Mealy and Moore Machine, Minimization of finite Automata.

Unit - 2   **(10 L)**
Formal Language: Basic Definition, operations of languages, grammar and the language generated by grammar, Chomsky classification.
Regular Sets and Regular grammars: Regular expression and regular sets, pumping lemma for regular sets, closure properties for regular sets, Regular Sets and Regular grammars.

Unit - 3   **(10 L)**
Context-free languages: Derivation trees, Ambiguity in context-free grammars, closure properties of context free languages, Chomsky and Greibach normal forms, Pumping lemma for context –free languages.

Unit - 4   **(10 L)**
Pushdown automata: Basic definition, Acceptance by pushdown automata, pushdown automata and context-free languages
Turing machine: Definitions, representations and acceptability of Turing machine, design of Turing machine.

Unit - 5   **(10 L)**
Computability: primitive recursive functions, recursive functions, partial recursive functions and Turing machine.
Complexity: The classes P and NP, NP complete problems.

Recommended Books:

1. K.L.P. Mishra, N. Chandrasekaran : *Theory of Computer Science*, Prentice Hall of India (2006).
2. J.C. Martin : *Introduction to Languages and the Theory of Computation*, Tata McGraw Hill (2003).
3. D.Saini : *Introduction to Automata Theory*, DhanpatRai& Co (2003).
4. J.Hopcroft & J.Ullman : *Introduction to Automata Theory, Languages and Computation*, NarosaPublishing House (2008).

ELECTIVE- II
BCA6E3 FUNDAMENTALS OF TCP/IP

Marks Scale: 100 marks (End Sem. Exam: 75 + Int.: 25)   **Credit: 4**
                                                                             (3- 1- 0)

Unit - 1   **(10L)**
TCP/IP Fundamentals: Introduction to Open Communications – TCP/IP and the Internet – Overview of TCP/IP

Unit - 2   **(10 L)**
Naming and Addressing: Names and Addresses in an IP Network – ARP and RARP – DNS: Name Services – WINS – Automatic Configuration

Unit - 3   **(10 L)**
IP and Related Protocols: Overview of the IP Family of Protocols – The Internet Protocol – The Transport Protocols – IP Version 6.

Unit - 4   **(10 L)**
Internetworking With IP: Routing in IP Networks – Gateway Protocols – Routing Information Protocol (RIP) – Open Shortest Path First (OSPF).

Unit - 5   **(10 L)**
Using TCP/IP Applications:Whois and Finger – File Transfer Protocols – Using Telnet – Using the R-Utilities

Recommended Books:

1. Karanjit. S. Siyan& Tim Parker : *TCP/IP Unleashed*, SAMS, Third Edition (2002).
2. Matthew. G. Naugle : *Illustrated TCP/IP,* Wiley Publishing (1998).
3. Andrew. G. Blank : *TCP/IP JumpStart – Internet Protocol Basics*, SYBEX, Second Edition (2002).

ELECTIVE- II
BCA6E4- IT ACT & CYBER LAW

Marks Scale: 100 marks (End Sem. Exam: 75 + Int.: 25)　　　　　　**Credit: 4**
　　　　　　　　　　　　　　　　　　　　　　　　　　　　　　　　　　　(3- 1- 0)

UNIT 1:　　　　　　　　　　　　　　　　　　　　　　　　　　　　　　**(10 L)**
Basic Concepts of Technology and Law : Definition Cyber Law, cyber law: Cyber-crimes, electronic &
Digital Signature, Intellectual property, Data protection and privacy, Scope and needs of Cyber Laws, The
jurisprudence of Indian Cyber Law.

UNIT 2:　　　　　　　　　　　　　　　　　　　　　　　　　　　　　　**(10 L)**
Evolution of cyber-crime, Cyber Fraud and Cyber Cheating, Virus on the Internet, Email spoofing, E-
mail bombing, cyber stalking, Denial of service attracts, cyber Terrorism, Salami attack, Online gambling,
Sale of illegal articles, Internet time theft, Web jacking, Data diddling, Intellectual Property crimes, Web
defamation, Cyber Pornography.

UNIT 3 :　　　　　　　　　　　　　　　　　　　　　　　　　　　　　　**(10 L)**
Law of Digital Contracts: The essence of Digital Contracts, The system of Digital signatures,
Digital Signature Certificates, Certifying Authorities and Liabilities, The role and function of certifying
authority.

UNIT 4 :　　　　　　　　　　　　　　　　　　　　　　　　　　　　　　**(10 L)**
E-Governance and IT Act 2000 & Amendments: Legal recognition of electronic records, Legal
recognition of digital signature, Use of electronic records and digital signatures in Government and its
agencies.
Information technology Act 2000: Object and Scope of the IT Act: Genesis, Object, and Scope of the Act.
Major issues address by the IT Act, Extend and jurisdiction of IT Act, Applicability of IT Act, and Relevant
Authorities in India.

UNIT 5:　　　　　　　　　　　　　　　　　　　　　　　　　　　　　　**(10 L)**
Copyright: Meaning, Ownership and Assignment, Licence of Copyright, Copyright Protection
of Content on the Internet.
Management Issues: Organizational Issues
Introduction, Cyber law: Management issues, Cyber law: Organizational issues, Jurisdictional issues, Online
Dispute Resolution (ODR)

Recommended books:
1. Farooq Ahmad : *Cyber Law in India- (Pioneer Books)*, New Era Law Publ.(2005).
2. Vivek Sood : *Cyber Law Simplified*, Tata McGraw Hill (2001).
3. Vakul Sharma : *Information Technology Law and Practice,* Universal Law Publishing Co. Pvt. Ltd
   (2011).
4. Suresh.T.Vishwanathan : *The Indian Cyber Law*, Bharat Law house New Delhi (2001).
5. *The Information Technology Act*, 2000 – Bare Act –Professional Book Publishers – New Delhi.

ELECTIVE- III
BCA6E5: ARTIFICIAL INTELLIGENCE

Marks Scale: 100 marks (End Sem. Exam: 75 + Int.: 25)   **Credit: 4**
                                                                              (3- 1- 0)

UNIT – 1   **(10 L)**
Overview of A.I: Introduction to AI, Importance of AI, AI and its related field, AI Techniques, Criteria for success, Agent & Environments: Good Behavior, The Nature of Environment,The structure of Agents.

UNIT –2   **(10 L)**
Problems Solving: problem space and search: Defining the problem as a state space search, Production system and its characteristics, Issues in the design of the search problem, Heuristic search techniques: Generate and test, hill climbing, best first search technique, Problem reduction, constraint satisfaction.

UNIT – 3   **(10 L)**
Knowledge representation: Definition and importance of knowledge, Knowledge representation, various approaches used in knowledge representation, Issues in knowledge representation, Statements, Connectives, Well-formed formulas, Conjunctive Normal Form, disjunctive normal form, Inference rules: simplification, modus ponens, modus tollens, Predicate logic, prepositional logic.

UNIT – 4   **(10 L)**
Expert System: Introduction, Representing using domain specific knowledge, Expert system
Shells, Knowledge Acquisition. Connectionist Model – Hopfield Networks, Perception, Back Propagation Network (including algorithm).

UNIT – 5   **(10 L)**
Applications of AI: Game playing technique, Mini-max search procedure, Natural Language Processing – Introduction, Syntactic Processing, Semantic Analysis, Image Processing with AI (only relational study).

Recommended Books:

1. Rich and K. Knight : *Artificial Intelligence*, TMH, 2nd Ed. (1999).
2. D.W. Peterson *: Introduction to AI and Expert Systems*, PHI (1999).
3. Nils. J. Nilsson : *Artificial Intelligence-A new Synthesis*,Harcourt Asia Ltd, 2ndEdition (2000).

ELECTIVE- III
BCA6E6: INTERNET AND E-COMMERCE

Marks Scale: 100 marks (End Sem. Exam: 75 + Int.: 25) **Credit: 4**
                                                             (3- 1- 0)

UNIT – 1 **(10 L)**
Introduction to the E-commerce: Meaning and concept, e-commerce versus traditional commerce, Electronic commerce and Physical Commerce, different type of ecommerce,some e-commerce scenario, Advantages of e-commerce. Limitations of e-commerce: technical and non-technical limitations. Model of Ecommerce: B2B, B2C, C2B, C2C.

UNIT – 2 **(10 L)**
Internet Payment System: Characteristics of payment system, SET Protocol for credit card payment, E-cash, E-check, Micropayment system.
E-commerce strategies: Strategies for marketing, Sales and Promotions, Strategies forPurchasing and support activities, Strategies for Web Auctions, Virtual Communitiesand web portals

UNIT – 3 **(10 L)**
E-Business - Introduction: E-Business vs E-commerce,, Characteristics of e-Business, e-Business role and their challenges, e-business Requirements, impacts of e-business.
E-business strategies: Strategic positioning, Levels of e-business strategies, Strategicplanning process, Strategic alignment, the consequences of e-Business, Success factorsfor implementation of e-business strategies. Business models, Business process andcollaborations.

UNIT – 4 **(10 L)**
Integration of Application: Approaches to Middleware, RPC and RMI, Enterprise Application Integration, e-business Integration, loosely Coupled e-Business solutions for integration, Service Oriented Architecture, EAI and web services, web service-security. E-commerce Infrastructure Cluster of Servers, Virtualization Techniques, Cloudcomputing, Server consolidation using cloud.

UNIT – 5 **(10 L)**
E-security – Security on the internet, network and web site risks for e-business, use of firewalls, secure physical infrastructure. The Information Technology Act 2000 and its highlights related to e-commerce.

Recommended Books:
1. Henry Chan : *E-Commerce- Fundamentals and Application*, Wiley Publication (2007).
2. Gary Schneider : *Electronics Commerce*, Cengage Learning (2010).
3. Michael P : *E-Business- Organizational and Technical Foundation*, Wiley Publication (2006).
4. DavidWhiteley : *E- Commerce- Strategies, Technology and Applications*, Tata McGrawHill (2010).
5. Jeffrey F Raypory : *Introduction to E-Commerce*, 2nd Edition, Tata McGraw Hill (2007).
6. BrahmCanzer : *E-Business and Commerce- Strategic Thinking and Practice*, Dreamtech Press (2004).

ELECTIVE- III
BCA6E7: SIMULATION AND MODELLING

Marks Scale: 100 marks (End Sem. Exam: 75 + Int.: 25)   **Credit: 4**
                                                                             (3- 1- 0)

Unit-1   **(10 L)**
Introduction to System Models: System definition and components, stochastic activities, continuous and discrete systems, system modeling, types of models, static and dynamic physical models, static and dynamic mathematical models, full corporate model, types of system study.

Unit-2   **(10 L)**
System simulation:System simulation, why & when to simulate, nature and techniques of simulation, comparison of simulation and analytical methods, types of system simulation, real time simulation, hybrid simulation, simulation of pure-pursuit problem, single-server queuing system and an inventory problem, Monte-Carlo simulation, Distributed Lag models, Cobweb model.

Unit-3   **(10 L)**
Simulation of continuous systems:Simulation of continuous systems, analog vs. digital Simulation, Simulation of water reservoir system, Simulation of a servo system, simulation of an autopilot. **Discrete system simulation**:Discrete system simulation, fixed time-step vs. even to even model, generation of random numbers, test for randomness, Monte-Carlo computation vs. stochastic simulation.

Unit-4   **(10 L)**
System dynamics: System dynamics, exponential growth models, exponential decay models, modified exponential growth models, logistic curves, generalization of growth models, system dynamic diagrams Introduction to SIMSCRIPT: Program, system concepts, origination, and statements, defining the telephone system model.

Unit-5   **(10 L)**
Simulation of PERT Networks: Simulation of PERT Networkscritical path computation, uncertainties in activity duration, Resource allocation and consideration. **Simulation languages:** Simulation software, continuous and discrete simulation languages, expression based languages, object oriented simulation, general purpose vs. application - oriented simulation packages, CSMP-III, MODSIM-III.

Recommended Books:

1. Geoftrey Gordon: *System Simulation*, PHI Learning (2011).
2. Jerry Banks, John S Carson,Barry, L. Nelson, David M. Nicol : *Discrete Event System Simulation*, Pearson Education (2009).
3. V P Singh : *System Modeling and Simulation*, New Age International (2009).
4. Averill. M. Law, W. David Kelton : *System Modeling and Simulation and Analysis*, McGraw-Hill (2000).

ELECTIVE- III
BCA6E8- ANALYSIS AND DESIGN OF ALGORITHMS

Marks Scale: 100 marks (End Sem. Exam: 75 + Int.: 25)　　　　**Credit: 4**

(3- 1- 0)

UNIT - 1 : BASIC CONCEPTS OF ALGORITHMS　　　　　　　　　　(10 L)

Introduction - Notion of Algorithm - Fundamentals of Algorithmic Solving - Important Problem types – Growth of functions - Asymptotic Notations and Basic Efficiency Classes. Analysis of Algorithm Efficiency. Analysis framework – Asymptotic notations – Analysis of Non-recursive and recursive algorithms. Elementary data structures – stacks, queues, linked list.

Brief review of Graphs, Sets and disjoint sets, union.

UNIT - 2: SORTING ALGORITHMS　　　　　　　　　　　　　　　(10 L)

Brute Force - Selection Sort and Bubble Sort - Divide and conquer - Merge sort - Quick Sort - Radix Sort, Counting Sort, Decrease and conquer -Topological Sorting, Insertion Sort,

UNIT-3: GREEDY ALGORITHMS　　　　　　　　　　　　　　　　(10 L)

Greedy Techniques - Prim's Algorithm - Kruskal's Algorithm - Dijkstra's Algorithm - Huffman codes – Minimum spanning tree.

UNIT - 4 : Dynamic programming and heaps　　　　　　　　　　　(10 L)

Heaps and Heap sort - Dynamic Programming – Elements of dynamic programming - Matrix chain multiplication, Optimal Binary Search trees.

UNIT - 5 : SEARCHING ALGORITHMS　　　　　　　　　　　　　(10 L)

Sequential Search and Brute-force string matching, Binary Search - Binary tree- Traversal and Related Properties, Depth first Search and Breadth First Search. Exhaustive search – Travelling salesman problem, knapsack problem.

Recommended Books:

1. AnanyLevitin : *Introduction to the Design and Analysis of Algorithm*, Pearson Education Asia (2003).
2. T.H. Cormen, C.E. Leiserson, R.L. Rivest and C. Stein : *Introduction to Algorithms*, PHI Pvt. Ltd. (2001)
3. Sara Baase and Allen Van Gelder : *Computer Algorithms - Introduction to Design and Analysis*, Pearson Education Asia (2003).
4. A.V.Aho, J.E. Hopcroft and J.D.Ullman : *The Design and Analysis Of Computer Algorithms*, Pearson Education Asia (2003).

BCA601P: PROJECT WORK

Marks Scale: 300 marks (End Sem. Exam: 200 + Int.: 100)

<div align="right">

Credit: 8
(0- 0- 8)

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OBJECTIVE:

The Project work constitutes a major component in most professional program. It needs to be carried out with due care, and should be executed with seriousness by the students. The project work is not only a partial fulfillment of the BCA requirements, but also provide a mechanism to demonstrate your skills, abilities and specialization. The objectives of the project is to help the student develop the ability to apply theoretical and practical tools/techniques to solve real life problems related to industry, academic institutions and research laboratories. The purpose behind the inclusion of this is to consolidate the concepts and practices that were imparted during the course arid to serve as record of competence. It should enable the students to apply concretely in a small package the concepts pined from system analysis and design.

Students should take this project work **very seriously.** Topics selected should be complex and large enough to justify as a BCA project. Please do not undertake the topics/specifications from the Mini Project. The project should be genuine and original in nature and should not be copied from anywhere else.

MARK DISTRIBUTION:

Marks distribution for internal as well as external is given below:

Topics	External
Project Record	20 Marks
Project Development and execution	100 Marks
Viva Voce	50 Marks
Presentation	30 Marks
Total	**200 Marks**

Internal   – 100 marks

STEPS INVOLVED IN THE PROJECT WORK:

The complete project work should be done by the student only. The role of guide should be about guidance wherever any problem encounters during project.The following are the major steps involved in the project, which may help you to determine the milestones and regulate the scheduling of the project:
1)   Select a topic and a suitable guide.
2)   Prepare the project proposal in consultation with the project guide.
3)   Submit the project proposal along with the necessary documents
4)   Obtain receipt of the project approval from concerned department
5)   Carry out the project-work.
6)   Prepare the project report.
7)   Submit the project report to the department concerned
8)   Appear for the viva-voce or presentation as per the intimation.

PROJECT SYNOPSYS:

The student can formulate a project synopsis with the help of her/his Guide and submit the project proposal of the same. **Approval of the project proposal is mandatory**. If approved, the student can commence working on it, and complete it. Use the latest versions of the software packages for the development of the project. Synopsis of the project proposal covering the following aspects must be submit to the department:

(i)   Proposed Title of the Project.
(ii)   Why is the particular topic chosen?
(iii)   Introduction and Objectives of the Project.
(iv)   Software Requirement specifications.
  ❖ Hardware Requirements
  ❖ Software Requirements
(v)   A complete structure which includes:
  ➢ Number of modules and their description
  ➢ Data Structures as per the project requirements for all the modules
(vi)   List of reports that are likely to be generated

The project synopsis must have proper cover page and signature of students and the guide to show his or her acceptance and willingness to guide.

ACCEPTANCE/REJECTION OF REPORT:
The student must submit a Synopsis of the project report to the Institute for approval. The Principal/Teacher in charge holds the right to accept the project or suggest modifications for resubmission. Only on acceptance of draft project report, the student should make the final copies.

PROJECT FILE:

Model 1
1.   The topic for the project can be any sub-system of a system software or tool or any scientific or a fairly complex algorithmic situation.
2.   The aim of this type is to highlight the abilities of algorithmic formulation, program and data flow representation, modular programming, optimized code preparation and systematic documentation and other associated aspects of software engineering.

Model 2:
1.   This model can be of a typical business oriented application. The aim of this type is to highlight the stages involved in a typical business oriented project development, though on a miniature scale and simulated environment. The appropriate use of DBMS/RDBMS towards any business application, along with adequate level system analysis and structured design and development of specific tools/products would be the underlying activity, in a preparing this project.
2.   The emphasis should be on selecting a system/ sub- system which shows the DBMS and System Analysis aspects, to a greater degree. Any small and simple business may be selected, although candidate's arc advised to use their knowledge and creativity, to select typical and intelligent applications, rather than run-of-the- mill themes, such as simple Pay Roll calculation or Issue Return portion on an inventory scheme. The Evaluation stage would give due weightage for theme selection, problem analysis, fact finding techniques and initial design, which is as close to real life business situations as possible.
3.   The project may be earned out in any of the X base family products which are equivalent to Oracle/Access. The code can be generated out of four GL Interface, like Screen Builder and Report

Generator, or can be totally hand- coded or a combination of both. The documentation need not contain the code generated by these applications, but only written by the candidate.

FORMAT OF THE PROJECT REPORT:

The student must adhere strictly to the following format for the submission of the Project Report.
Paper:
The Report shall be typed on White paper, A4 size or continuous computer stationery bond, for the final submission. The Report to be submitted to the Mizoram University must be original and subsequent copies may be photocopied on any paper.
Typing:
The typing shall be of standard letter size, double spaces and on one side of the paper only, using black ribbons and black carbons.
Margins:
The typing must be done in the following margins:
Left ..35mm, Right ..20mm,
Top ..35mm, Bottom ..20mm.
Binding:
The report shall be rexin bound in black. Plastic and spiral bound Project Reports not is accepted.
Front Cover:
The front cover should contain the following details:
TOP: The title in block capitals of 6mm to 15mm letters.
CENTER: Full name in block capitals of 6mm to 10mm letters.
BOTTOM: Name of the University, Year of submission-all in block capitals of 6mm to 10mm letters separate lines with proper spacing and spacing.
Blank Sheets:
At the beginning and end of the report, two white black bound papers should be provided, one for the purpose of binding and other to be left blank.

Abstracts:
Every report should have an Abstract following the Institute's Certificate. The abstract shall guide the reader by highlighting the important material contained in the individual chapters. The abstract should not exceed 800 words.

Contents:
The contents shall follow the abstract indicating the title of the chapters, section, subsection etc.

FORMAT OF THE PROJECT REPORT:

The format of the report should be prepared according to the format given below:

- Cover Page
- Institute Certificate
- Certificate from Company acknowledgements.
- Abstract
- List of Figures.
- List of Tables
- Nomenclature and Abbreviations.
- Contents
- **Introduction**
  - Introduction
  - Objectives
  - Scope and Purpose
- **System Analysis**
  - Need for system
  - Feasibility Study
  - Hardware Requirements
  - Software Requirements Specifications
  - Software Engineering Paradigm applied
  - System Flow Charts
  - Entity Relationship Diagram
  - Data Flow Diagram
- **System Design**
  - Program Structure
  - Modularization Details
  - User Interface Design
    - Menu Explanation
    - Design of Input Output screens and reports
  - Database Design
    - Schema Design & Normalization
    - Data Integrity and Constraints
    - Data Dictionary
- **Coding**
  - Complete Project Coding
  - Comments and Description of Coding segments
  - Standardization of the coding
  - Error Handling Mechanism
  - Parameters calling and passing
  - Validation checks
- **Testing**
  - Testing techniques and Testing strategies
  - Testing Case Design
  - Test reports
- Drawbacks and Limitations
- Conclusion
- Bibliography

VIVA-VOCE AND PRESENTATION:

The viva-voce will be conducted by an external examiner appointed by the University and an internal examiner from the College. Other members of the faculty and students may be present. It will be of a duration of about 15 to 20 minutes. The logic, analysis and design aspects relevant to the project mentioned under assessment would be the main subject matter for the viva. However, the general proficiency of the candidate in the selected software platform should also be tested.

NUMBER OF COPIES:

The student should submit four (4) hard-bound copies of the Project Report and Soft copy on CD/DVD to the college or university which will be forward as given below:
   (1) One copy to their college
   (2) One copy to the university or Board
   (3) One copy for the project guide
   (4) One copy for student which they may collect after getting all necessary signatures.

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