

BODOLAND UNIVERSITY
BCA (Bachelor of Computer Application)
Year 2016

The course will be a 3 year - 6 semester course.

Eligibility: The candidate must have passed Higher Secondary or equivalent level examination from Science/Commerce/Arts Stream. Students who have passed the Higher Secondary examination with either Mathematics or Computer Science as one of the subjects obtaining minimum pass mark in the subject should be given preference at the time of admission. Students completing Diploma in CSE/IT from AICTE recognized institutes are also eligible for taking admission. The Colleges may have their own cut-off marks which they found to be reasonable for them and/or hold admission test for the final selection of candidates.

Examination: The mark obtained by a student in paper 2.6 Environmental Studies will not be counted in his/her semester grade point average (GPA), but he/she will have to obtain the minimum pass mark in this paper in order to clear the second semester. The **L-T-P-C** break- up for the courses has been mentioned below with each course. Each paper will carry a total of 6 credits except the courses 2.6 (Environmental Studies) and 6.3 (project work) which will carry 3 credits and 18 credits respectively. For the theory papers, 1 credit point corresponds to one lecture / tutorial per week and for practical papers 1 credit point corresponds to 1 practical session (of at least 2 hours) per week.

All matters related to examinations including internal evaluations will be as per the regulation of TDC for semester system of B.U. with choice based credit and grading system.

SL. NO.	CORE COURSE (14)	ABILITY ENHANCEMENT COURSE (AECC) (2)	SKILL ENHANCEMENT COURSE (SEC) (2)	ELECTIVE: DISCIPLINE SPECIFIC DSE (4)	ELECTIVE: GENERIC (GE) (4)
I	C1 :Computer fundamental & ICT Hardware (4+4 lab)	AECC:1 (English/Hindi/MIL Communication)			GE:1 Computer Fundamentals
	C2: Introduction to C Programming (4+4 lab)				
II	C3: Mathematics-I	AECC:2 Environmental Science			GE:2 Introduction to Programming
	C4: Data Structure & Algorithm (5+1 lab)				
III	C5: Computer based Accounting & financial Management (4+4 lab)		SEC 1: Oracle (SQL/PL-SQL)		GE:3 Computer Networks and Internet
	C6: Digital Logical Fundamentals				
	C7: Mathematics-II				
IV	C8: Software Engineering		SEC 2: UNIX/LINUX Programming		GE:4 Multimedia and Applications
	C9: Computer Organization and Architecture				
	C10: Data Base Management System (4+4 lab)				
V	C11:Object oriented Programming in C++ (4+4 lab)			DSE 1: Digital Image Processing	
	C12: Operating System (5+1 lab/Tutorial)			DSE 2: Numerical Methods	
VI	C13: Web Technology (4+4 lab)			DSE 3: System Programming	
	C14: Computer Networks and Internet			DSE 4: DISSERTATION/PROJECT WORK	

SEM-I						
Paper Code	Course	L+T+P	Credit	End Sem	Int	Total
BCA-101G	C-1	4+0+2 5+1+0	6	60(L)+20(P) 60(L)+20(T)	20 20	100
BCA-102G	C-2	4+0+2 5+1+0	6	60(L)+20(P) 60(L)+20(T)	20	100
BCA-GE-103G	GE-1	4+0+2 5+1+0	6	60(L)+20(P) 60(L)+20(T)	20 20	100
COMM-104GR	AECC-1:English/ Hindi/MIL (Communication)	5+0+0	6	60(L)	20	100
Total-			20	290	60	400

SEM-II						
Paper Code	Course	L+T+P	Credit	End Sem	Int	Total
BCA -201G	C-3	4+0+2 5+1+0	6	60(L)+20(P) 60(L)+20(T)	20	100
BCA -202G	C-4	4+0+2 5+1+0	6	60(L)+20(P) 60(L)+20(T)	20	100
BCA-GE-203G	GE-2	4+0+2 5+1+0	6	60(L)+20(P) 60(L)+20(T)	20	100
ENV -204GR	AECC-2: Environmental Science	4+1+1	6	60(L)+20(P)	20	100
Total-			24	290	60	400

SEM-III						
Paper Code	Course	L+T+P	Credit	End Sem	Int	Total
BCA -301G	C-5	4+0+2 5+1+0	6	60(L)+20(P) 60(L)+20(T)	20	100
BCA -302G	C-6	4+0+2 5+1+0	6	60(L)+20(P) 60(L)+20(T)	20	100
BCA -303G	C-7	4+0+2 5+1+0	6	60(L)+20(P) 60(L)+20(T)	20	100
BCA –SEC1-304GR	SEC-1	2	2	50(L)		50
BCA –GE-305G	GE-3	4+0+2 5+1+0	6	60(L)+20(P) 60(L)+20(T)	20	100
Total-			26	370	80	450

SEM-IV						
Paper Code	Course	L+T+P	Credit	End Sem	Int	Total
BCA -401G	C-8	4+0+2 5+1+0	6	60(L)+20(P) 60(L)+20(T)	20	100
BCA -402G	C-9	4+0+2 5+1+0	6	60(L)+20(P) 60(L)+20(T)	20	100
BCA -403G	C-10	4+0+2 5+1+0	6	60(L)+20(P) 60(L)+20(T)	20	100
BCA –SEC2-404GR	SEC-2	2	2	50(L)		50
PHY-GE-405G	GE-4	4+0+2 5+1+0	6	60(L)+20(P) 60(L)+20(T)	20	100
Total-			26	370	80	450

SEM-V						
Paper Code	Course	L+T+P	Credit	End Sem	Int	Total
BCA -501G	C-11	4+0+2 5+1+0	6	60(L)+20(P) 60(L)+20(T)	20	100
BCA -502G	C-12	4+0+2 5+1+0	6	60(L)+20(P) 60(L)+20(T)	20	100
BCA –DSE1- 503G	DSE-1	4+0+2 5+1+0	6	60(L)+20(P) 60(L)+20(T)	20	100
BCA –DSE2- 504G	DSE-2	4+0+2 5+1+0	6	60(L)+20(P) 60(L)+20(T)	20	100
Total-			24	320	80	400

1. Where there is a practical there will be no tutorial or vice-versa.
2. Institute should evolve a system/policy about ECA/ General Interest/Hobby/Sports/NCC/NSS/related courses on its own.
3. **Skill Enhancement Courses (SEC):** These courses are to be chosen from a pool of courses designed to provide value-based and/or skill-based knowledge and should contain both theory and lab/hands-on/training/field work. The main purpose of these courses is to provide students life-skills in hands-on mode so as to increase their employability. The list provided under this category are suggestive in nature and each Institution/College has complete freedom to suggest their own papers under this category based on their expertise, specialization, requirements, scope and need. However, in this case approval of Academic section of the University is mandatory.

SEM-VI						
Paper Code	Course	L+T+P	Credit	End Sem	Int	Total
BCA -601G	C-13	4+0+2 5+1+0	6	60(L)+20(P) 60(L)+20(T)	20	100
BCA -602G	C-14	4+0+2 5+1+0	6	60(L)+20(P) 60(L)+20(T)	20	100
BCA -DSE3-603G	DSE-3	4+0+2 5+1+0	6	60(L)+20(P) 60(L)+20(T)	20	100
BCA -DSE4-604G	DSE-4 (Project/Dissertation)	4+0+2 5+1+0	6	60(L)+20(P) 60(L)+20(T)	20	100
Total-			24	320	80	400

DETAILED SYLLABUS

SEMESTER – I

BCA.C1. COMPUTER FUNDAMENTAL & ICT HARDWARE

Total marks: 100 (Semester end examination - 60, Practical- 20, Internal assessment - 20)

UNIT I

Evolution of Computer system, Classification of Computer, Modern Computer, Hardware and Software. Major components of a Digital Computer.

Number System: Representation of numbers , Representation of signed integers, Sign and magnitude, 1^s complement and 2^s complement representation, conditions for overflow/underflow and its detection.

Assembler, Compiler, Interpreter, Linker and Loader. Definition and concepts of algorithm and its different implementations-pseudo code, flowchart and Computer programs.

UNIT II

Hard Disk Drive: logical structure and file system, Hard disk tools: Disk cleanup, error checking, de fragmentation, scanning for virus, formatting, installing additional HDD. New trends in HDD.

UNIT III

Optical Media, CDROM, theory of operation, drive speed, buffer, cache, CD-r, CD-RW, DVD ROM, DVD technology, preventive maintenance for DVD and CD drives, New Technologies, Driver installation, Writing and cleaning CD and DVD.

UNIT IV

Processor: Intel processor family. Latest trends in processor, Motherboard, Sockets and slots, power connectors. Peripheral connectors. Bus slots, USB, pin connectors. Different kinds of motherboards. RAM. Cache and Virtual Memory concept.

UNIT V

SMPS. BIOS. Network Interface Card, network cabling, I/O Box, Switches, RJ 45 connectors, Patch panel, Patch cord, racks, IP address.

SUGGESTED READINGS:

1. Anita Goel, *Computer Fundamentals*, Pearson, 2010.
2. *Comdex: Hardware and Networking Course Kit.*, DreamTech press.
3. V. Rajaraman, Neeharika Adabala, *Fundamentals of Computers*, PHI, EEE 6th Edition.

4. Ron Gilster, *PC hardware: A beginners Guide*, Tata McGraw Hill.
5. E. Balaguruswamy, *Computer Fundamentals and C Programming*, Tata McGraw Hill.

LABORATORY

Practical Assignments covering paper BCA. C1. (Computer Fundamentals & ICT Hardware) - 40 marks (At least 6 assignments have to be done by each student from the following list.)

Objectives: The Practical introduces the students to a personal computer and its basic peripherals, the process of assembling a personal computer, installation of system software like Windows OS, LINUX OS, and device drivers. Basic system administration in Linux which includes: Basic Linux commands in bash, Create hard and symbolic links, Text processing, Using wildcards In addition hardware and software level troubleshooting process, tips and tricks would be covered.

Different ways of hooking the PC on to the network and internet from home and workplace and effectively usage of the internet. Configuring the TCP/IP setting. Usage of web browsers, email, newsgroups and discussion forums would be covered. In addition, awareness of cyber hygiene, i.e., protecting the personal computer from getting infected with the viruses, worms and other cyber attacks would be introduced.

List of Experiments/Tasks:

Task 1: Identify the peripherals of a computer, components in a CPU and its functions. Draw the block diagram of the CPU along with the configuration of each peripheral and submit to your instructor.

Task 2: Every student should disassemble and assemble the PC back to working condition. Lab instructors should verify the work and follow it up with a Viva.

Task 3: Every student should individually install MS windows on the personal computer. Lab instructor should verify the installation and follow it up with a Viva.

Task 4: Every student should install Linux on the computer. This computer should have windows installed. The system should be configured as dual boot with both windows and Linux. Lab instructors should verify the installation and follow it up with a Viva

Task 5: Basic commands in Linux

Task 6: Hardware Troubleshooting: Students have to be given a PC which does not boot due to improper assembly or defective peripherals. They should identify the problem and fix it to get the computer back to working condition. The work done should be verified by the instructor and followed up with a Viva

Task 7: Software Troubleshooting: Students have to be given a malfunctioning CPU due to system software problems. They should identify the problem and fix it to get the computer back to working condition. The work done should be verified by the instructor and followed up with a Viva.

Task 8: The test consists of various systems with Hardware / Software related troubles, formatted disks without operating systems. Installation of antivirus software, configure their

personal firewall and windows update on their computer. Then they need to customize their browsers to block pop ups, block active x downloads to avoid viruses and/or worms.

BCA.C2. INTRODUCTION TO C PROGRAMMING

Total marks: 100 (Semester end examination-60, Practical -20 Internal assessment - 20)

UNIT I

Overview of C

C program structure, executing C program. Variables, Data Types, Constants, Character set, C tokens, variables declaration, Assigning values to variables---Assignment statement, declaring a variable as constant, as volatile.

Operators and Expression

Categories of operator- Arithmetic, Relational, logical, assignment, increment, decrement, conditional, bitwise and special operators; arithmetic expressions, precedence and associativity of operators, type conversions, mathematical functions

Managing Input and Output Operators

Reading and writing a character, formatted input, formatted output.

UNIT II

Decision Making and Branching Statement

if statement, *if.....else* statement, nested *if.... else* statement , *switch....case* statement, *goto* statement.

Decision Making and Looping

Definition of loop, categories of loops, *for* loop *while* loop, *do-while* loop, *break* statement, *continue* statement

UNIT III

Arrays

Declaration and accessing of one & two-dimensional arrays, initializing two-dimensional arrays, multidimensional arrays.

Functions

The form of C functions, Return values and types, return statement, calling a function, categories of functions, Nested functions, Recursion, functions with arrays, call by value, call by reference

Unit IV

Structures and Unions

Defining, giving values to members, initialization and comparison of structure variables, array of structure, array within structure, structure within structure, structures and functions, unions.

Preprocessors

Macro substitution, file inclusion.

Unit V

Pointers

Definition of pointer, declaring and initializing pointers, accessing a variable through address and through pointer, pointers and arrays, pointers and functions, pointers and structures.

File Management in C

Opening, closing and I/O operations on files, random access to files, command line arguments.

SUGGESTED READINGS:

1. Byron Gottfried, *Schaum's Outline Programming with C*, Second Edition, Tata McGraw-Hill
2. Yashavant Kanetkar, *Let Us C*, Eighth Edition, BPB Publications.
3. Kernighan and Ritchie, *The C Programming Language*, Second Edition, Prentice Hall,

LABORATORY

Practical Assignments covering paper BCA.C2 (Introduction to C programming) - 60 marks (At least 20 programming assignments have to be done by each student from the following list. The assignments should be selected in such a way that all the features of C language are included.) List of Experiments:

1. Write a program to convert a given temperature value from Fahrenheit scale to Centigrade scale and vice versa.
2. Write a program to display ASCII value of a character.
3. Write a program to check whether a number is perfect or not.
4. Write a program to find out the biggest of three numbers using nested if.
5. A company insures its drivers if either of the following conditions are satisfied Driver is married. • Driver is an unmarried, male and above 30 years of age. • Driver is unmarried,

female and above 25 years of age. • Write a program to decide if a driver is to be insured using logical operators.

6. Write a program to read a list of positive integers terminated by -1 and display the odd and even numbers separately and also their respective counts.

7. Write a program to read values of n and x and print the value of y using switch case where

a. $y=n+x$ when $n=1$

b. $y=1+x/n$ when $n=2$

c. $y= n+3x$ when $n=3$

d. $y=1+nx$ when $n>3$ or $n<1$.

8. Write a program to n values of sales and then calculate the commission on sales amount where the commission is calculated as follows: a. If sales \leq Rs.500, commission is 5%. b. If sales > 500 but ≤ 2000 , commission is Rs 35 plus 10% above Rs 500. c. If sales > 2000 but ≤ 5000 , commission is Rs 185 plus 12% above Rs.2000. d. If sales > 5000 , commission is 12.5%.

9. Write a program to find out minimum, maximum, sum and average of n numbers without using array.

10. Program to find mean and standard deviation (SD) for a set of n numbers without using array.

11. Write a program to find out the roots of a quadratic equation. Use proper testing to find checks for real and complex roots.

12. Write a program to print the digits of a number in words. (eg. if a number 841 is entered through the keyboard your program should print "Eight Four One".)

13. Write a program to print the PASCAL Triangle up to the n-th row where n is an input to the program.

14. Write a function to return the HCF of two positive integers. Write a main function to read two positive integers and print their HCF and LCM by using the above function.

15. Write a program to convert a decimal number into binary number using function.

16. Write a program to display the result of sine series using function.

17. Write a program to find the sum of the following series $1+x-x^3/3!+x^5/5!-x^7/7!+\dots$ corrected up to the 3 decimal place.

18. Write a program to read n numbers in a sorted array and insert a given element in a particular position

19. Write functions to compute the factorial of a number using both recursive and non-recursive procedure.

20. Write a program to print the values of nCr and $nPr \geq pr$ for given positive integers $n > 0$. Use a function $fact(n)$ to return the factorial of a non-negative integer. $nCr = n!/r!(n-r)!$ $nPr = n!/(n-r)!$

21. Write a program to display the first n Fibonacci numbers using function.

22. Write a program to display the prime numbers within a given range. Write a function to check whether a given integer is prime or not and use it.

23. Write a program to Multiply two matrices using function

24. Write a program to display the upper Triangle and lower Triangle of a given square matrix using function.

25. Write a function to check if a given square matrix is symmetric or not. Write a main function to implement it.
26. Write a program to read a m X n matrix and calculate the Row sum and Column Sum of the matrix
27. Write a function to read in an integer and print the representation of the number using the sign and magnitude representation scheme using 8 bits. The program should check for overflow/under flow conditions. The left most bit is to be used as the sign bit.
28. Write a program to merge two sorted arrays.
29. Write a program to implement selection sort using function.
30. Write a program to count the number of vowels in a string.
31. Write a program to concatenate two strings using function (without using library function).

32. Write a program to convert a string from upper case to lower case and vice versa.
33. Write a program to swap two numbers using function (pass the pointers).
34. Write a program to sort n number of strings in ascending order using pointer.
35. Write a program using pointers to copy a string to another string variable (without using library function).
36. Declare a structure of a student with details like roll number, student name and total marks. Using this, declare an array with 50 elements. Write a program to read details of n students and print the list of students who have scored 75 marks and above.
37. Create a structure to store the following information of employees. a. Employee's number, name, pay and date of joining.
It has been decided to increase the pay as per the following rules: Pay \leq Rs.3000 : 20% increase Pay \leq Rs.6000 but $>$ Rs.3000 :15% increase Pay $>$ Rs.6000 : no increase Write a program to implement the above structure.
38. Write a program to read a text file and count the number of vowels in the text file.
39. Write a program to copy a text file to another file.

GE-1: Computer Fundamentals

Theory: 60 lectures

- | | |
|--|------------|
| 1. Introduction: Introduction to computer system, uses, types. | 6L |
| 2. Data Representation: Number systems and character representation, binary arithmetic | 12L |
| 3. Human Computer Interface: Types of software, Operating system as user interface, utility programs | 6L |
| 4. Devices: Input and output devices | 10L |
| 5. Memory: Primary, secondary, auxiliary memory, RAM, ROM, cache memory, hard disks, optical disks | 6L |
| 6. Computer Organisation and Architecture: C.P.U., registers, system bus, main memory unit, cache memory, Inside a computer, SMPS, Motherboard, Ports and Interfaces, expansion cards, ribbon cables, memory chips, processors. | 12L |
| 7. Overview of Emerging Technologies: Cloud computing, big data, data mining, mobile computing and embedded systems. | 8L |

Reference Books:

1. A. Goel, Computer Fundamentals, Pearson Education, 2010.
2. P. Aksoy, L. DeNardis, Introduction to Information Technology, Cengage Learning, 2006
3. P. K.Sinha, P. Sinha, Fundamentals of Computers, BPB Publishers, 2007

Computer Fundamentals Lab
Practical: 60 lectures

Practical exercises based on MS Office/ Open Office tools using document preparation and spreadsheet handling packages.

MS Word

1. Prepare a **grocery list** having four columns (Serial number, The name of the product, quantity and price) for the month of April, 06.
 - Font specifications for Title (Grocery List): 14-point Arial font in bold and italics.
 - The headings of the columns should be in 12-point and bold.
 - The rest of the document should be in 10-point Times New Roman.
 - Leave a gap of 12-points after the title.

2. Create a **telephone directory**.
 - The heading should be 16-point Arial Font in bold
 - The rest of the document should use 10-point font size
 - Other headings should use 10-point Courier New Font.
 - The footer should show the page number as well as the date last updated.

3. Design a **time-table form** for your college.
 - The first line should mention the name of the college in 16-point Arial Font and should be bold.
 - The second line should give the course name/teacher's name and the department in 14-point Arial.
 - Leave a gap of 12-points.
 - The rest of the document should use 10-point Times New Roman font.
 - The footer should contain your specifications as the designer and date of creation.

4. BPB Publications plans to release a new book designed as per your syllabus. Design the **first page of the book** as per the given specifications.

- The title of the book should appear in bold using 20-point Arial font.
 - The name of the author and his qualifications should be in the center of the page in 16-point Arial font.
 - At the bottom of the document should be the name of the publisher and address in 16-point Times New Roman.
 - The details of the offices of the publisher (only location) should appear in the footer.
5. Create the following one page documents.
- a. Compose a note inviting friends to a get-together at your house, Including a list of things to bring with them.
 - b. Design a certificate in landscape orientation with a border around the document.
 - c. Design a Garage Sale sign.
 - d. Make a sign outlining your rules for your bedroom at home, using a numbered list.
6. Create the following documents:
- (a) A newsletter with a headline and 2 columns in portrait orientation, including at least one image surrounded by text.
 - (b) Use a newsletter format to promote upcoming projects or events in your classroom or college.
7. Convert following text to a table, using comma as delimiter
Type the following as shown (do not bold).

Color, Style, Item
Blue, A980, Van
Red, X023, Car
Green, YL724, Truck
Name, Age, Sex
Bob, 23, M
Linda, 46, F
Tom, 29, M

DETAILED SYLLABUS

SEMESTER-III

BCA.C5. COMPUTER BASED ACCOUNTING AND FINANCIAL MANAGEMENT

Total marks: 100 (Semester end examination - 60, Practical-20, Internal assessment- 20)

Part: I Accounting

- Introduction - Definition, function, objective, need, advantage, events and transaction, double entry system of book keeping.
- Books of accounts - classification of books of accounts, meaning of journal, journalizing of transactions, ledger and ledger posting, closing of books of accounts and preparation of trial balance.

Part: II Tally

1. Introduction – Versions of Tally, Features of Tally, ERP Features, Data Directory, and Tally switching between screen areas.
2. Company creation:-Create/ Alter/Select/Close/Delete.

Introduction on F11 features & F12 configuration.

3. Basic Accounting: - Accounting Info Ledger/Group (Single & Multiple) Create/Display/Alter/Delete.
4. Accounting Voucher:- Types of Voucher, Configuring Voucher, Voucher Creation, Entering/Altering & Deleting.
5. Basic of Tally Inventory:-“Integrated A/c with Inventory” Create/Display/Alter/(Single & Multiple) : Group, Category, Godown, Units (Simple/Compound)

Part: III

Advanced Accounting

1. Bill wise Details – Transaction wise Bill By Bill for trading & non trading organization
2. Interest Calculation – Simple & Advance parameters Interest calculation on outstanding Balances, use of vouchers class ,Adjustment entries
3. BRS- Simple & Advanced
4. Multiple Currencies – Create of different currencies, voucher entries ,Adjustment entries on forex gain / loss
5. Cost Center & Cost Categories – (By using purchase, Sales, Receipt, Payment voucher) Create / Alter / Display.

6. Advance Inventory- Actual/Different Billed Qty, O., Value, Batch wise, Alternate Units, BOM, Price List

Printing, Housekeeping & Administration

9. Administration – Security control, Tally Audit.
10. Housekeeping – Group company, Split company Export Data, ODBC.
11. Printing – Company printing option, Setting to a Bill.

SUGGESTED READINGS:

1. K.R.Das, K.M. Sinha, K.S.Paul Choudhury, G.G.banik; *Accountancy (for H.S. first year)*; LBS Publication.
2. B.B. Dam; *Accountancy (for H.S. first year)*.
3. A.K.Nadhani, K.K.Nadhani; *Implementing Tally - 9*; BPB Publication, Delhi.
4. N. Agarwal and S. Agarwal; *Comdex Tally - 9 Course Kit (with CD)*.
5. A.K. Nandhani; *Tally - 9, Training Guide*, BPB Publication.

Covering paper-C5 (Computer Bases Accounting and Financial Management) – 50 Marks (Each student should do at least 10 assignments from the following list.)

List of Experiments:

1. Create Multiple Ledger of the following Account Heads : Bank Charges ; Basic Pay ; Bonus ; Bonus Paid ; Business Promotion Expenses ; Commission Paid ; Conveyance ; Depreciation on Air Conditioner ; Depreciation on Building ; Depreciation on Computers ; Depreciation on Furniture & Fixtures ; Depreciation on Motor Car ; Depreciation on Plant & Machinery ; Discount ; Donation ; Electricity Charges ; Employers Contribution to Provident Fund ; Freight Outward ; Insurance Premium ; Interest Due ; Interest & Finance Charge ; Interest on Bank Overdraft ; Interest on Partner's Capital A/c ; Interest on Unsecured Loans ; Legal Fees ; Miscellaneous Expenses ; Office Rent ; Office Repairs & Maintenance ; Printing & Stationery ; Rent ; Rent Due ; Travelling Expenses.
2. Make necessary entries in Tally in the books of Galaxy Enterprise : (a) Introduced Cash Rs 10,00,000 , Furniture worth Rs1,00,000 , Computer worth Rs 86,000 , Machinery Rs 1,20,000 into the business on 1st Jan,2010 (b) Opened a Current A/c with Bank of Baroda with Rs 1,00,000 on 2nd Jan,2011 (c) Purchased goods on 6th Jan,2010 from Sridhar Stores on credit Rs 2,25,000 (d) Sold goods for Cash Rs 1,20,000 to Maitree Stores on 7th Jan,2010 (e) Sold goods to Sankar on credit for Rs 34,000 on 9th Jan,2010 (f) Paid Rent advance Rs 25,000 by Cheque No 345671 on 10th Jan,2010 (g) Withdrew from bank Rs 5,000 for office expenses on 18th Jan,2010 (h) Purchased stationery items on 22nd Jan , 2010 for office use from Radhika Stationeries for Rs 1,500 (i) Received Advance from Jagat for

supply of goods worth Rs 12,000 (j) Paid salary to office staff Rs10,000 by Cheque 345672 on 31st Jan, 2010

3. Make Data Entries for the following transactions : (a) Withdrew Rs 1,00,000 cash from SBI on 6th Jan ,2011 (b) Deposited Rs 40,000 in HDFC Bank on 9th jan ,2011 (c) Transferred Rs 20,000 from HDFC Bank to SBI on 12th jan , 2011 (d) Paid Rs 4,300 as Insurance charges through HDFC Bank on 18th Jan , 2011 (e) Received Rs 3,25,000 from ABC Co. Ltd. On 23rd Jan , 2011 against our sales through Cheque and it has been deposited in SBI (f) Sales worth Rs 5,50,000 made on credit to Vikas Group on 29th jan,2011 (g) Provision towards Employers PF Contribution Rs 78,000 made on 31st jan,2011 (h) Purchased Machinery Rs 1,00,000 from Sunder Enterprise (INPUT VAT 12.5%)

4. Enter the following transactions in Tally in the books of Computer Solutions : (a) Purchased on 8th April , 2009 HCL Celeron 15 Nos @ Rs 14,000 ; HCL PIV 15 Nos @ Rs 21,000 from Next Generation Systems (Input VAT @ 4%) (b) Sold on 10th April , 2009 to Fortune Computer Services 10 Nos HP Laserjet Series 1010 @ Rs 12,000 (Output VAT @ 12.5%) (c) Received from Fortune Computer Services Rs 80,000 on 25th April , 2009 (d) Paid to Next Generation System Rs 2,00,000 vide Cheque No 357602 of HDFC Bank

5. Record the following transactions in Tally in the books of Hind Computers : (a) Returned one Wireless Keyboard Rs 250 to Super Buzz (Input VAT 4%) on 13th August , 2010 (b) Returned from Computer Junction BM PIV Rs 500 on 16th August , 2010 (CST 4%) (c) Transferred 10Nos CD ROM Disks (1 Box @ Rs 265/Box) from Stores to Defective Goods Stores on 31st August , 2010

6. Prepare a Cash Book from the books of ABC Enterprise : (a) Cash Balance on 1st April 2010 Rs 4,00,000 (b) Opened a Current Account with UCO Bank on 5th April , 2010 with Rs16,000 (c) Purchased goods for Cash Rs 2,50,000 on 6th April , 2010 (d) Sold goods for Cash Rs 1,25,000 on 8th April , 2010 (e) Paid for Travelling Expenses Rs 2,300 on 10th April , 2010 (f) Paid for Staff Welfare Rs 1,200 on 16th April , 2010 (g) Introduced Additional Capital Rs 50,000 on 20th April , 2010 (h) Withdrew from Bank for Office Cash Rs 2,000 on 27th April , 2010 (i) Sold goods for Rs 65,000 on 28th April , 2010 and payment received by Cheque 15,000 and balance in Cash

7. Prepare a Double Column Cash Book from the following transactions of XY Ltd : (a) On 1st Jan, 2010 Cash in Hand Rs 5,00,000 and Cash at SBI Rs 2,30,000 (b) On 4th Jan, 2010 Goods purchased for cash Rs 1,24,000 (c) On 8th Jan, 2010 Goods sold for cash Rs 2,25,000 (d) Deposited into SBI an amount of Rs 1,10,500 (e) Paid rent to landlord Rs 24,000 by Cheque no 234675 (f) Withdrew from SBI Rs 30,000 for purchase of Furniture (g) Received payment of Rs 30,000 from Amit Kothari, a customer by Cheque (h) Withdrew from SBI Rs 23,000 for office cash

8. Make relevant Voucher Entries from the following transactions : (a) On 1st April, 2010 India Infotech received a Bill (vide No. 001) from Pheonix Agencies for Rs. 5,00,000 towards the Advertisement services rendered. (b) On April 8, 2010, payment of Rs. 4,95,000

is made towards bill no. Bill-001 to Pheonix Agencies for the purchase of Advertisement services, vide cheque no. 254781 (c) On May 6, 2010, Universal Infotech, paid TDS of Rs. 5,000 towards Advertisement Expenses, vide cheque no. 056330 for the month of April, 2010.

9. Show how would you deal with the following Bills in Tally : (a) On 7th May, 2010, India Infotech received a bill (vide no. 911) from Gautam Bishnu & Associates for Rs. 1,12,360 inclusive of other charges of Rs. 12,360 towards the auditing services provided (TDS Rs10,000) (b) On 8th May, 2010 India Infotech received a bill (vide No. 696) from Digitech Computers for Rs. 25,000 towards commission charges. (c) On 12th May, 2010 India Infotech received a bill (vide No. 874) from Digitech Computers for Rs. 40,000 towards commission charges. (d) On 14th May, 2010 India Infotech deducted tax Rs 2,500 towards Commission Expenses for the transaction dated 8th May and Rs 4,000 towards transaction dated 12th May.

10. Prepare a Bank Reconciliation Statement of Digitech Solutions on 31st December, 2010 (a) Balance as per Bank Book on 31st Dec, 2010 Rs 32,000 71 (b) Cheque deposited into UBI Rs 13,000 on 27th Dec , 2010 cleared by bank on 31st Dec ,2010 omitted to be recorded in Cash Book (c) Withdrew from UBI Rs 2,000 for office cash on 28th Dec, 2010 but omitted to be recorded in Cash Book (d) Service Charge debited by UBI Rs 200 not credited in Cash Book (e) Bank Interest Rs 568 credited by UBI not recorded in Cash Book (f) Dividend from UTI Rs 12,450 credited by UBI not recorded in Bank Book (g) Direct deposit by Ravi, a customer Rs 3,400 into our UBI A/c not recorded in Cash Book

11. Choose the Correct Answer : (i) What kind of procedure is used while operating the key F1 ? (a) ALT and F1 (b) CTRL and F1 (c) SHIFT and F1 (d) F1 (ii) By default how many Groups and Ledgers does Tally have ? (a) 22 Groups and 2 Ledgers (b) 28 Groups and 3 Ledgers (c) 28 Groups and 2 Ledgers (d)) 26 Groups and 3 Ledgers (iii) To toggle back to the „Main Area“ , the short cut key is (a) CTRL and M (b) CTRL and A (c) CTRL and I (d) CTRL and N (iv) Ledger Menu comes under (a) Accounts Info (b) Inventory Info (c) Accounting Vouchers (d) Inventory Vouchers (v) To change the current period press (a) F1 (b) ALT and F1 (c) F2 (d) ALT and F2

12. Fill in the Blanks: (a) To display the „Change Voucher Type“ press ----- (b) The shortcut key to view detailed ” Profit & Loss A/c” is ----- (c) To record the Voucher in ” Sales“ press ----- 72 (d) To shut an Activated Company press ----- (e) The shortcut key used to get the „Stock Journal Voucher“ screen is -----

13. Show relevant Voucher Entry in Tally: (a) You have purchased an item at a rate of Rs.100 on 8th April, 2010 however by mistake your supplier had billed you at a rate of Rs.95. Now your supplier issues a debit note for balance of Rs. 5 plus vat and other applicable duty Rs 6. (b) You have agreed to pay a purchase invoice of Rs 1,00,000 within 1 month time to your supplier Geeta Stores. However, you couldn't manage to pay and your supplier agreed for a delayed payment at an interest rate of @2. p.m. for the same.

14. The total gross salary payable by X Ltd for the month of January 2010 is Rs. 3,00,000. Out of above, basic salary which is eligible for Provident Fund contribution @ 12% is Rs. 2,00,000. X Ltd is also required to pay a sum @12% from the basic salary before the same is disbursed to employee. Apart of this, it is also required to pay @1.61% (of basic pay additional amount as per below : @1.10% towards PF administration fees ; @0.50% towards Employees Deposit linked insurance scheme and @0.1% towards EDLI administration charges. Show how you would record the above transactions in Tally.

15. BX Ltd purchased a machinery for Rs 5,00,000. To use this machine company requires a platform, pipe connections, electrical connections, fabrication works etc. at the cost of Rs. 1,00,000. On the expense of Rs. 1,00,000 tax to be deducted at source. The Company made a contract with Arun Contractors for electrical and fabrication work. On 10-8-2010 BX Ltd received bill for Rs. 60,000 from Arun contractors towards electrical and fabrication work. Record the above transaction in Tally.

BCA.C6. DIGITAL LOGIC FUNDAMENTALS

Total marks: 100 (Semester end examination - 80, Internal assessment - 20)

UNIT – I

Boolean Algebra and Logic Gates

Axiomatic definition of Boolean algebra, Rules (postulates and basic theorems) of Boolean algebra, dual and complement of Boolean expression, Canonical form and Standard form, Sum of product and product of sum form, Conversion between Boolean expression and truth table, Karnaugh map method (upto four variable kmap)

UNIT – II

Combinational Circuit

Adder, Subtractors, Decoder, Encoder, Multiplexer, Demultiplexer,

UNIT – III

Sequential Circuit

Simple RS flip-flop or latch, Clocked RS flip-flop, D flip-flop, JK flip-flop, T flip-flop, Analysis of Clocked Sequential circuits, Design Procedure for sequential circuits.

UNIT – IV

Counters

Ripple counters: Binary Ripple Counter, BCD Ripple Counter, and Synchronous Counters: Binary Counter, Binary Up and down Counter

Unit – V

Registers

Registers: Shift registers (serial in serial out, serial in parallel out, parallel in serial out, parallel in parallel out)

SUGGESTED READINGS:

1. M. M. Mano, *Digital Logic and Computer Design*, PHI, 1994
2. C. Bartee, *Computer Architecture and Logic Design*, McGraw Hill, 1991

BCA.C7. MATHEMATICS–II

Total marks: 100 (Semester end examination - 80, Internal assessment - 20)

UNIT I

Sets, relations and functions

Definition and representation of sets, cardinality of sets, elementary set operations - union, intersection, difference, cartesian product, concept of universal set and complementation, Venn diagram, De Morgan's Law.

Relations, properties of binary relations - reflexive, transitive symmetric and anti- symmetric, closures of relations, equivalence relations, equivalence classes and partitions.

Functions, one-to-one and onto, composition of functions, invertible functions.

UNIT II

Combinatorics and recurrence relations

Permutations, Combinations, permutations with repetitions, combinations with repetitions, recurrence relations and their solutions.

UNIT III

Graphs

Basic concepts, Bipartite, Eulerian and Hamilton graphs, computer representation of graphs - matrix and linked representation of graphs. Algorithms on graphs, Breadth first search, Depth first search.

UNIT IV

Mathematical Logic

Logical variables and constants, connectives, truth tables, Normal forms- CNF, DNF. Converting expressions to CNF and DNF.

UNIT V

Sequence and Series

Sequence, Arithmetic Progression and Geometric Progression, general term, A.M.(Arithmetic Mean) and G.M.(Geometric Mean), Sum of AP and GP series. Sum to n terms of special series. Sequence of real numbers, bounded, convergent and non-convergent sequences.

SUGGESTED READINGS:

1. Tremblay, J.P, Manohar, R. *Discrete Mathematical Structures with Applications to Computer Science*, 2nd print 1988, McGraw Hill.
2. Kolman, Bernard, Robert C. Busby and Sharon Ross, *Discrete Mathematical Structures*, 3rd Edition, PHI.

3. *Discrete Mathematics*, N. Ch.SN Iyengar, K.A. Venkatesh, V. M. Chandrasekaran, P. S. Arunachalam, Vikash Publishing House Pvt Ltd.

1. Introduction to Oracle as RDBMS

SQL Vs. SQL * Plus:

SQL Commands and Data types, Operators and Expressions, Introduction to SQL * Plus. (2L)

2. Managing Tables and Data:

- Creating and Altering Tables
- Data Manipulation Command

- SELECT statement
- Join, Built in functions (4L)

3. Other Database Objects

- View
- Index (2L)

4. Transaction Control Statements

- Commit, Rollback, Save point (2L)

5. Introduction to PL/SQL

- SQL v/s PL/SQL
- Language construct of PL/SQL
- % TYPE and % ROWTYPE
- Using Cursor (Implicit, Explicit) (5L)

Books Recommended:

1. Ivan Bayross, "SQL, PL/SQL the Programming Language of Oracle Paperback", BPB Publicatins, 2010.
2. Steven Feuerstein, Bill Pribyl , "Oracle PL/SQL Programming", 6th Edition, O'Reilly Media, 2014.
3. Rajeeb C. Chatterjee, "Learning Oracle SQL and PL/SQL: A simplified Guide", PHI, 2012.
4. Ron Hardman, Michael Mclaughlin, "Expert Oracle PL/SQL", Oracle Press, 2005.
5. Michael Mclaughlin, "Oracle Database 11g PL/SQL Programming", Oracle Press, 2008.
6. John Watson, Roopesh Ramklass, "OCA Oracle Database11g SQL Fundamentals I Exam Guide", Oracle Press, 2008.

Software Lab Based on SQL/PL-SQL:

Practical: 30 Lectures

[SQL COMMANDS]

- 1) SQL* formatting commands
- 2) To create a table, alter and drop table.
- 3) To perform select, update, insert and delete operation in a table.
- 4) To make use of different clauses viz where, group by, having, order by, union and intersection,
- 5) To study different constraints.

[SQL FUNCTION]

- 6) To use oracle function viz aggregate, numeric, conversion, string function.
- 7) To understand use and working with joins.
- 8) To make use of transaction control statement viz rollback, commit and save point.
- 9) To make views of a table.
- 10) To make indexes of a table. **[PL/SQL]**
- 11) To understand working with PL/SQL
- 12) To implement Cursor on a table.
- 13) To implement trigger on a table

SUGGESTED READINGS:

1. Tremblay, J.P, Manohar, R. *Discrete Mathematical Structures with Applications to Computer Science*, 2nd print 1988, McGraw Hill.
2. Kolman, Bernard, Robert C. Busby and Sharon Ross, *Discrete Mathematical Structures*, 3rd Edition, PHI.
3. *Discrete Mathematics*, N. Ch.SN Iyengar, K.A. Venkatesh, V. M. Chandrasekaran, P. S. Arunachalam, Vikash Publishing House Pvt Ltd.

GE-3: Computer Networks and Internet Technologies

Theory: 60 lectures

- | | |
|--|------------|
| 1.Computer Networks: Introduction to computer network, data communication, components of data communication, data transmission mode, LAN, MAN, WAN, wireless LAN, internet, intranet, extranet. | 6L |
| 2.Network Models: Client/ server network and Peer-to-peer network, OSI, TCP/IP | 8L |
| 3.Transmission Media: Introduction, Guided Media, Unguided media | 4L |
| 4.LAN Topologies: Ring, bus, star, mesh and tree topologies. | 2L |
| 5.Network Devices: NIC, repeaters, hub, bridge, switch, gateway and router. | 2L |
| 6.Internet Terms: Web page, Home page, website, internet browsers, URL, Hypertext, ISP, Web server | 2L |
| 7.Internet Applications: www, telnet, ftp, e-mail, social networks, search engines, Video Conferencing, e-Commerce, blogs. | 6L |
| 8.Introduction to Web Design: Introduction to hypertext markup language (html), creating web pages, lists, hyperlinks, tables, web forms, inserting images, frames, hosting options and domain name registration. | 16L |
| 9.JavaScript Fundamentals: Data types and variables, functions, methods and events, controlling program flow, JavaScript object model | 14L |

Reference Books:

- 1.Andrew S. Tanenbaum, David J. Wetherall Computer Networks (5th Edition),PHI, 2010
- 2.B. A. Forouzan, Data Communication and Networking , TMH,2003.
- 3.D.R. Brooks, An Introduction to HTML and Javascript for Scientists and Engineers, Springer W. Willard,2009
4. HTML A Beginner's Guide, Tata McGraw-Hill Education, 2009.
5. J. A. Ramalho, Learn Advanced HTML 4.0 with DHTML, BPB Publications, 2007

Computer Networks and Internet Technologies Lab
Practical: 60 lectures

Practical exercises based on concepts listed in theory using HTML.

1. Create HTML document with following formatting – Bold, Italics, Underline, Colors, Headings, Title, Font and Font Width, Background, Paragraph, Line Brakes, Horizontal Line, Blinking text as well as marquee text.
2. Create HTML document with Ordered and Unordered lists, Inserting Images, Internal and External linking
3. Create HTML document with Table:

4. Create Form with Input Type, Select and Text Area in HTML.
5. Create an HTML containing Roll No., student’s name and Grades in a tabular form.
6. Create an HTML document (having two frames) which will appear as follows:

<p>About</p> <p>Department 1</p> <p>Department 2</p> <p>Department 3</p>	<p>This frame would show the contents according to the link clicked by the user on the left Frame.</p>
--	--

7. Create an HTML document containing horizontal frames as follows:

Department Names (could be along with Logos)
Contents according to the Link clicked

8. Create a website of 6 – 7 pages with different effects as mentioned in above problems.

9. Create a form using HTML which has the following types of controls:

- V. Text Box
- VI. Option/radio buttons
- VII. Check boxes
- VIII. Reset and Submit buttons

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List of Practical using Javascript :

Create event driven program for following:

1. Print a table of numbers from 5 to 15 and their squares and cubes using alert. 8. Print the largest of three numbers.
2. Find the factorial of a number n.
3. Enter a list of positive numbers terminated by Zero. Find the sum and average of these numbers.
4. A person deposits Rs 1000 in a fixed account yielding 5% interest. Compute the amount in the account at the end of each year for n years.
5. Read n numbers. Count the number of negative numbers, positive numbers and zeros in the list.

SUGGESTED READINGS:

1. Tremblay, J.P, Manohar, R. *Discrete Mathematical Structures with Applications to Computer Science*, 2nd print 1988, McGraw Hill.
2. Kolman, Bernard, Robert C. Busby and Sharon Ross, *Discrete Mathematical Structures*, 3rd Edition, PHI.
3. *Discrete Mathematics*, N. Ch.SN Iyengar, K.A. Venkatesh, V. M. Chandrasekaran, P. S. Arunachalam, Vikash Publishing House Pvt Ltd.

DETAILED SYLLABUS

SEMESTER-V

BCA.C11. OBJECT ORIENTED PROGRAMMING USING C++

Total marks: 100 (Semester end examination - 80, Practical-20 Internal assessment - 20)

UNIT I

Marks: 15

Introduction to object oriented programming.

Basic Concepts of Object Oriented Programming-Benefits of OOP-Applications of OOP.

Introduction to c++

Structure of a Simple C++ program-Output operator-Input operator-Cascading of I/O operators. Tokens. Basic data types-User defined data types-Dynamic initialization of variables-Reference variables-Operators in C++-Scope resolution operator-applications-Member dereferencing operators-Memory Management operators-new and delete.

Control Structures-simple if, if else, nested if, switch, while do, break and continue statements. Introduction to Functions-Function Prototyping-Call by reference

UNIT II

Marks: 15

Classes and objects

Introduction - Defining a class-Class Vs structures-Creating objects-Accessing class members-Defining member functions-Outside the class definition-Inside the class definition-Memory allocation for objects-Array-Declaring an array-accessing elements of an array-Array of objects. Friendly functions.

Constructors and destructors

Basic Concepts of constructors- Dynamic initialization of objects-Copy constructor-Dynamic constructors-Destructors.

UNIT III

Marks: 15

Function and operator overloading

Overloading Concepts Function Overloading: Functions with different sets of parameters, default and constant parameters. Rules for overloading operators-Defining operator overloading-Overloading Unary operators-Prefix operators overloading-Overloading Binary operators-Overloading relational operators-Overloading using friend functions

UNIT IV

Marks: 15

Inheritance

Introduction-Defining derived classes-Types of inheritances

Virtual functions and run time polymorphism-Introduction-Compile time and Runtime polymorphism-Pointers to objects-this pointer-Pointer to derived classes-Virtual functions-Rules for virtual functions-Pure virtual functions.

UNIT V Marks: 10

Streams

C++ stream classes-put() and get() functions-getline() and write() functions-Formatted Console I/O operations

UNIT VI

Marks: 10

Files

Introduction-Stream classes for files-Opening files using constructor-Opening files using open()-File modes-Detecting end of file-eof()-Sequential input and output-put() and get()-Reading and writing objects-read() and write()

SUGGESTED READINGS:

1. Schildt Herbert, *The Complete Reference C++*, Tata McGraw Hill, 4th Edition, 2003.
2. Deitel & Deitel, *C++ How to program*, Pearson Education Asia, 6th Edition, 2008.
3. Bjarne Stroustrup, *The C++ Programming Language*, Special Edition, Pearson Education, 2004.
4. M. T. Somashekara, D. S. Guru, *Object-Oriented Programming with C++*, 2nd Edition, PHI, 2012.

Practical Assignments covering paper C11 (OOP in C++)- 50 marks Each student should do at least 12 practical assignments from the following –

List of Experiments:

1. Define a class named *triangle* to represent a triangle using the lengths of the three sides. Write a constructor to initialize objects of this class, given the lengths of the sides. Also write member functions to check

- (a) if a triangle is isosceles
- (b) if a triangle is equilateral

Write a main function to test your functions.

2. Define a structure employee with the following specifications.

empno : integer

ename : 20 characters

basic, hra, da : float

calculate() : a function to compute net pay as basic+hra+da with float return type.

getdata() : a function to read values for empno, ename, basic, hra, da.

dispdata() : a function to display all the data on the screen Write a main program to test the program.

1. Define a class circle to represent circles. Add a data member radius to store the radius of a circle. Write member functions area() and perimeter() to compute the area and perimeter of a circle.
4. Define a class complex with two data members real and imag to represent real and imaginary parts of a complex number.

Write member functions

rpart() : to return the real part of a complex number

ipart() : to return the imaginary part of a complex number

add() : to add two complex numbers.

mul() : to multiply two complex numbers. Write constructors with zero, one and two arguments to initialize objects. (This is an example of polymorphism.)

5. Define a class point with two data members xordinate and yordinate to represent all points in the two dimensional plane by storing their x co-ordinate and y co-ordinate values. Write member functions

dist() : to return the distance of the point from the origin.

slope(): to return the slope of the line obtained by joining this point with the origin.

Write constructors with zero, one and two arguments to initialize objects. Also write a friend function to compute the distance between two points.

6. Define a class string with the following data members

char *p;

int size;

and write member functions to do the following (without using library function) and using dynamic memory allocation.

- Length of the string
- Compare two strings
- Copy one string to another
- Reverse the string

Write suitable constructors and destructors. Also write a copy constructor for the class.

7. For the class complex defined in 4 above, overload the $\lt\gt$, + and * operators in the usual sense. Also overload the unary – operator.

8. For the class string defined in 6 above, overload the $\lt\gt$ and + operators where + is to be used for concatenating two strings.

9. Define a class time to store time as hour, minute and second, all being integer values. Write member functions to display time in standard formats. Also overload the ++ and -- operators to increase and decrease a given time by one second where the minute and hour values will have to be updated whenever necessary.

10. Define a class to store matrices. Write suitable friend functions to add and multiply two matrices.

11. Write a class based program implementing static members.

12. Define a class student with the following specification:

rollno : integer

sname : 20 characters

Derive two classes artst and scst. The class artst will represent students belonging to arts stream and the class scst will represent students belonging to science stream. The artst class will have additional data members ph, hs, en and as to store marks obtained by a student in three subjects Philosophy, History, English and Assamese. The class scst will have additional data members ph, ch, ma and en to store marks obtained in Physics, Chemistry, Mathematics and English.

Write the following member functions in the classes artst and scst

ctotal() : a function to calculate the total marks obtained by a student

takedata() : function to accept values of the data members

showdata() : function to display the marks sheet of a student .

13. Define an abstract base class printer. Derive three classes laser-printer, line-printer and inkjet-printer. The derived classes will have data members to store the features of that particular printer. Write pure virtual function display() in the base class and redefine it in the derived classes.

14. Define a abstract base class figure and add to it pure virtual functions

display() : to display a figure

get() : to input parameters of the figure

area() : to compute the area of a figure

perimeter() : to compute the perimeter of a figure.

Derive three classes circle, rectangle and triangle from it. A circle is to be represented by its radius, rectangle by its length and breadth and triangle by the lengths of its sides. Write a main function and write necessary statements to achieve run time polymorphism.

15. Write an interactive program to compute square root of a number. The input value must be tested for validity. If it is negative, the user defined function my_sqrt() should raise an exception.

16. Define a class rational to store rational numbers as a pair of integers, representing the numerator and denominator. Write a member function for setting the values of the numerator and denominator. This function should raise an exception if attempt is made to set a zero value as the denominator and in such cases it should be set to 1.

17. Write a class template for storing an array of elements. Overload the << and >> operators. Write a member function to sort the array in descending order.

18. Write a class template for representing a singly linked list. Write functions for inserting, deleting, searching and for displaying a linked list. Write a main function to test it on a linked list of integers and characters.

BCA.C12. OPERATING SYSTEM

Total marks: 100 (Semester end examination - 60, Practical-20 Internal assessment - 20)

Introduction

Basics of Operating Systems: Definition, Types of Operating Systems (definition only): Mainframe, Batch, Multiprocessor, Distributed, Multitasking, Real time, Parallel and Time sharing.

Processes

Process: Concept of a Process, Process States, Process creation, Process termination, Context switching, Concept of Thread

Process Synchronization

Basic concept of Inter-Process communication, Race condition, Critical-Section, Mutual exclusion, semaphore, mutex. Different ways to achieve mutual exclusion- Disabling interrupt, Test-and-Set-Lock, Peterson's solution using semaphore.

Scheduling

Basic Concepts of scheduling, Scheduling objectives, preemptive and non preemptive scheduling, Scheduling criteria – CPU utilization, Throughput, Turnaround Time, Waiting Time, Response Time , Basic concepts on batch, interactive and real-time scheduling algorithm, Scheduling algorithms- FCFS, SJF, RR, priority scheduling

Deadlocks

Definition, Deadlock characteristics , Methods for Handling Deadlocks, Deadlock Prevention , Deadlock detection and Recovery, Deadlock Avoidance using Banker's Algorithm.

Memory management

Memory allocation in Multiprogramming, Relocation and Protection, Swapping, Virtual memory: - Basics of Virtual Memory, Logical versus Physical address space, Paging and Concept of Segmentation, Page fault, Page table and its entries, Page replacement algorithms: - LRU, Optimal, NRU, FIFO

File system

File concepts, File naming, File types(directory, regular, device), File attributes, Operations on file, Access Methods – Sequential, Random access, Directory in UNIX, File system layout, Disk block allocation- Contiguous allocation, Linked list allocation, FAT, i-nodes

I/O management

Basic principles and overall structure of I/O management subsystem, Layers of the I/O subsystem-interrupt handler's device driver, device independent I/O software and user space I/O software.

SUGGESTED READING:

1. Tannenbaum, *Operating Systems*, PHI, 4th Edition, 2000

2. Silberschatz and Galvin, *Operating System Concepts*, Person, 5th Ed. 2001
3. William Stallings, *Operating System*, Prentice Hall of India, 4th Edition,

LABORATORY

Practical Assignments Covering paper C12 (Operating System) - 20 marks Each student should do at least 12 assignments from the following list.

List of Experiments:

1. Write a program to create a child process that starts looping and then terminates.
2. Write a program to show that the child can be set up to ignore a signal from its parent.
3. Write a program to show that a process can ignore a signal.
4. Write a program to create a thread in which prints "We are proud to be Indians" and terminates.
5. Write a program to demonstrate how to "wait" for thread completions by using the Pthread join routine. Threads are explicitly created in a joinable state.
6. Write a program to create a thread in which print "We are proud to be Indians" and pass multiple arguments using structure during its creation.
7. Write a program to compute the dot product of two vectors and also show the use of mutex variable.
8. Write a program to create threads, the main thread creates three threads. Two of these threads increment a counter variable while third thread watches the value of the counter variable. When the counter variable reaches a predefined limit, the waiting thread is signaled by one of the incrementing threads. The waiting thread "awakens" and then modifies the counter. The program continues until the incrementing threads reach a final value and also print the final value.
9. Write a program to show attaching and detaching shared memory.
10. Write a program to show the communication between two processes through shared memory.
11. Write a program to show how two processes can talk to each other using wait() and signal() operations applied on semaphore.
12. Write a program in which a parent process accepts a list of integers to be sorted. Parent process uses the fork system call to create a new process called a child process. Both the processes use shared memory for the list of integers. Now use the parent process to sort the integers using bubble sort and the child process to sort the integers using selection sort. Use semaphore variable for process synchronization.
13. Write a program to implement Banker's Algorithm for multiple resource type each.
14. Write a program to simulate Dining Philosophers Algorithm.

DSE-1: Digital Image Processing

Theory: 60 Lectures

1. Introduction (6 Lectures)

Pixels, coordinate conventions, Imaging Geometry, Perspective Projection, Spatial Domain Filtering, sampling and quantization.

2. Spatial Domain Filtering (7 Lectures)

Intensity transformations, contrast stretching, histogram equalization, Correlation and convolution

3. Filtering in the Frequency domain (8 Lectures)

Fourier Transforms and properties, FFT (Decimation in Frequency and Decimation in Time Techniques), Convolution, Correlation, Discrete Cosine Transform, Frequency domain filtering.

4. Image Restoration (8 Lectures)

Basic Framework, Interactive Restoration, Image deformation and geometric transformations, image morphing, Restoration techniques, Noise characterization, Noise restoration filters, Restoration from projections.

5. Image Compression (10 Lectures)

Encoder-Decoder model, Types of redundancies, Lossy and Lossless compression, Sub-image size selection, blocking artifacts, DCT implementation using FFT, Symbol-based coding, JBIG-2, Bit-plane encoding, Bit-allocation, JPEG, Lossless predictive coding, Lossy predictive coding

6. Wavelet based Image Compression (5 Lectures)

Expansion of functions, Multi-resolution analysis, Scaling functions, MRA refinement equation, Wavelet series expansion, Discrete Wavelet Transform (DWT), Continuous Wavelet Transform, Digital Image Watermarking.

7. Morphological Image Processing (7 Lectures)

Basics, SE, Erosion, Dilation, Opening, Closing, Hit-or-Miss Transform, Boundary Detection, Hole filling, Connected components, Reconstruction by dilation and erosion.

8. Image Segmentation (9 Lectures)

Boundary detection based techniques, Point, line detection, Edge detection, Edge linking, local processing, regional processing,

Reference Books

1. R C Gonzalez , R E Woods, Digital Image Processing, 3rd Edition, Pearson Education.2008.

2. A K Jain, Fundamentals of Digital image Processing, Prentice Hall of India.1989.
3. K R Castleman, Digital Image Processing, Pearson Education.1996
4. Schalkoff, Digital Image Processing and Computer Vision, John Wiley and Sons.1989.
5. Rafael C. Gonzalez, Richard E. Woods, Steven Eddins,' Digital Image Processing using MATLAB', Pearson Education, Inc., 2004.

Digital Image Processing Lab

Practical: 60 Lectures

1. Write program to read and display digital image using MATLAB or SCILAB
 - a. Become familiar with SCILAB/MATLAB Basic commands
 - b. Read and display image in SCILAB/MATLAB
 - c. Resize given image
 - d. Convert given color image into gray-scale image
 - e. Convert given color/gray-scale image into black & white image
 - f. Draw image profile
 - g. Separate color image in three R G & B planes
 - h. Create color image using R, G and B three separate planes
 - i. Flow control and LOOP in SCILAB
 - j. Write given 2-D data in image file
2. To write and execute image processing programs using point processing method
 - a. Obtain Negative image
 - b. Obtain Flip image
 - c. Thresholding
 - d. Contrast stretching
3. To write and execute programs for image arithmetic operations
 - a. Addition of two images
 - b. Subtract one image from other image

- c. Calculate mean value of image
 - d. Different Brightness by changing mean value
4. To write and execute programs for image logical operations
- a. AND operation between two images
 - b. OR operation between two images
 - c. Calculate intersection of two images
 - d. Water Marking using EX-OR operation
 - e. NOT operation (Negative image)
5. To write a program for histogram calculation and equalization using
- a. Standard MATLAB function
 - b. Program without using standard MATLAB functions
 - c. C Program
6. To write and execute program for geometric transformation of image
- a. Translation
 - b. Scaling
 - c. Rotation
 - d. Shrinking
 - e. Zooming
7. To understand various image noise models and to write programs for
- a. image restoration
 - b. Remove Salt and Pepper Noise
 - c. Minimize Gaussian noise
 - d. Median filter and Weiner filter
8. Write and execute programs to remove noise using spatial filters

- a. Understand 1-D and 2-D convolution process
 - b. Use 3x3 Mask for low pass filter and high pass filter
9. Write and execute programs for image frequency domain filtering
- a. Apply FFT on given image
 - b. Perform low pass and high pass filtering in frequency domain
 - c. Apply IFFT to reconstruct image
10. Write a program in C and MATLAB/SCILAB for edge detection using different edge detection mask
11. Write and execute program for image morphological operations erosion and dilation.
12. To write and execute program for wavelet transform on given image and perform inverse wavelet transform to reconstruct image.

DSE-2: Numerical Methods

Theory: 60 Lectures

1. Floating point representation and computer arithmetic, Significant digits, Errors: Round-off error, Local truncation error, Global truncation error, Order of a method
2. Bisection method, Secant method, Regula-Falsi method Newton-Raphson method, Gauss-Jordan method
3. Iterative methods: Jacobi and Gauss-Seidel iterative methods Interpolation: Lagrange's form
4. Finite difference operators, Gregory Newton forward and backward differences Interpolation, Linear interpolation
5. Numerical integration: Trapezoid rule, Simpson's rule (only method),
6. Extrapolation methods: Romberg integration, Gaussian quadrature, Ordinary differential equation: Euler's method, Runge-Kutta second methods
- 7.

REFERENCE BOOKS:

- [1] Laurence V. Fausett, Applied Numerical Analysis, Using MATLAB, Pearson, 2/e (2012)
- [2] M.K. Jain, S.R.K. Iyengar and R.K. Jain, Numerical Methods for Scientific and Engineering Computation, New Age International Publisher, 6/e (2012)
- [3] Steven C Chapra, Applied Numerical Methods with MATLAB for Engineers and Scientists, Tata McGraw Hill, 2/e (2010)

Numerical Methods Lab

Practical: 60 lectures

1. Find the roots of the equation by bisection method.
2. Find the roots of the equation by secant/Regula-Falsi method.
3. Find the roots of the equation by Newton's method.
4. Find the solution of a system of nonlinear equation using Newton's method.
5. Find the solution of tridiagonal system using Gauss Thomas method.
6. Find the solution of system of equations using Jacobi/Gauss-Seidel method.
7. Find the cubic spline interpolating function.
8. Evaluate the approximate value of finite integrals using Gaussian/Romberg integration.

