

**2010**

**Full Marks –70**

**Time – As in the programme**

The questions are of equal value

Answer ALL questions.

1. (a) Define algorithm. Explain what you mean by Top- Down Approach.
- (b) Write an algorithm to find the greatest of three numbers.

OR

- (a) Calculate by induction method the total numbers of handshaking possible for a class with 28 students.
- (b) Discuss about the criteria for writing an efficient algorithm to solve a problem.

2. Discuss about different types of Logical Operators and Relational Operators used in C programming.

OR

Discuss with example about Variables and Constants used in c programming.

3. Compare and Contrast
- (a) Formatted and Unformatted input
  - (b) While and Do- While

OR

Write notes on

- (a) Switch - Break
- (b) Go- To statement

4. (a) Write a C program to multiply two 4X4 matrices.

OR

Write a C program using pointers to sort a set of n numbers of numbers in ascending order. What change is to be incorporated for descending order ?

5. Explain with example the concept of Structure used in C programming. How does it differ from Union ?

OR

Write a C program to create a data file of "ABC" company dealing with Books. The fields to be considered are Book No. Book Name, Price, Author and Publisher.

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1. (a) Construct truth table for the expression. [4

$$(P \Leftrightarrow Q) \Leftrightarrow ((P \wedge Q) \vee (\neg P \wedge \neg Q))$$

- (b) Show that the statements are consistent or inconsistent:

“If Miranda does not take a course in discrete mathematics, then she will not graduate,” “If Miranda does not graduate, then she is not qualified for the job.” “If Miranda reads this book, then she is qualified for the job”.

“Miranda does not take a course in discrete mathematics but she reads this book.” [5]

(c) Sort 3, 5, 7, 8, 2, 4, 6 using merge sort. [5]

OR

(d) Simplify the expression.

$$(P \vee \neg Q) \wedge (\neg P \vee Q) \vee \neg(\neg(P \vee \neg R) \wedge Q)$$

(e) Explain which rules of inference is used in the following statements and whether the conclusion is correct or not.

“Somebody in this class enjoys whale watching. Every person who enjoys whale watching cares about ocean pollution. Therefore, there is a person in this class who cares about ocean pollution”. [5]

(f) Using mathematical induction, prove

$4^n - 1$  is divisible by 3, where  $n = 1, 2, \dots$

2. (a) Two equivalence relation R and S are given by relation matrices  $M_R$  and  $M_S$ . Show that  $R \circ S$  is not an equivalence relation. [6]

$$M_R = \{(1,1), (1,2), (2,1), (2,2), (3,3)\} \text{ and}$$

$$M_S = \{(1,1), (2,2), (2,3), (3,2), (3,3)\}$$

- (b) For the poset  $(\{3,5,9,15,24,45\}, /)$ , find the following: [8]

- (i) The maximal elements
- (ii) The minimal elements
- (iii) The least upper bound
- (iv) The greatest lower bound
- (v) Find all upper bounds of  $\{3,5\}$
- (vi) All lower bounds of  $\{15, 45\}$
- (c) Using Warshall's algorithm, find the transitive closure of the relation on  $\{1,2,3,4\}$ . The relation is  $\{(1,1), (1,4), (2,1), (2,3), (3,1), (3,2), (3,4), (4,2)\}$ . [10]

(d) Draw Hasse diagram for the divisibility of the set  $\{1, 2, 3, 6, 12, 36, 48\}$ . [4]

3. (a) Solve the recurrence relation. [8]

$$a_n = 6a_{n-1} - 12a_{n-2} + 8a_{n-3}$$

$$\text{With } a_0 = -5, a_1 = 4, a_2 = 88.$$

(b) There are 2504 Computer Science students at a school. Of these, 1876 have taken course in Pascal, 999 have taken course in Fortran and 345 have taken course in C. Further, 876 have taken courses in both Pascal and Fortran. 231 have taken courses in both Fortran and C, and 290 have taken courses in both Pascal and C. If 189 of these students have taken courses in Fortran, Pascal C, how many to these 2504 students have not taken a course in any of these three programming languages. [6]

OR

[5]

(c)(i) Find all solution of the recurrence relations.

[14

$$a_n = 2a_{n-1} + 2n^2$$

(ii) Find the solution of the recurrence relation in part (i) with initial condition  $a_1 = 4$  [5

4. (a) How many permutations of the letters ABCDEFGH contain [5

(i) The string AB, DE and GH ?

(ii) The string CDE

(b) Express the greatest common divisor of each of the pairs of integers as a linear combination of these integers. [9

(i) 117, 213

(ii) 0, 223

(iii) 123, 2347

OR

[Cont.



- (c) Seven women and nine men are the faculty of the mathematics department at a school.

[8

- (i) How many ways are there to select a committee of 5 members of the department if atleast one woman must be on the committee?
- (ii) How many ways are there to select a committee of 5 members of the department if atleast one women and one man must be in the committee ?
- (d) List the ordered pairs in the equivalence relation produced by these partitions
- $\{0,1,2,3,4,5\}$
- (i)  $\{0\}, \{1,2\}, \{3,4,5\}$
- (ii)  $\{0,1,2\}, \{3,4,5\}$
- (iii)  $\{0,1\}, \{2,3\}, \{4,5\}$

a) Write short notes on:

[4]

- (i) Finite state Machines
  - (ii) Turing Machines
- (b) Construct a finite automata that recognize the set  $ab^*(bba)^*$  [10]

OR

- (c) What does the Turing Machine described by the five tuples  $(s_0, 0, s_0, 0, R)$ ,  $(s_0, 1, s_1, 0, R)$ ,  $(s_0, B, s_2, B, R)$ ,  $(s_1, 0, s_1, 0, R)$ ,  $(s_1, 1, s_0, 1, R)$  and  $(s_1, B, s_2, B, R)$  do when the input string is [14]

(i) 00011

(ii) 101100

I - (MCA)- II (MFCS)

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The figure in the right hand margin indicate marks.

Answer ALL questions.

1.(a) Convert numbers from one base to another as indicated. [6

(i)  $(290.65)_{10}$  to binary

(ii)  $(6CBC.20)_{10}$  to decimal

(iii)  $(111011010110.101)_2$  to hexadecimal

(b) The addresses of locations in a memory range from 0000 to OFFF. Each memory location stores 1 byte. In decimal, how many bytes can be stored in this memory ? [2

(c) Solve the following equation for x [6

$(1101)_2 + (1010)_8 = (x)_{16}$ , where the subscripts denote the base of the number system. [6

- (d) State the De Morgan's theorems for three input variables. Verify the theorems by writing the corresponding truth tables. [8]
- (e) Draw the logic circuit of a Binary - to - Decimal decoder and explain its working. [6]
- 2.(a) Describe all possible Quads (a group of four 1s) that can be formed in a 3- variable Karnaugh map. Write simplified Boolean expression corresponding to each of these quads. [8]
- (b) Express the Boolean expression for sum of three bits in
- (i) Sum of Products form
  - (ii) Product of sums form

OR

- (c) Write the truth table of a full subtractor. Draw the logic diagram of the full subtractor using only NAND gates. [8]

- (d) Explain the working of a 2's complement adder - subtracter to add / subtract two 3 bit numbers.

[6]

- 3.(a) Write truth table for

[6]

(i) RS flip flop

(ii) D flip flop

(iii) JK flip flop

- (b) Explain what is meant by

[4]

(i) Level clocking

(ii) Edge triggering

- (c) Explain the function and utility of three state register.

[4]

OR

- (d) Draw the circuit diagram of a 4 bit ripple counter and explain its working with the help of timing diagram.

[7]

- (e) Draw the circuit diagram of a 4 bit ring counter and explain its working with the help of timing diagram.

- 4.(a) Differentiate between static RAM and dynamic RAM. [4]
- (b) Describe the characteristics of ROM, PROM and EPROM, EEPROM and Flash memory. [10]

OR

- (c) Describe the organisation of magnetic disk in terms of tracks and sector. [5]
- (d) Explain what is meant by seek time and rotational delay.
- (e) Develop a formula for the total average access time for transferring a given number of bytes from a magnetic disk as a function of relevant parameters of the disk. [5]
- 5.(a) Describe the function of each of the following units of SAPI computer. [8]
- (i) PC (ii) Output register
- (iii) IR (iv) Controller

- (b) Hand - assemble the following SAP2 program starting at memory address A50C. [6

MVIC, 0A

BACK : DCR C

JNZ BACK

NOP

HLT

Note : The op codes are 06, 05, C2, 00 and 76 for MVI B, DCR B, JNZ, NOP and HLT respectively.

OR

- (c) Consider the program. [3

LOOP : MVIC, 78H

DCR C

JNZ LOOP

HLT

- (i) How many times (decimal) is the DCR executed? [3

- (ii) How many times does the program jump to LOOP ?
- (iii) How can you change the program to loop 210 (decimal ) times ?
- (d) Draw the logic circuit for setting the S and Z flags in SAP2 computer. [5]
- (e) Explain the effect of the following SAP- 3 instructions. [6]
- (i) MOVL, A
- (ii) LXIH, 1FFF
- (iii) MOV M, B



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**The questions are of equal value.**

**Answer ALL questions.**

1.(a) Define accounting. Why is accounting known as language of business ?

(b) What is accounting equation ? Discuss different types of accounts.

**OR**

Journalise the following transactions and post them into ledgers.

Date	Particulars	Rs.
2010		
Jan - 1	Started business with cash	10, 000
Jan - 3	Paid into Bank	4,000
Jan - 5	Sold goods to Mohan	2, 200
Jan - 9	Goods purchased from Shyam	3, 150
Jan - 10	Purchased goods from Rekesh on credit	8, 000
Jan - 12	Paid to Rakesh in full settlement	7, 950
Jan - 15	Salaries paid	1, 000

2. Enter the following transaction in Cash Book with discount column:

Date	Particulars	Rs.
2010		
Feb - 1	Cash in hand	1, 500

[Cont.

Feb - 6	Paid to Ram	300
Feb - 7	Discount allowed by him	10
Feb - 8	Purchased goods	400
Feb - 10	Received from R. Gupta	980
Feb - 10	Discount allowed	20
Feb - 15	Sold goods	400
Feb - 20	Paid to M. Sharma	295
Feb- 20	Discount received	5
Feb - 25	Paid wayges	50
Feb - 30	Paid to David in full settlement of his account which shows a credit balance of Rs. 400	390

OR

From the following trial balance prepare  
Trading Profit & Loss Account M/s James and

Co. for the year eading 31st December, 2010

Particular	Rs.
Capital	20,000
Drawings	6,000
Sales	50,000
Purchases	30,000
Rent and Lighting	4, 000
Expenses	6, 000
Furnitures and Fixtures	15,000
Sundry creditors	5,000
Sundry Debtors	6, 500
Cash in hand and bank	7, 500

3. What do you understand by analysis and interpretation of financial statements ? Discuss methods used for the analysis and interpretation of financial statements.

OR

(a) Calculate the current ratio from the following information:

Particulars	Rs.	Particulars	Rs.
Stock	60,000	Sundry creditors	20,000
Sundry Debtors	70,000	Bills payables	15,000
Cash	20,000	Tax payable	18,000
Bills receivables	30,000	Outstanding Expenses	7,000
Prepaid Expense	10,000	Bank overdraft	25,000
Land & Building	1,00,000	Debentures	75,000
Gooswill	50,000		

(b) Particulars	Rs.
Annual credit sales	25,000
Returns	1,000

[Cont.]

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**Answer any FIVE questions.**

1. There is 10nos. of vacancies in tcs in the category of junior programmer software to be filled up, forward your cv along with covering letter to the appropriate authority on the basis of one advt. in the Indian expression Dt. 25/ 01/ 2011.
2. Write an e.mail to one of your friend who is an American and interested to know about Oriya culture so that he / she can present a paper before the students of Lousiana University.

3. Write a report on the sudden spread of malaria in your locality to be submitted before the Minister Health and Family Welfare, suggesting the necessary measure to be taken to tackle the situation so that you can avoid escalation of casualties.
4. Do as directed.
- (i) Information to students regarding the exam schedule. ( Write a notice)
- (ii) Opening of a new SBI Branch in your locality.  
(Design the content of the advertisement)
5. Make sentences so that these feelings are aptly expressed in your every day communication.
- (i) Regret, Thanksgiving, Pleasue, Reprimand
- (ii) Permission: Prohibit, Reject, Refuse, Appology, Praise

6. As a leader of a group you are supposed to present a paper on the educational, scenario of Orissa. What are the things you would take care of to make your presentation effective? Explain
7. What are the dos and donts of a group discussion, what are the elements a candidate should take care in order to be successful in a structure group discussion
8. Write 10 possible questions usually asked by the interviewer and their possible answers so that you will be selected in the interview.