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2 SEM TDC CSC G 1 (N/O)

2018

(May)

COMPUTER SCIENCE

(General)

Course : 201

*The figures in the margin indicate full marks
for the questions*

(New Course)

(Programme and Problem Solving with C)

Full Marks : 48

Pass Marks : 14

Time : 2 hours

1. Answer the following questions : 1×5=5

(a) What symbol is used at the end of every C statement?

(b) What is the output produced by the following program segment?

```
int x;  
x = 2;  
x = 4;  
x = 1;  
printf ("%d %d %d", x, x, x);
```



(2)

- (c) Which of the two operators, multiplication or division has the higher precedence?
- (d) What is meant by declaration of a variable?
- (e) Write two different ways to multiply the variable x by y , placing the result in x .

2. Answer the following questions :

2×5=10

- (a) What is modulus operator and how does it work?
- (b) What are the rules for naming arrays?
- (c) What is the purpose of the `strcpy` function? Give an example.
- (d) What is the difference between a 'while' and a 'do-while' loop?
- (e) What is the difference between pre-increment and post-increment operations?

3. Answer any three of the following questions :

11×3=33

- (a) (i) Write a C program to calculate the amount of interest on a bank account using the formula

$$i = p(1+r)^d - p$$

(3)

i is the total interest earned, p is the principal (the amount originally deposited in the account), r is the rate of interest as a decimal less than 1 (for example 12 percent is expressed as 0.12), and d is the number of days the money is earning interest.

- (ii) Write a C program to find the Fibonacci series up to 21 using recursion.

- (b) (i) Write a C program to find the sum of the following series :

$$1 + \frac{1}{2} + \frac{1}{3} + \frac{1}{4} + \frac{1}{5} + \dots + \frac{1}{N}$$

The value of N should be entered through keyboard.

- (ii) Write a C program to find the sum of all the digits of a positive number.

- (c) (i) Write a C program to find the transpose of a two-dimensional array. For example, given the array :

15	7	8
9	2	4
1	6	4

(Turn Over)

(4)

The transpose would be

15 9 1

7 2 6

8 4 4

- (ii) Write a C program to create a structure to specify the following data on books :

ISBN No., Book name, Book publisher, Book author and Date of publishing

- (d) (i) Write a C program to display all the odd and even numbers separately up to a given number n .

- (ii) Write a C program to read a string and print its length.

- (iii) How is string represented as an array? Discuss briefly.

- (e) (i) Write a C program to check whether a given number is prime or not.

- (ii) Write a C program to display the following :

1
1 2
1 2 3
1 2 3 4
1 2 3 4 5

(5)

(Old Course)

(Discrete Structures)

Full Marks : 80

Pass Marks : 32

Time : 3 hours

1. Answer the following questions as directed :

1×6=6

- (a) The total degree of an isolated node is _____ .

(Fill in the blank)

- (b) Power set of the null set ϕ has only the element ϕ .

(Write True or False)

- (c) Define a null graph.

- (d) The cardinality of a power set of a set S of cardinality n is _____ .

(Fill in the blank)

- (e) The dual of $(A \cap B) \cup C$ is $(A \cup B) \cap C$.

(Write True or False)

- (f) A set A is called a proper subset of a set B if $A \subseteq B$ and $A \neq B$.

(Write True or False)

(Turn Over)

(6)

2. Answer any four of the following questions :

3×4=12

- (a) Construct the truth table for the following formula :

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

- (b) Define a null set with example.
 (c) How two formulas A and A^* are said to be duals of each other?
 (d) Define extential quantifier and universal quantifier.
 (e) What is the difference between a graph and a tree?
 (f) Define identity functions with example.

3. Prove the following (any three) :

4×3=12

- (i) $[(A \rightarrow B) \wedge A] \rightarrow B$ is a tautology
 (ii) $\neg(A \vee B)$ and $[(\neg A) \wedge (\neg B)]$ are equivalent
 (iii) $(A \cup B)' = A' \cap B'$, given $A = \{1, 2, 3, 4\}$, $B = \{1, 3, 5, 7\}$
 (iv) If A and B are any two sets, then $A \cup B = A \cap B \Leftrightarrow A = B$

(7)

4. Answer any five of the following questions :

10×5=50

- (a) (i) Define symmetric relation with example. 4

- (ii) Solve the recurrence relation

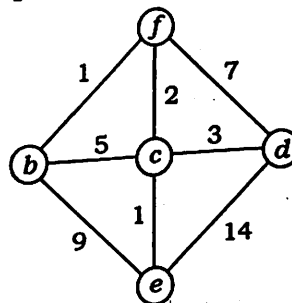
$$a_{r+2} - 3a_{r+1} + 2a_r = 0$$

by the method of generating function with the initial conditions $a_0 = 2$ and $a_1 = 3$. 6

- (b) (i) Define connected and disconnected graph. 4

- (ii) Show that the sum of degree of all the vertices in a graph G , is even. 6

- (c) What is meant by minimum spanning tree? Find the minimum spanning tree of a graph G : 3+7=10



- (d) (i) Give an example of a relation which is symmetric and transitive but neither reflexive nor antisymmetric. 4

(Turn Over)

- (ii) Solve the recurrence relation

$$F_n = 5F_{n-1} - 6F_{n-2}$$

where $F_0 = 1$ and $F_1 = 4$.

- (e) (i) Explain complete and bipartite graph.

- (ii) Prove that maximum degree of any vertex in a simple graph having n vertices is $n-1$.

- (f) (i) Prove that the relation

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

on set $A = \{1, 2, 3\}$ is transitive.

- (ii) Define isomorphic graphs with example.

- (g) (i) What are disjoint sets? Give example.

- (ii) Show the differences between symmetric and anti-symmetric relation with example.

- (h) Explain the following terms by giving one example in each case : $5 \times 2 = 10$

(i) Multigraph

(ii) Cut points

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