Max Marks: 20

DATE: 01-10-2019

1. `Create a Red Black Tree for the following data in sequence: A, L, G, O, R, I, T, H, M. From the resulting Red Black Tree, delete the following keys one by one: A, L, G, O and R. (4)

2. For the given forest, find the preorder, postorder and inorder traversals. (3)
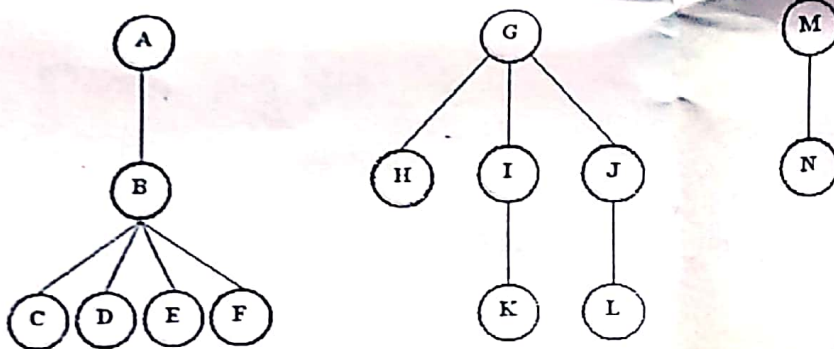
3. Consider a complete undirected graph with vertex set {0, 1, 2, 3, 4}. Entry W_{ij} in the matrix W below is the weight of the edge {i, j}. Draw the minimum spanning tree T in this graph such that vertex 0 is a leaf node in the tree T? (3)
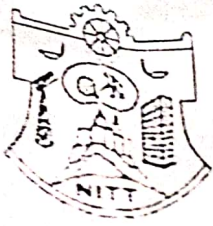
$$W = \begin{pmatrix} 0 & 1 & 8 & 1 & 4 \\ 1 & 0 & 12 & 4 & 9 \\ 8 & 12 & 0 & 7 & 3 \\ 1 & 4 & 7 & 0 & 2 \\ 4 & 9 & 3 & 2 & 0 \end{pmatrix}$$

4. Find the shortest path from Z to all other vertices for the given directed graph. (4)
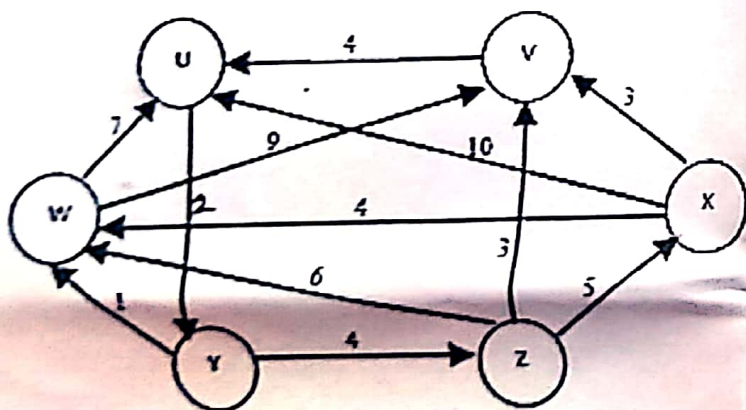
5. Illustrate the heapsort by tracing the following elements stepwise: A,L,G,O,R,I,T,H and M. (4)

6. Suppose we are sorting an array of eight integers using quicksort, and we have just finished the first partitioning with the array looking like this: 2 5 1 7 9 12 11 10.

   What is(are) the possible key element(s)? (2)

CSPC22 Digital Systems Design   Date: 01.11.2019

CT 2-Nov 2019   Max: Marks:20

Answer ALL Questions:

1. If a *net* has no driver, it gets the value _____
2. Default value of *reg* is _____
3. The task $Sstop$ is provided to _____
4. Externally, a output port must always connected to a _____
5. If A= 4'b011 and B= 4b'0011, then the result of A**B will be _____
6. If A= 4b'001x and B= 4b'1011, then result of A−B will be _____
7. If A = 4'1xxz and B= 4'b1xxx, then A===B will return _____
8. Result of 9% −2 will be
9. Initial value of a=1 and b=2, then what will be final value if _____

    always @ (posedge clock)
       a=b;
    always @ (posedge clock)
       b=a;

10. initial value of a=1 and b=2, then what will be final value if _____

    always @ (posedge clock)
       a<=b;
    always @ (posedge clock)
       b<=a;

11. A sequential circuit has two JK flip-flops A and B, two inputs x and y, and one output z .The flip-flop input equations and circuit output equation are   (10)

    $JA = Bx + B'y$
    $JB = A'x$

    $KA = B'xy'$
    $KB = A + xy'$

    $z = Axy + Bx'y'$

(a) Draw the logic diagram of the circuit.

(b) Tabulate the state table.

(c) Derive the state equations for A and B.

DEPARTMENT OF MATHEMATICS, NIT- TIRUCHIRAPALLI- 620015
B.Tech III Semester: Computer Science and Engineering
SUBJECT: MAIR 37 INTRODUCTION TO PROBABILITY THEORY

4-11-2019   Assessment TEST –II   9.30-10-30AM
Answer all questions & All Questions Carry Equal Marks   Max. Marks: 20

1. Find K, conditional density $f_{y/x}(y/x)$ and $E(X/Y)$ for the joint density
   $f(x,y)= K (2x+3y)$ $0 < x \le 1$, $0 < y \le 1$

2. If $Y = X^2/5$, find K, the density $f_Y(y)$, $E(Y)$ and Var(Y) for $f_x(x)=K\ x(5-x)$ $1 < x \le 4$

3. An item is drawn from a population with pdf $f(x) = K(8x - x^2 - 10)$, $2 < x < 5$. Using Chebychev's inequality find bound for the probability of item takes value between 2.55 to 4.25

4. Find the mean and auto correlation of the random process $X(t) = (A-1) \cos(wt) + B \sin(wt)$ where A and B are random variable with densities $f_{AB}(a,b) = 5(a+b)\ 0 < a \le 1, 0 < b \le 1$

5. Explain 3 different states of Markov chain. Classify the various states of the Markov Chain $S =\{1,2,3,4,5\}$ whose one transition probability matrix is given as below:

$$\begin{pmatrix} 0.2 & 0 & 0.3 & 0.1 & 0 & 0.4 \\ 0 & .1 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0.4 & 0 & 0.6 & 0 \\ 0.2 & 0.1 & 0.2 & 0.1 & .2 & 0.2 \\ 0 & 0 & 0.6 & 0 & 0.4 & 0 \\ 0 & .4 & 0.3 & 0.2 & 0.1 & 0 \end{pmatrix}$$

Handwritten annotations: Absorbing 1 / Transient 3 / Recurrent 2,4

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Class / Semester : II yr CSE / III sem.   Time   : 3.30 to 4.30 P.M
Venue & Date   : G01 & 05/11/2019   Max. Marks : 20

1. Prove that there is no 3 regular graph with 7 vertices.   (2)

2. Prove or disprove. The following two graphs are isomorphic.   (3)
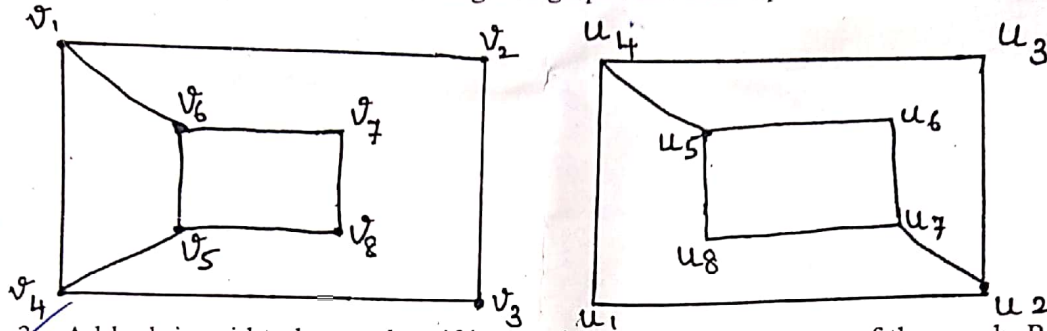
3. A block is said to be pendant if it contains only one cut vertex of the graph. Prove that every graph with a cut vertex has atleast two pendant blocks.   (2)

4. Let G be a graph with four connected components and of size 24. What is the maximum possible number of vertices in G?   (2)

5. Prove or disapprove – if G is Euler circuit with edges e and f that share a vertex, then G has a Euler tour in which e, f appears consecutively.   (2)

6. A postman takes the bus to the post office. From there, he chose a route to reach home as quickly as possible (not ending at the post office). The map of the streets along with the minutes required to walk is provided. How many times will each edge be traversed in the optimal route?   (3)
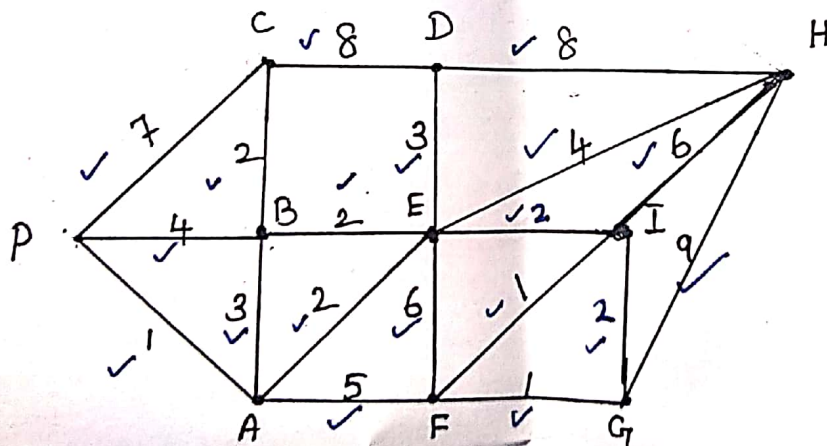
P – Post office

H – House

7. Show that a planar graph with at least four vertices has at least four vertices with degree five or less.   (2)

8. Prove that every connected graph possesses a spanning tree as a sub graph.   (2)

9. Find number of students in a class to be sure that three of them are born in the same month.   (2)

$$\left\lceil \frac{p-1}{12} \right\rceil + 1 = 3$$

25

DEPARTMENT OF COMPUTER SCIENCE AND ENGG.
NATIONAL INSTITUTE OF TECHNOLOGY, TIRUCHIRAPPALLI.

CYCLE TEST II

CSPC24 COMPUTER ORGANIZATION

05/11/19

Time: 60 mins

ANSWER ALL THE QUESTIONS:

MAX: 20 Marks

1. With examples, explain the different methods of representation of floating point numbers in the memory of a computer. (5)

2. With an example and a diagram, explain the concept of pipelining, by highlighting its advantages and limitations. (5)

3. What are exceptions? How are they handled? Explain. (5)

   RR RW WR WW

4. For a direct-mapped cache design with a 32-bit address, the following bits of the address are used to access the cache:

   $\frac{128}{32} = 4:1$

Tag	Index	Offset
31-10	9-5	4-0

(i) What is the cache block size (in words)? (1)
(ii) How many entries does the cache have? 31 (2)
(iii) What is the ratio between total bits required for such a cache implementation over the data storage bits? 4:1 (2)

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Cycle Test - II
CSPC23 – Principles of Programming Languages

Class / Semester : II CSE / III   Time : 3.30 PM to 4.30 PM
Date   : 04.11.2019   Marks : 20

define R 2
define C 2
⊀ a 1 ⊀a 2)

Answer all questions

1. Write a User-Defined Function in C to perform Matrix Subtraction using Pointers by passing the two input arrays as parameters to the function.   (5)

   int   Mat Sub (⊀ a1[R][C] , ⊀a 2[R]
   { int i , J ;
   for
   for ...
   *return (⊀(⊀(a1+i)+1)) *
   - (⊀(⊀(a2+i)+
   }

2. Write a Generic program using the concept of Templates in C++ to find the Maximum and Minimum of 3 Integer and Floating point numbers.   (5)

   $a > b ? (a > c ? a : c) : (b > c ? b : c)$
   $< b ? (a < c ? (b < c ?$

3. Write a C++ program to implement the following Multi-Level Inheritance. Create a new Class named NUMBER that input an integer number - N and also return that number. Create another class named SQUARE derived from NUMBER Class that get the number N from NUMBER Class and return N^2. Create another class named CUBE derived from SQUARE Class that get N^2 from SQUARE Class and return N^3.

   b
   a
   c

4. How Exceptions are handled in C++ ? Explain with an example.   (5)

   try , throw , catch

   b > a