

Roll No: 059

UNIVERSITY OF PETROLEUM  
AND ENERGY STUDIES



Mid Semester Examination, October 2017

Program: B.Tech. (CSE)  
Subject (Course): Discrete Mathematical Structures  
Course Code : MATH 231  
No. of page/s: 01

Semester – III  
Max. Marks : 100  
Duration : 2 Hrs

Section A

(5 X 4 = 20)

1. Define a 'Power Set'. Find out the all power sets of set  $X = \{\phi, 1, 2, 3\}$ .
2. Define the following types of graphs by taking suitable examples of each:  
a) Simple graph b) Complete Bipartite graph c) Regular graph d) Wheel graph
3. With the help of contradiction technique, prove that for all non-negative real numbers,  $x, y$  and  $z$  if  $x^2 + y^2 = z^2$ , then  $x + y \geq z$ .
4. Define *isomorphism* in graphs. State the necessary conditions for two graphs to be isomorphic to each other and show why these are necessary conditions only by taking a counter example.
5. There are 79 Grade 10 learners at school. All of these take some combination of Maths, Geography and History. The number who take Geography is 41; those who take History is 36; and 30 take Maths. The number who take Maths and History is 16; the number who take Geography and History is 6, and there are 8 who take Maths only and 16 who take History only.
  - a. Draw a Venn diagram to illustrate all this information. (2)
  - b. How many learners take Maths and Geography but not History? (2)

Section B

(5 X 8 = 40)

1. Let  $R$  be a relation defined on a set of positive integers such that for all  $x, y \in \mathbb{Z}^+$   $xRy$  if and only if  $(x-y)$  is divisible by 3. Prove that  $R$  is an equivalence relation.
2. Using principle of mathematical induction, prove that  $n^3 + 2n$  is divisible by 3 for  $n \geq 1$ .
3. Prove that in a graph the number of odd degree vertices are always EVEN in number.
4. Let  $f: \mathbb{R} \rightarrow \mathbb{R}$  be a function defined as  $f(x) = 3x + 5$  and  $g: \mathbb{R} \rightarrow \mathbb{R}$  be another function defined as  $g(x) = x+4$ . Find  $(g \circ f)^{-1}$  and  $f^{-1} \circ g^{-1}$  and thus verify  $(g \circ f)^{-1} = f^{-1} \circ g^{-1}$ .
5. Find the equivalent numeric function of the generating function  $1/x^2 - 2x - 3$ .

Section C

(2 X 20 = 40)

1. Prove that in a simple graph having  $n$  vertices and  $k$  components, there can be at most  $(n-k)(n-k+1)/2$  edges.
2. Find the solution of the recurrence relation  $a_r + 4a_{r-1} + 3a_{r-2} = 4r + 3$ .  
OR  
Find the solution of the recurrence relation  $a_r = -a_{r-1} + 6a_{r-2} + 2^r$ .

UNIVERSITY OF PETROLEUM AND ENERGY STUDIES  
Mid Semester Examination, March, 2017

Roll No: R110216098



Program Name: B.Tech(CSE) all branches  
Course Name: Design and Analysis of algorithms  
Course Code: CSEG 242  
No. of page/s: 02

OCTOBER, 2017

Semester - III  
Max. Marks : 100  
Duration : 2 Hrs

**Section: A (Answer all questions, each question carries 5 Marks) 4X 5M=20M**

1. Derive the time complexity growth order for the following function

```
void Fun(int n, char A, char B, char C)
{
    if (n == 1)
    {
        return;
    }
    Fun(n-1, A, C, B);
    printf(" Move from A to B");
    towerOfHanoi(n-1, C, B, A);
}
```

2. Derive the average time complexity of quick sort is  $O(1.38N * \log_2 N)$   
3. Find the return value and time complexity of the following function

```
Int unknown(int n){
    int i, j, k=0;
    for (i=n/2; i<=n; i++)
        for (j=2; j<=n; j=j*2)
            k = k + n/2;
    return (k);
}
```

4. Encode the following message using Huffman coding and find the percentage of compression to store the message;

a a b b b b a b c c d d d c c c c b d d

**Section: B (Answer all questions, each question carries 12 Marks) 5X 12M=60M**

5. Solve the following recurrence relation

a.  $T(n) = T(\sqrt{n}) + \log n$  (6 Marks)

b.  $T(n) = 4T(n/2) + n^2 \sqrt{2}$  (6 Marks)

6. Solve the following recurrence relation

$$t(n) = \begin{cases} n, & \text{if } n = 0, 1, \text{ or } 2 \\ 5t(n-1) - 8t(n-2) + 4t(n-3), & \text{otherwise} \end{cases}$$

7. What is an asymptotic notation? Explain the different types of asymptotic notations with an example
8. Write a quicksort recursive call binary tree for the following message; Q U I C K S O R T
9. Explain the Strassen's Matrix multiplication with an example

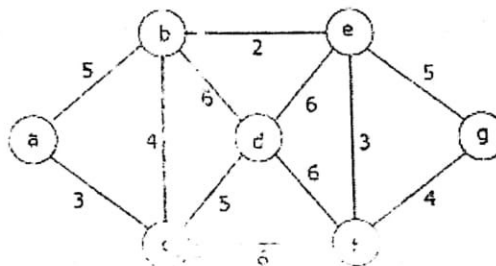
**Section: C (Answer the following question)**

**1X 20M=20M**

10. A). Explain the different stages of algorithms design process with flowchart (10 Marks)
- B). Solve the following recursive function using recursive tree method;  $t(n) = 4t\left(\frac{n}{2}\right) + n$  (10 Marks)

OR

- ✓ What is a spanning tree? Write an algorithm to construct minimum cost spanning tree using Prim's algorithm and construct the minimum cost spanning tree for the following graph.



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**UNIVERSITY OF PETROLEUM  
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Mid Semester Examination, October 2017

Program: B. Tech (CCVT)  
Subject (Course): Introduction to virtualization and Cloud Computing  
Course Code : CSIB 274  
No. of page/s: 01

Semester – III  
Max. Marks : 100  
Duration: 2 Hrs.

A) Attempt all question (Limited Words-50 words)

(4\*5=20 marks)

- 1) What is QEMU define its role.
- 2) What are the key issues in IT infrastructure and how these issues are solved through virtualization?
- 3) Explain the Role of Emulation and Isolation in virtualization briefly.
- 4) Which main components can be virtualized using VMware.

B) Attempt all question (Words limit 150 words max)

(12\*5=60 marks)

5) Explain Taxonomy of Virtualization Techniques define the process level and system level sub components of it.

- 6) What do you understand by instruction, kindly explain their types based on security rings and privileged mode.
- 7) Explain the role of ISA, ABI in different categories of Hypervisors with their architecture.
- 8) What are the criteria that need to be satisfied by the Virtual machine manager to efficiently support virtualization, and Explain the Hypervisor Reference Architecture?
- 9) Define a) Distributed Computing System b) Cloud Computing System and state its differences among them.

C) Attempt any one question

(1\*20=marks)

10) Design a Cloud Computing Architectural model for Cloud Reference.

11) Discuss

- a) Xen Architecture and Guest OS Management
- b) Hardware Virtualization Reference Model