**National University of Computer & Emerging Sciences, Karachi**
**Fall-2017 CS-Department**
**Quiz 1 (A)**
**12th September 2017, 12:00 pm – 12:20 pm**

| | |
|---|---|
| **Course Code:** CS302 | **Course Name:** Design and Analysis of Algorithm |
| **Instructor Name / Names:** Subhash Sagar | |
| **Student Roll No:** | **Section: D** |

**Time**: 20 minutes. **Max Marks**: 5 points

**Question 1:** Arrange the following functions in increasing order of growth rate: (**1.5 points**)

a) $\sqrt{n}$
b) $10^n$
c) $n^{1.5}$
d) $2^{\sqrt{logn}}$
e) $n^{\frac{5}{3}}$
f) $logn$

**Question 2:** Solve the recurrence using **Recurrence Tree** (**3.5 points**)

$$T(n) = T\left(\frac{n}{10}\right) + T\left(\frac{9n}{10}\right) + n$$

**National University of Computer & Emerging Sciences, Karachi**
**Fall-2017 CS-Department**
**Quiz 1 (B)**
**12th September 2017, 12:00 pm – 12:20 pm**

| | |
|---|---|
| **Course Code:** CS302 | **Course Name:** Design and Analysis of Algorithm |
| **Instructor Name / Names:** Subhash Sagar | |
| **Student Roll No:** | **Section: D** |

**Time**: 20 minutes. **Max Marks**: 5 points

**Question 1:** Whether each of the following are **True** or **False**? Justify your answer. (**1.5 points**)

a) $n^{1.5}$ + 10 n log n = O(n log n)
b) n log n + $\frac{n}{2}$ = Theta(n)
c) 10$\sqrt{n}$ + log n = O(n)
d) $\sqrt{n}$ + log n = O(log n)
e) 2$\sqrt{n}$ + log n = Theta($\sqrt{n}$)

**Question 2:** Solve the recurrence using **Recurrence Tree**. (**3.5 points**)

$$T(n) = T\left(\frac{n}{5}\right) + T\left(\frac{7n}{10}\right) + n$$

**National University of Computer & Emerging Sciences, Karachi**
**Fall-2017 CS-Department**
**Quiz 1 (A)**
**13th September 2017, 9:00 am – 9:20 am**

| | |
|---|---|
| **Course Code:** CS302 | **Course Name:** Design and Analysis of Algorithm |
| **Instructor Name / Names:** Subhash Sagar | |
| **Student Roll No:** | **Section: B** |

**Time**: 20 minutes. **Max Marks**: 5 points

**Question 1:** Is **T1(n) = O(T2(n))**?, Is **T1(n) = Omega(T2(n))**?, Is **T1(n) = Theta(T2(n))**? Justify your answer. (**1.5 points**)

a) **T1(n) = $6n^2$, T2(n) = $n^2 logn$**

b) **T1(n) = $\frac{3}{2}n^2$+ 7n -4, T2(n) = $8n^2$**

c) **T1(n) = $n^4$, T2(n) = $n^3 logn$**

**Question 2:** Solve the recurrence using **Recurrence Tree**. (**3.5 points**)

$$\mathbf{T\ (n) = T\ (\frac{n}{3}) + T\ (\frac{n}{5}) + n^2}$$

**National University of Computer & Emerging Sciences, Karachi**
**Fall-2017 CS-Department**
**Quiz 1 (B)**
**13th September 2017, 9:00 am – 9:20 am**

| | |
|---|---|
| **Course Code:** CS302 | **Course Name:** Design and Analysis of Algorithm |
| **Instructor Name / Names:** Subhash Sagar | |
| **Student Roll No:** | **Section: B** |

**Time**: 20 minutes. **Max Marks**: 5 points

**Question 1:** Use Master's Theorem to find the solution of the following recurrences. (**1.5 points**)

a) $\mathbf{T(n) = 10T(\frac{n}{5}) + n^2}$

b) $\mathbf{T(n) = 4T(\frac{n}{3}) + \sqrt{n}}$

c) $\mathbf{T(n) = T(\frac{n}{2}) + n}$

**Question 2:** Solve the recurrence using **Recurrence Tree** (**3.5 points**)

$$\mathbf{T(n) = 9T(\frac{n}{5}) + n}$$

**National University of Computer & Emerging Sciences, Karachi**
**Fall-2017 CS-Department**
**Quiz 1 (A)**
**14th September 2017, 1:00 pm – 1:20 pm**

| | |
|---|---|
| **Course Code:** CS302 | **Course Name:** Design and Analysis of Algorithm |
| **Instructor Name / Names:** Subhash Sagar | |
| **Student Roll No:** | **Section: E** |

**Time**: 20 minutes. **Max Marks**: 5 points

**Question 1:**

a) Use **Master's Theorem** to Solve (**1.5 points**)

$$\mathbf{T(n) = 2T\left(\frac{n}{2}\right) + \sqrt{n}}$$

$$\mathbf{T(n) = 10T\left(\frac{n}{3}\right) + n\,logn}$$

b) Solve the Asymptotic Notation $\boldsymbol{f(x) = x^3 + 2x + 3\ is\ O(x^3)}$

**Question 2:** Solve the recurrence using **Recurrence Tree** (**3.5 points**)

$$\mathbf{T(n) = T\left(\frac{n}{4}\right) + T\left(\frac{3n}{4}\right) + n}$$

**National University of Computer & Emerging Sciences, Karachi**
**Fall-2017 CS-Department**
**Quiz 1 (B)**
**14th September 2017, 1:00 pm – 1:20 pm**

| | |
|---|---|
| **Course Code:** CS302 | **Course Name:** Design and Analysis of Algorithm |
| **Instructor Name / Names:** Subhash Sagar | |
| **Student Roll No:** | **Section: E** |

**Time**: 20 minutes. **Max Marks**: 5 points

**Question 1:** Arrange the following functions in increasing order of growth rate: (**1.5 points**)

a) $\sqrt{n}$
b) $10^n$
c) $nlogn$
d) $2^{\sqrt{logn}}$
e) $2^{2n}$
f) $n!$

**Question 2:** Solve the recurrence using **Recurrence Tree**. (**3.5 points**)

$$T(n) = T\left(\frac{n}{5}\right) + T\left(\frac{n}{2}\right) + n^2$$