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MID TERM EXAMINATION

March-2024

COURSE CODE- 208 COURSE TITLE- Design and Analysis of Algorithm

Time-1:00 Hours

Max. Marks-25

**Note: Answer all questions. Write pseudo codes for all algorithms asked.
Assume suitable missing data, if any.**

Q1) (a) Solve the following recurrence relation using a suitable method

$$T(n) = \begin{cases} T(n^{1/7}), & n > 2 \\ 2, & n = 2 \end{cases}$$

(b) Solve the following recurrence relation using a suitable method

$$T(n) = \begin{cases} 2T(n/2) + n \log n, & n > 2 \\ 2, & n = 2 \end{cases}$$

(d) Find the time complexity of the following pseudocode

```
void fun(int n)
{
    for (int i = 0; i < n / 2; i++)
        for (int j = 1; j + n / 2 <= n; j++)
            for (int k = 1; k <= n; k = k * 2)
                printf("Hello");
}
```

[2+3+3=8M] [CO1]

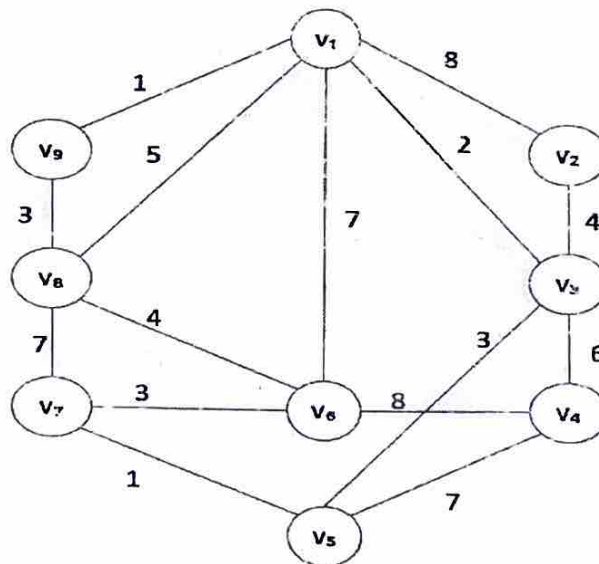
Q2 (a) The operation HEAP-INSERT (A , $item$) inserts the $item$ in a binary heap A containing n element. Propose an implementation of HEAP-INSERT that runs in $O(\log n)$ time for a max heap.

[3M][CO3]

(b) Write an efficient pseudocode to find the minimum and maximum elements in an array of size n using Divide and Conquer [4M][CO2]

(c) A long string consists of the four characters A, C, G, and T. They appear with frequency 31%, 20%, 9%, and 40%, respectively. What is the Huffman encoding of these four characters? [3M][CO3]

Q3. Find the minimum spanning tree of the given weighted graph using Prim's algorithm. Write all steps involved. Assume V_1 is the source vertex



[7M][CO3]