**PART 1**

Marks: 10 (2 marks each )

Find the time complexity of the below functions in Θ form. Write NA if the function does not

apply to any case.

a) T (n) = 3T (n/2) + n

**Solution**: This recurrence can be solved using **case 1** of **master-theorem** and the time complexity of T (n) = 3T (n/2) + n can be written as **T (n) = Θ(n lg 3 )**

b) T (n) = 64T (n/8) − n^2(log n)

**Solution**: we have a =64, b= 8, f(n)= -n^2(logn). Since the combination time i.e f(n)= -n^2(logn) is not positive , we can’t solve this recurrence using master’s theorm. (**NA**)

However, the time complexity can be achieved using Akra-Bazzi Method, but we can’t mention the solution as it’s instructed that the methods other than master theorem wouldn’t be accepted.

c) T (n) = 2nT (n/2) + n^n

**Solution**: Master Theorem can’t be applied here: ( ‘a’ is not constant) (**NA**)

d) T (n) = 3T (n/3) + n/2

**Solution**: Here case 2 of the master theorem can be applied and the time complexity can be written as **T (n) = Θ(n log n)**

e) T (n) = 7T (n/3) + n^2

**Solution**: Here case 3 of Master Theorem is applicable and the time complexity is:

**T (n) = Θ(n 2 )**