**Practice Assessment - Algorithms**

**PART – 1**

**Q: Find the time complexity of the below functions in Ɵ form. Write NA if the function does not apply to any case.**

1. **T(n) = 3T(n/2) + n**

Here a = 3; b= 2; d = 1

So, 3 > 21

i.e., a > (bd)

ANS- T(n) = Ɵ (n log 3) (Case 1)

NOTE: - If f(n) ϵ (nd), When d > = 0, then if a > (bd)

Then, T(n) = Ɵ (nlog a [base b])

1. **T(n) = 64T(n/8) – n2log n**

Here, we have founded negative function in f(n). (f(n)) = - n2logn

as, we know in limitations of master’s theorem we have Seen that f(n) should be positive function.

Hence cannot apply Masters theorem

ANS- N.A

1. **T(n) = 2nT(n/2) + nn**

Here, a = 2n; b = 2; d = n

In Masters theorem we have understood that “a must be a constant”. And in this problem, we have not founded “a” as constant.

Hence, cannot apply Masters theorem.

ANS – N.A

1. **T(n) = 3T(n/3) + n/2**

Here a = 3; b = 3; d = 1;

So, 3 = 31

i.e., a = bd

Case 2 says: - If f(n) ϵ (nd), When d > = 0, then if a = (bd)

T(n) = Ɵ (nd logn).

Hence, case 2 of Masters theorem applied here.

1. **T(n) = 7T(n/3) + n2**

Here, a = 7; b = 3; d = 2

So, 7 < 32

= 7 < 9 i.e., a < bd

Case 3 says: - If f(n) ϵ (nd), When d > = 0, then if a < (bd)

T(n) = Ɵ (n2).

Hence, case 3 of Masters theorem applied here.