GATE Computer Science Engineering Coaching by IGC

Algorithm Assignment – 1

Q1. $T(n) = 4T(n/2) + n^3$ then T(n) is equal to :- (T(n) denotes time complexity for size n)

a) $\Theta(n)$
b) $\Theta(n \log_2 n)$
c) $\Theta(n^2 \log_2 n)$
d) $\Theta(n^3)$

Q2. Solve the recurrence relation to find T(n), $T(n) = 4T(n/2) + n$:-

a) $\Theta(\log_2 n)$
b) $\Theta(n^2)$
c) $\Theta(n^2 \log_2 n)$
d) None of these

Q3. Solve $T(n) = 4T(n/2) + n^2$:-

a) $\Theta(n^2)$
b) $\Theta(n^2 \log_2 n)$
c) $\Theta(n \log_2 n)$
d) None of these

Q4. Solve $T(n) = 2T(n/2) + n^3$:-

a) $\Theta(n^3)$
b) $\Theta(n^3 \log_2 n)$
c) $\Theta(n \log_2 n)$
d) None of these

Q5. Solve $T(n) = 16T(n/4) + n^2$:-

a) $\Theta(n \log_2 n)$
b) $\Theta(n^2 \log_2 n)$
c) $\Theta(n^2)$
d) None of these

Q6. Consider the following statements :-

1. An algorithm is a no. of steps to be performed to solve a problem.
2. An algorithm is a no. of steps as well as the implementation using any language to a given problem.
3. To a given problem there may be more than one Algorithm.

Which of the following is True ?

a) 1 is correct
b) 2 is correct

c) 1 and 3 are correct
d) 2 and 3 are correct

Q7. Which one of the following is True ?

1. $a*n = o(n^2)$ (small oh), $a > 0$
2. $a*n^2 = O(n^2)$ (Big oh), $a > 0$
3. $a*n^2 != o(n^2)$ (small oh), $a > 0$

a) Only 1 and 2 are correct
b) Only 1 is correct
c) 1 and 3 are correct
d) All are correct

Q8. $f(n) = 3n^2 + 4n + 2$
Which will be the exact value for f(n)
a) $\Theta(n^2)$
b) $o(n^2)$
c) $O(n^2)$
d) $\Omega(n^2)$

Q9. f(n) = O(g(n)) If and only if
a) g(n) = O(f(n))
b) $g(n) = \omega(f(n))$
c) $g(n) = \Omega(f(n))$
d) None of these

Q10. f(n) = o(g(n)) If and only if
a) $g(n) = \Omega(f(n))$
b) $g(n) = \omega(f(n))$
c) Both (a) and (b)
d) None of these

Q11. T(n) = (n + 1) + T(n + 1). Then T(n) is equal to
a) $o(n \log_2 n)$
b) $o(\log_2 n)$
c) $O(n^2)$
d) None of these

Q12. T(n) = T(2n/3) + 1 then T(n) is equal to
a) $\Theta(\log_2 n)$
b) $\Theta(n \log_2 n)$
c) $\Theta(n^2)$

d) Θ(n)

Q13. Which of the following is not correct ?

a) f(n) = O(f(n))
b) c * f(n) = O(f(n)) for a constant c
c) O(f(n) + g(n)) = o(g(n) + f(n))
d) $O[f(n)^2] = [O(f(n))]^2$

Q14. High level languages are not concerned with the computers but with

a) Problems
b) Machine code
c) Assembler
d) Compiler

Q15. The postfix expression for the infix expression (A + B * (C + D))/(F + D * E) is

a) (AB+CD+*F)/D+E*
b) (ABCD*+F)/(+DE*+)
c) (A*B+CD)/F*DE++
d) None of these

Q16. The time complexity for evaluating a postfix expression is

a) O(n)
b) $O(n \log_2 n)$
c) $O(\log_2 n)$
d) $O(n^2)$

Q17. Preorder of A * (B + C)/D - G

a) -*A/+BCDG
b) *+AB/C-DG
c) *A+BC/-DG
d) None of these

Common data for Q 18. And Q 19.

```
void x (int A [], int n)
{
   int i, j;
   for (i = 0; i < n; i++)
   {
      j = n - 1;
      while (j > i)
      {
```

```
            swap (A[j], A[j-1]);
            j--;
        }
    }
}
```

Q18. What will be the time complexity of the above algorithm ?

a) O(n)
b) $O(n^2)$
c) $O(n \log_2 n)$
d) $O(n^3)$

Q19. If the array is in sorted order the time complexity will be

a) Θ(n)
b) $O(n^2)$
c) $O(n \log_2 n)$
d) $O(\log_2 n)$

Q20. What will be the time complexity of the following algorithm ?

```
long Fib(const unsigned int N)
{
   If (N < = 1) return 1;
   else return (Fib(n - 1) + Fib(n - 2));
}
```

a) $O(n^2)$
b) $O(n^3)$
c) $O(n^2 \log_2 n)$
d) $O(c^n)$ where c is a constant

Answers :-

1. D
2. B
3. B
4. A
5. B
6. C
7. D
8. A

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9. C
10. B
11. C
12. A
13. C
14. A
15. D
16. B
17. A
18. B
19. B
20. D