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Quiz (10)

1 2 3 4 5 6 7 8 9 10

QUESTION 10

5 marks

When $n = 2^{2k}$ for some $k \geq 0$, the recurrence relation
$T(n) = \sqrt{(2)}\, T(n/2) + \sqrt{n}$, $T(1) = 1$
evaluates to :

- √(n) (log n + 1)
- √(n) (log n)
- √(n) log √(n)
- n log √(n)

Your submitted response was correct.

Explanation

Please note that the question is asking about exact solution. Master theorem provides results in the form of asymptotic notations. So we can't apply Master theorem here. We can solve this recurrence using simple expansion or recurrence tree method.

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T(n) = √(2) T(n/2) + √n

     = √(2) [√(2) T(n/4) + √(n/2) ] + √n

     = 2 T(n/4) + √2 √(n/2) +√n

     = 2[ √2 T(n/8) + √(n/4) ]+√2 √(n/2)+√n

     = √(2^3) T(n/8)+ 2 √(n/4) + √2 √(n/2) +√n

     = √(2^3) T(n/8)+√n +√n +√n

     = √(2^3) T(n/(2^3))+3√n

     .............................................

     = √(2^k) T(n/(2^k))+k√n

     = √(2^logn) + logn √n

     = √n + logn √n

     = √n(logn +1)
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Alternate Solution : This question can be easily done by substitution method look: T(1)= 1; GIVEN. Now use n=2 in the given recurrence relation which gives 2*(1.414) (since value of root over 2 is 1.414) now by looking at the options use n=2 which satisfies option A.

8 Correct 2 Wrong 0 Unanswered

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