University of Mumbai

Examination 2020 under cluster 4 (PCE)

Program: BE Information Technology
Curriculum Scheme: Rev 2016
Examination: Third Year Semester V
Course Code: ITDLO5011 and Course Name: Advanced Data Structures & Analysis of Algorithms

Time: 1 hour Max. Marks: 50

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Note to the students:- All the Questions are compulsory and carry equal marks .

Q1.	What is the result of the recurrences which fall under third case of Master's theorem (let the recurrence be given by $T(n)=aT(n/b)+f(n)$ and $f(n)=n^c$?
Option A:	$T(n) = O(n\log_b a)$
Option B:	$T(n) = O(n^c \log n)$
Option C:	$T(n) = O(f(n))$
Option D:	$T(n) = O(n^2)$
Q2.	Master's theorem is used for?
Option A:	Solving recurrences
Option B:	Solving iterative relations
Option C:	Analyzing loops
Option D:	Calculating the time complexity of any code
Q3.	Solve the following recurrence using Master's theorem. $T(n) = 16T (n/4) + n$
Option A:	$T(n) = O(n)$
Option B:	$T(n) = O(\log n)$
Option C:	$T(n) = O(n^2 \log n)$
Option D:	$T(n) = O(n^2)$
Q4.	What is the maximum height of an AVL tree with p nodes?
Option A:	p
Option B:	log(p)
Option C:	log(p)/2
Option D:	p⁄2
Q5.	What is an AVL tree?
Option A:	a tree which is balanced and is a height balanced tree
Option B:	a tree which is unbalanced and is a height balanced tree
Option C:	a tree with three children
Option D:	a tree with atmost 3 children
Q6.	Quick sort uses which of the following technique to implement sorting?
Option A:	backtracking
Option B:	greedy algorithm
Option C:	divide and conquer
Option D:	dynamic programming
Q7.	What is the worst case time complexity of a Merge sort algorithm?
Option A:	O(N)

Option B:	O(N log N)
Option C:	$O(N^2)$
Option D:	O(log N)
Q8.	Suppose we are sorting an array of eight integers using quick sort, and we have just finished the first partitioning with the array looking like this: 2 5 1 7 9 12 11 10 Which statement is correct?
Option A:	The pivot could be either the 7 or the 9.
Option B:	The pivot could be the 7, but it is not the 9
Option C:	The pivot is not the 7, but it could be the 9
Option D:	10 is the pivot.
Q9.	Consider a complete graph G with 4 vertices. The graph G has ____ spanning trees.
Option A:	15
Option B:	8
Option C:	16
Option D:	13
Q10.	Given items as {value,weight} pairs {{60,20},{50,25},{20,5}}. The capacity of knapsack=40. Find the maximum value output assuming items to be divisible and nondivisible respectively.
Option A:	100, 80
Option B:	110, 70
Option C:	130, 110
Option D:	110, 80
Q11.	Which of the following is false about the Kruskal's algorithm?
Option A:	It is a greedy algorithm
Option B:	It constructs MST by selecting edges in increasing order of their weights
Option C:	It can accept cycles in the MST
Option D:	It uses union-find data structure
Q12.	Which of the following problem is solved using dynamic programming?
Option A:	0/1 knapsack problem
Option B:	Stressens Matrix Multiplication
Option C:	Quicksort
Option D:	Fractional knapsack problem
Q13.	You are given a knapsack that can carry a maximum weight of 60.There are 4 items with weights {20, 30, 40, 70} and values {70, 80, 90, 200}. What is the maximum value of the items you can carry using the knapsack?
Option A:	160
Option B:	200
Option C:	170
Option D:	90

Q14.	The Knapsack problem is an example of _____
Option A:	Greedy algorithm
Option B:	2D dynamic programming
Option C:	1D dynamic programming
Option D:	Divide and conquer
Q15.	Suppose you have coins of denominations 1,3 and 4. You use a greedy algorithm, in which you choose the largest denomination coin which is not greater than the remaining sum. For which of the following sums, will the algorithm produce an optimal answer?
Option A:	14
Option B:	10
Option C:	6
Option D:	100
Q16.	Consider the matrices P, Q and R which are 10 x 20, 20 x 30 and 30 x 40 matrices respectively. What is the minimum number of multiplications required to multiply the three matrices?
Option A:	18000
Option B:	12000
Option C:	24000
Option D:	32000
Q17.	Problems that cannot be solved in polynomial time are known as?
Option A:	intractable
Option B:	tractable
Option C:	decision
Option D:	complete
Q18.	To which of the following class does a CNF-satisfiability problem belong?
Option A:	NP class
Option B:	P class
Option C:	NP complete
Option D:	NP hard
Q19.	The OBST algorithm in worst case takes _____time if all c(i,j)'s and r(i,j)'s are calculated
Option A:	O(log n)
Option B:	$O(n^4)$
Option C:	$O(n^3)$
Option D:	O(nlog n)
Q20.	Consider the strings “QRSTPQRS” and “PRATPBRQRP”. What longest common subsequence?
Option A:	RSTP
Option B:	RTQPST
Option C:	RTPQR
Option D:	RSQT

Q21.	What is the worst case time complexity of KMP algorithm for pattern searching (m = length of text, n = length of pattern)?
Option A:	O(n)
Option B:	O(n*m)
Option C:	O(m)
Option D:	O(log n)
Q22.	What is length of the longest common subsequence between the strings “hbcfgmnapq” and “cbhgrsfnmq” ?
Option A:	4
Option B:	3
Option C:	7
Option D:	5
Q23.	Genetic Algorithm is _____inspired algorithm
Option A:	Nature
Option B:	Machine
Option C:	Robot
Option D:	Animal
Q24.	If modulo value (q) is taken large in Rabin Karp what will happen?
Option A:	Complexity increases
Option B:	Spurious hits occur frequently
Option C:	Cost of extra checking is low
Option D:	Matching time increases
Q25.	In roulette wheel selection individuals are selected with following criteria
Option A:	Best Fitness value
Option B:	First fitness value
Option C:	random
Option D:	Last fitness value

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Question	Correct Option
Q1.	C
Q2.	A
Q3.	D
Q4	B
Q5	A
Q6	C
Q7	B
Q8.	A
Q9.	C
Q10.	D
Q11.	C
Q12.	A
Q13.	A
Q14.	B
Q15.	D
Q16.	A
Q17.	A
Q18.	C
Q19.	C
Q20.	C
Q21.	C
Q22.	D
Q23.	A
Q24.	C
Q25.	C