

Examinations Commencing from 7<sup>th</sup> January 2021 to 20<sup>th</sup> January 2021

Program: Computer Engineering

Curriculum Scheme: Rev2016

Examination: TE Semester V

Course Code: CSDLO5013 and Course Name: Advanced Algorithm

Time: 2 hour

Max. Marks: 80

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R16\_Comp\_V\_Advanced Algorithm\_Sample QP

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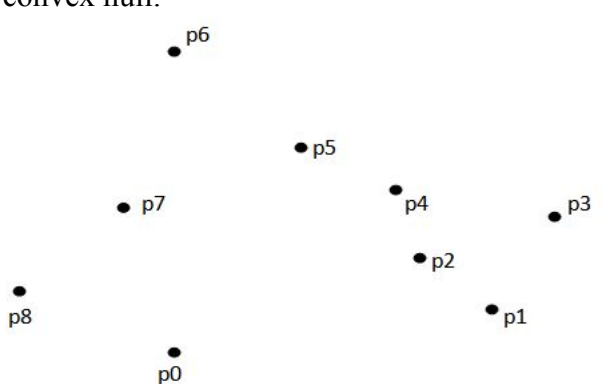
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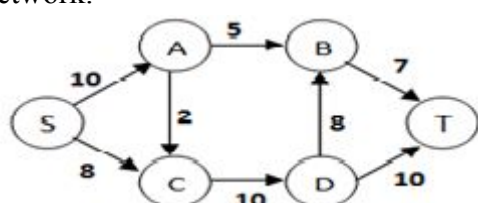
Q1.	Choose the correct option for following questions. All the Questions are compulsory and carry equal marks
1.	Which of the following are the types of amortized analysis?
Option A:	Potential, Accounting, Integration
Option B:	Aggregate , Potential, Integration
Option C:	Aggregate , Accounting, Integration
Option D:	Potential, Accounting, Aggregate
2.	Select binomial-heap property from following options.
Option A:	All trees must have same nodes.
Option B:	Roots of binomial trees are linked in decreasing degree.
Option C:	Order of degree is not important.
Option D:	Roots of binomial trees are linked in increasing degree
3.	Apply master's method to solve the given recurrence: $T(n)=3T(n/4) + n \log n$
Option A:	$T(n)=\Theta(n^2)$
Option B:	$T(n)=\Theta(\log n)$
Option C:	$T(n)=\Theta(n)$
Option D:	$T(n)=\Theta(n \log n)$
4.	Which of the following variable provides a convenient method for converting between probabilities and expectations?
Option A:	Indicator variable
Option B:	Random variable
Option C:	Indicator random variable
Option D:	Temporary variable

5.	The worst case of the hiring problem involves
Option A:	hiring a single candidate
Option B:	hiring few candidates
Option C:	hiring no candidate
Option D:	hiring every candidate
6.	Decreasing a key algorithm of binomial heap performs which operation?
Option A:	Replaces the existing key value with given smaller value.
Option B:	Replaces the existing key value with given larger value.
Option C:	Replaces the existing key value from root list.
Option D:	Deleting node from given binomial heap.
7.	Number of black nodes on any path from the node to leaf is -----of that node.
Option A:	Black Height
Option B:	Black Depth
Option C:	Red Height
Option D:	Red Depth
8.	What will be the function $f(n)$ if level sum cost in every level of the recursion tree is geometrically increasing?
Option A:	Level sum of first level
Option B:	Level sum of last level
Option C:	Level sum of middle level multiplied by number of levels
Option D:	Level sum of each level multiplied by number of levels
9.	Which of the following statements about red-black tree is false?
Option A:	It is a binary tree.
Option B:	The root is black.
Option C:	Every leaf (NIL) is black.
Option D:	The root is red.
10.	Recognize order of given binomial tree.
Option A:	B[3]
Option B:	B[4]

Option C:	B[5]
Option D:	B[6]
11.	The flow from vertex $u$ to vertex $v$ is the negative of the flow in reverse direction" is called as
Option A:	Capacity constraint
Option B:	Skew Symmetry
Option C:	Flow conservation property
Option D:	Residual Capacity
12.	Algorithm PUSH( $u, v$ ) is applicable if,
Option A:	$v$ is overflowing, $cf(u, v) > 0$ , and $h[u] = h[v] + 1$
Option B:	$u$ is overflowing, $cf(v, u) > 0$ , and $h[u] = h[v] + 1$
Option C:	$u$ is overflowing, $cf(u, v) > 0$ , and $h[u] = h[v] + 1$
Option D:	$u$ is overflowing, $cf(u, v) > 0$ , and $h[v] = h[u] + 1$
13.	An augmenting path is a:
Option A:	simple cyclic path between source and sink which pass through only positive weighted edges.
Option B:	simple acyclic path between source and sink which pass through only positive weighted edges.
Option C:	simple cyclic path between source and sink which pass through only negative weighted edges.
Option D:	simple acyclic path between source and sink which pass through only negative weighted edges.
14.	Find the net flow across the cut in the given figure A.
<p>Fig. A cut(<math>S, T</math>) in flow network</p>	
Option A:	21
Option B:	19
Option C:	7
Option D:	5

15.	The algorithm which uses a technique of package wrapping to compute the convex hull is known as
Option A:	Incremental method
Option B:	Divide and conquer method
Option C:	Graham scan method
Option D:	Jarvis's March method
16.	The time complexity of convex hull is
Option A:	$O(n)$
Option B:	$O(\log n)$
Option C:	$O(n \log n)$
Option D:	$O(n^2)$
17.	If the cross product between vector $p_1$ and vector $p_2$ ( $p_1 \times p_2$ ) is positive, then
Option A:	Vector $p_1$ is counterclockwise from vector $p_2$ with respect to the origin $(0,0)$ .
Option B:	Vector $p_1$ is clockwise from vector $p_2$ with respect to the origin $(0,0)$ .
Option C:	The boundary condition arises.
Option D:	It can be concluded that cross product is wrong.
18.	Minimum Vertex Cover problem belongs to which of the class?
Option A:	P
Option B:	NP
Option C:	Linear
Option D:	Dynamic
19.	Extra bit in red black tree is for _____
Option A:	Address
Option B:	Height
Option C:	Index
Option D:	Color
20.	Those problems are solvable in polynomial time?
Option A:	P
Option B:	NP
Option C:	NP Complete
Option D:	NP Hard

<b>Q2</b> <b>(20 Marks)</b>	<b>Solve any Four out of Six</b>	<b>5 marks each</b>
A	Give amortized analysis by aggregate analysis method for the working of binary 4-bit counter.	
B	Explain a hiring problem.	
C	Solve the given recurrence by recursion tree method to find asymptotic bound. $T(n) = 2T(n/4) + n^2$	
D	Write Relabel-to-front algorithm.	
E	Apply Graham Scan algorithm to identify the set of points required to form a convex hull. 	
F	Write an algorithm for Extracting the node with the minimum key in Binomial Heap.	

<b>Q3.</b> <b>(20 Marks)</b>	<b>Solve any Two Questions out of Three</b>	<b>10 marks each</b>
A	Apply Ford Fulkerson algorithm to find maximum flow for the given flow network. 	
B	Construct binomial heap with keys <b>2,4,17,1,8,15,20</b> .	
C	Show Red-Black tree after inserting keys 5,10,15,25,30,35	