****

**KIIT Deemed to be University**

**Online Mid Semester Examination (Spring Semester-2022)**

**Subject Name & Code:** **DAA/CS2012**, **Applicable to Courses: 4th B. Tech(Repeat Mid sem)**

**Full Marks=20** **Time: 1 Hour**

**SECTION-A (Answer All Questions. All questions carry 2 Marks)**

**Time:20 Minutes (5×2=10 Marks)**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Question No** | **Question Type** | **Question** | **Answer Key** | **CO Mapping** |
| **Q. No:1(a)** | **MCQ** | Which of the following is correct?  a)f(n)=O(g(n)) iff g(n)=O(f(n))  b) f(n)=Ω(g(n)) iff g(n)=Ω(f(n))  c) f(n)=θ(g(n)) iff g(n)=θ(f(n))  d) None of these | c |  |
|  | **MCQ** | Which of the following is correct?  a) f(n)=O(g(n)) iff g(n)=Ω(f(n))  b) f(n)=O(g(n)) iff g(n)=θ(f(n))  c) f(n)=O(g(n)) iff g(n)=o(f(n))  d) f(n)=O(g(n)) iff g(n)=ω(f(n)) | a |  |
|  | **MCQ** | what is the solution for the recurrence relation T(m)= T(3m/4) +1?  a) θ(log m)  b) θ(m)  c) θ(m log m)  d) θ(log log m) | a |  |
|  | **MCQ** | Let f(n)=n2 log n and g(n)=n(log n)10 be two positive functions of n. Which of the following statements is correct?    a) f(n)=O(g(n)) and g(n)≠O(f(n))  b) g(n)=O(f(n)) and f(n)≠O(g(n))  c) f(n)≠O(g(n)) and g(n)≠O(f(n))  d) f(n)=O(g(n)) and g(n)=O(f(n)) | b |  |
| **Q. No:1(b)** | **MCQ** | Consider a job sequencing problem where the four jobs { j1,j2,j3,j4 } have a profit of {10,30,60,40} and corresponding deadlines { 2,3,1,3}. Which one of the following sequences of jobs is the optimal solution?  a) {j3,j4,j2}  b) {j3,j1,j4}  c) {j3,j1,j2}  d) {j3,j4,j2} | b |  |
|  | **MCQ** | Consider a job sequencing problem where the four jobs { j1,j2,j3,j4 } have a profit of {40,30,50,60} and corresponding deadlines { 2,3,1,3}. Which one of the following sequences of jobs is the optimal solution?  a) {j3,j4,j2}  b) {j3,j1,j4}  c) {j3,j1,j2}  d) {j3,j4,j2} | b |  |
|  | **MCQ** | Consider a job sequencing problem where the four jobs { j1,j2,j3,j4,j5 } have a profit of {20,30,40,60,50} and corresponding deadlines { 1,2,3,1,3}. Which one of the following sequences of jobs is the optimal solution?  a) {j4,j3,j5}  b) {j4,j2,j5}  c) {j5,j1,j2}  d) {j5,j4,j2} | b |  |
|  | **MCQ** | Consider a job sequencing problem where the four jobs { j1,j2,j3,j4,j5 } have a profit of {20,30,40,60,50} and corresponding deadlines { 3,3,2,2,1}. Which one of the following sequences of jobs is the optimal solution?  a) {j5,j4,j2}  b) {j5,j2,j3}  c) {j4,j1,j2}  d) {j4,j4,j2} | a |  |
| **Q. No:1(c)** | **MCQ** | In fractional knapsack n=3, K=6, (w1,w2,w3)=(3,4,5), (p1,p2,p3)=(2,3,6). The profit gain is \_\_\_\_\_\_\_  a) 6.75  b) 6.66  c) 6.50  d) 6.25 | a |  |
|  | **MCQ** | In fractional knapsack n=3, K=6, (w1,w2,w3)=(4,3,2), (p1,p2,p3)=(1,2,4). The profit gain is \_\_\_\_\_\_\_  a) 6.75  b) 6.66  c) 6.50  d) 6.25 | d |  |
|  | **MCQ** | In fractional knapsack n=3, K=7, (w1,w2,w3)=(4,3,2), (p1,p2,p3)=(1,2,4). The profit gain is \_\_\_\_\_\_\_  a) 6.75  b) 6.66  c) 6.50  d) 6.25 | c |  |
|  | **MCQ** | In fractional knapsack n=3, K=6, (w1,w2,w3)=(3,3,2), (p1,p2,p3)=(1,2,4). The profit gain is \_\_\_\_\_\_\_  a) 6.75  b) 6.66  c) 6.33  d) 6.25 | d |  |
| **Q. No:1(d)** | **MCQ** | If a problem can be solved by combining optimal solutions to non-overlapping problems, the strategy is called \_\_\_\_\_\_\_  a) Dynamic programming  b) Greedy  c) Divide and conquer  d) Recursion | c |  |
|  | **MCQ** | When dynamic programming is applied to a problem, it takes far less time as compared to other methods that don’t take advantage of overlapping subproblems.  a) True  b) False  c) Cannot be said | a |  |
|  | **MCQ** | A greedy algorithm can be used to solve all the dynamic programming problems.  a) True  b) False  c) Cannot be said | b |  |
|  | **MCQ** | In dynamic programming, the technique of storing the previously calculated values is called \_\_\_\_\_\_\_\_\_\_\_  a) Saving value property  b) Memorization  c) Mapping  d) Recursion | b |  |
| **Q. No:1(e)** | **MCQ** | Which of the given options provides the increasing order of asymptotic complexity of functions f1, f2, f3 and f4?  f1(n) = 2^n  f2(n) = n^(3/2)  f3(n) = n Log n  f4(n) = n^(Log n)  a) f3, f2, f4, f1  b) f3, f2, f1, f4  c) f2, f3, f1, f4  d) f2, f3, f4, f1 | a |  |
|  | **MCQ** | Which is the safest method to choose a pivot element?  a) choosing a random element as pivot  b) choosing the first element as pivot  c) choosing the last element as pivot  d) median-of-three partitioning method | a |  |
|  | **MCQ** | To verify whether a function grows faster or slower than the other function, we have some asymptotic or mathematical notations, which is\_\_\_\_\_\_\_\_\_.  a) Big Omega Ω (f)  b) Big Theta θ (f)  c) Big Oh O (f)  d) All of the above | d |  |
|  | **MCQ** | The worst-Case running times of Insertion Sort, Merge Sort and Quick Sort respectively are  a) O(n2),O(n log n), O(n2)  b) O(n2),O(n log n), O(n log n)  c) O(n log n), O(n2), O(n2)  d) O(n log n), O(n log n), O(n2) | a |  |

**SECTION-B(Answer Any One Question. Each Question carries 10 Marks)**

**Time: 30 Minutes** **(1×10=10 Marks)**

|  |  |  |
| --- | --- | --- |
| **Question No** | **Question** | **CO Mapping** |
| **Q. No:2** | (i) Write the general procedure of dynamic programming.  (ii) Solve the recurrence relation:-    (iii) Construct the Huffman’s tree for the following data and obtain its Huffman code.  Let {a/119,m/96,c/247,g/283,h/72,f/77,k/92,j/19}, be the letters and its frequency |  |
| **Q. No:3** | (i) What are the steps required to develop a greedy algorithm?  (ii) Solve the following recurrence relation:-    (iii) Construct the Huffman’s tree for the following data and obtain its Huffman code.  Let {a/98,m/120,c/75,g/90,h/50,f/18,k/97,j/99}, be the letters and its frequency |  |
| **Q. No:4** | (i) What does dynamic programming have in common with divide-and-Conquer? Justify with an example.  (ii) Solve the following recurrence relation:-    (iii) Construct the Huffman’s tree for the following data and obtain its Huffman code.  Let {a/79,m/18,c/47,g/83,h/92,f/301,k/62,j/89}, be the letters and its frequency |  |
| **Q. No:5** | (i) Explain quick sort algorithm and simulate it for the following data 20, 35, 10, 16, 54, 21, 25.  (ii) Solve the following matrix chain multiplication using dynamic programming:-  P<5,7,8,9,12,11>. |  |
| **Q. No:6** | (i) Explain quick sort algorithm and simulate it for following data sequence:  3, 5, 9, 7, 1, 4, 6, 8, 2  (ii) Solve the following matrix chain multiplication using dynamic programming:-  P<6,9,10,11,12,8>. |  |
| **Q. No:7** | (i) Explain quick sort algorithm and simulate it for following data sequence: 8, 2, 1, 5, 9, 6, 7, 4, 3  (ii) Solve the following matrix chain multiplication using dynamic programming:-  P<8,5,9,15,10,7>. |  |

**Controller of Examinations**