SANT GADGE BABA AMRAVATI UNIVERSITY, AMRAVATI
Hanuman Vyayam Prasarak Mandals's
College of Engineering & Technology, Amravati
Course: Information Technology
BE Four year Semester (Information technology) Summer 2020 Exam
Subject:4IT01 Data structures and Algorithms
Assignment for ONLY BACKLOG STUDENTS

Instructions

1) **Solve ANY TWO Questions**
2) **Each Question Carries 10 marks**

Q I) Solve the following

1) Consider a text string T=$(abcde)^5$. Determine the number of comparisons required to find the index I of the following pattern strings in the text T

i) P=abcde ii)p=cde iii) P=eabcd iv) P=ijkf [2M]

2) Prove the identity 1+2+3+------+n=n(n+1)/2 [2M]

3) Let J and K be in integers and suppose Q(J. K) is recursively defined by

Q(J. K) = 5 if J<K

= Q(J-K ,K+2)+ J if J >=K

Find Q(2, 7) Q(5, 3) [2M]

4) Define Stack and Queue [1M]

5) Explain Inorder ,Preorder and Post order [1M]

6) Apply Selection sort to the following numbers
45,23,56,78,11,33,59 [2M]

QII) Solve the following

1) Consider pattern P =aaabb. Construct the table and the corresponding labeled directed graph used in the "fast" pattern matching algorithm. [2M]
2) Consider the following multidimensional array:X(-5:5,3:33) Y(3:10,1:15,10:20)
   i) Find the length of each dimension and the number of elements in X and Y
   ii) Suppose Base(Y)=400 and there are 4 words per memory location.find the effective indices E1,E2,E3 and the address of Y(5,10,15) by Row-major order and coloumn major order. [2M]
3) Define Doubly Linked list [2M]

4) Consider the following stack, where STACK is allocated N=4 memory cells :
STACK : AAA, BBB,___,____
Describe the stack as the following operations take place :
i) POP (STACK. ITEM)
ii) POP (STACK, ITEM)
iii) PUSH (STACK. EEE)
iv) POP (STACK, ITEM) [2M]

5) Define Full Binary tree with example [1M]

6) Apply Insertion sort to the following numbers
33,55,11,22,77,88,99,44,66 [1M]

QIII) Solve the following

1) Consider a text string $T=(abc)^5$. Determine the number of comparisons required to find the index I of the following pattern strings in the text T
   i) P=cde ii) p=cab [2M]
2) What is Pointer array?What is Need of pointer array?Expalin with example. [2M]
3) Discuss the advantages, if any, of two-way list over a one-way list for each of the following operations :
   i) Traversing the list to process each node
   ii) deleting a node whose location LOC is given
   iii) Searching an unsorted list for a given element ITEM.
   iv) Searching a sorted list for a given element ITEM. [2M]
4) Consider the following stack, where STACK is allocated N=4 memory cells :
   STACK : AAA, BBB,___,___
   Describe the stack as the following operations take place :
   i) PUSH (STACK, GGG)
   ii) PUSH (STACK, HHH) [2M]
5) Explain WARSHALL'S Algorithm [1M]
6) Apply Merge Sort to the following numbers
   22,33,56,77,11,24,68,34,91,12 [1M]

QIV) Solve the following

1) Let S and T be a character array variable such that
   S= "WE THE PEOPLE" and T="OF THE UNITED STATES" Find
   I. Length of T and length of S
   II. INDEX (S,'E')
   III. INDEX(T,'THEN')
   IV. SUBSTRING(S,4,10)||'ARE'||SUBSTRING (T,8,6) [2M]

2) Using the Bubble sort algorithm,Find the number C of comparisons and the number D of interchanges which alphabetized the letters PEOPLE. [2M]

3) Write an algorithm to insert ITEM after a given node. [2M]

4) Consider the following arithmetic infix expression Q :
Q: A+(B*C – (D / E ↑ F) * G) *H)
Use algorithm to transform Q into its equivalent postfix expression p. [2M]

5) Define Binary tree and Strictly Binary tree [1M]

6) Define Graph and Degree of Graph [1M]