SDM COLLEGE OF ENGINEERING & TECHNOLOGY, DHARWAD

Department of Computer Science and Engineering

Internal Assessment - 1

Course. Title & Code : Data Structures and Applications (22UCSC300)
Semester : III (A & B) Date : 06-11-2023
Max. Marks : 20 Duration : 1 Hr.
Course Teachers : Prof. Sandhya S V & Prof. Dr. J C Karur Time: 4.00pm – 5.00pm

Note: 1. Answer any one question from Q1 and Q2. Q3 is compulsory.
2. Write programs using modular approach.

Q.No. 1.a) Write an algorithm to check whether the given infix parenthesized expression is balanced parenthesis or not. Show the content of stack after each input character is read, for the expressions given below.

i. {a+(b−d)/[c*e]}
ii. ((x*(y/z)-[p^q]} **[Marks:5, CO1]**

b) Show how to implement a queue of integers using an array q[10], where q[0] is used to indicate the front of the queue, q[1] is used to indicate its rear and q[2] through q[9] are used to contain queue elements. Also, show how to initialize such an array to represent empty queue and write routines dequeue, enqueue and empty for such an implementation. **[Marks:5, CO2]**

Q.No. 2. a) The Greatest Common Divisor of two integers x and y is defined as follows,

$gcd(x,y)=y$ *if(y<=x && x%y==0)*
$gcd(x,y) = gcd(y,x)$ *if(x<y)*
$gcd(x,y) = gcd(y,x\%y)$ *otherwise.*

Write a recursive C function to compute *gcd(x,y)*. Also find for how many times the recursive function is called for the values of gcd (20,75). **[Marks:4M+1M, CO1]**

b) In a bank, the customers entering for the cash transactions are made to sit in a row of chairs. Every customer entering for the transaction gets a token and he/she sits on a chair beside the customer at the tail end. The customer who is sitting at the initial chair in that row will be called for the transaction and is the first to leave the chair. Write pseudocode to simulate this scenario. **[Marks:5, CO2]**

Q.No.

3.a) Perform the following operations as mentioned:

i. Convert Infix to postfix ((A + B) * C - (D – E)) $ (F + G)

ii. Convert Infix to prefix A $ B * C – D + E / F / G / (G + H)

iii. Convert Prefix to postfix - A / B * C $ D E

iv. Convert Postfix to infix A B C D E - + $ * E F * - **[Marks:5, CO1]**

v. Evaluate the expression. A B C + * C B A - + * , assume A=1,B=2,C=3

b) Write a C routines for the implementation of an ascending priority queue with following operations:

pqinsert ( )

pqmindelete ( )

pqempty ( ) **[Marks:5, CO2]**