Department of Computer Science and Telecommunication Engineering

Course: Numerical Analysis CT-2 Course Code: CSTE-1203

Total mark: 25 Time: 40 min

1.	a)	Extract the equation for Simpson's 1/3 rules.	6
	b)	Find the value of the function corresponding to $x = 4$ using Lagrange's interpolation formula from the following set of data:	6

x:	2	3	5	8	12
$f(x)$:	10	15	25	40	60

2.	a)	Find LU factorization for $\begin{bmatrix} 1 & 2 & 3 \\ 2 & 3 & 1 \\ -2 & 3 & -2 \end{bmatrix}$	6
	b)	Use the trapezoidal rule to numerically integrate $f(x) = 0.2 + 25x + 3x^2$ from $a = 0$ to $b = 2$ with $h = 0.25$.	7

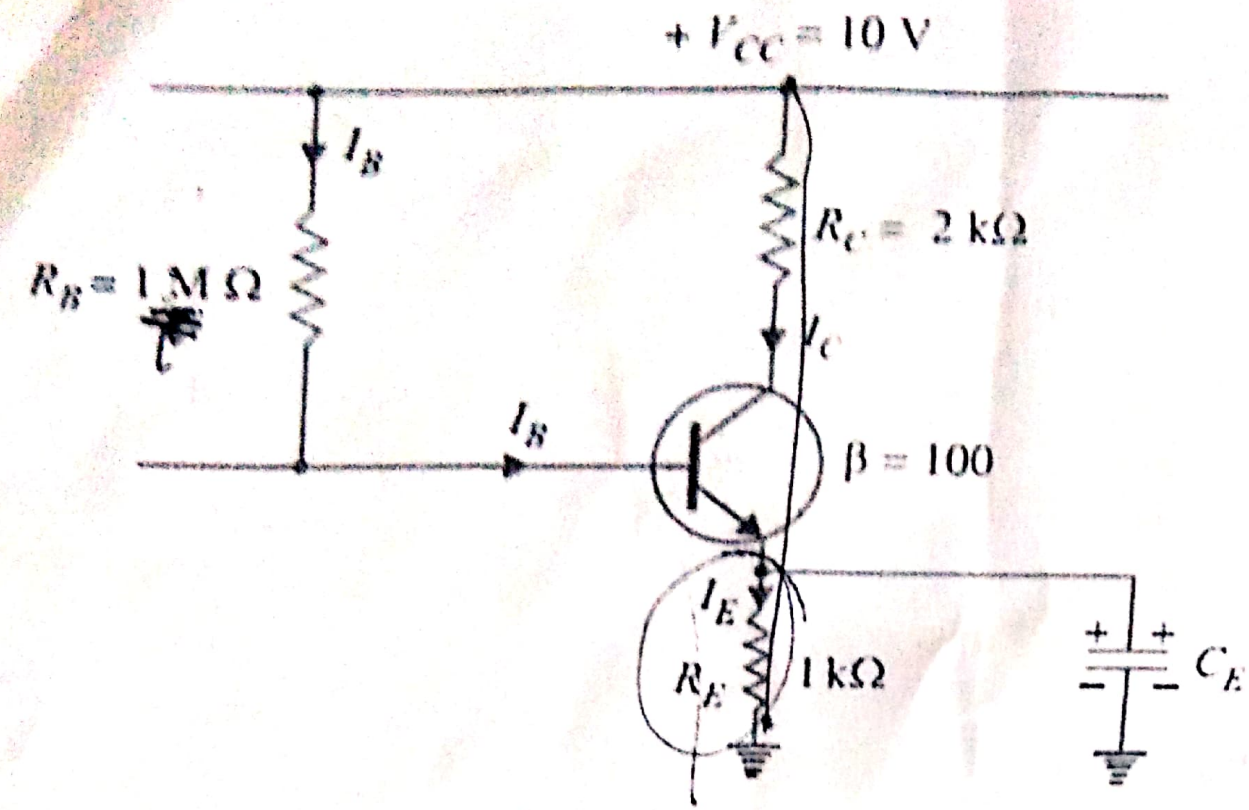
Class Test-1

1	Define differential equation, ordinary and partial differential equation with examples?	3
2	Form the differential equations for the following: (i) $y = Ae^{2x} + Be^{-2x}$ (ii) $y = A\cos nt + b\sin nt$, where A and B being arbitrary constants.	5
3	What is Wronskian? Find the Wronskian of e^{x}, e^{-x} and e^{2x} . hence, conclude whether or not these are linearly independent.	5
4	Define order and degree of a differential equations. Also define linear and non-linear differential equations.	4
5	Find the order and degree of the following differential equations. Also classify them as linear and non-linear: (i) $y = \sqrt{x}\left(\frac{dy}{dx}\right) + \frac{k}{\frac{dy}{dx}}$ (ii) $y = x(dy/dx) + a\left\{1 + \left(\frac{dy}{dx}\right)^2\right\}^{1/2}$	6

Class Test-2

1.	Define Bernoulli differential equation. Solve: $x^2\frac{dy}{dx} + xy = \frac{y^2}{x}$, $y(1) = 1$.
2.	Define orthogonal trajectories and oblique trajectories with examples.
3.	Find orthogonal trajectories of the family of curves $x^2 + y^2 = cx^3$.
4.	Define UC functions. Solve: $\frac{d^2y}{dx^2} - 2\frac{dy}{dx} - 3y = 2e^x - 10\sin x$, by using method of undetermined coefficients.

Class test-2, Dept: cste, subject: Electronic devices and circuit theory

1.	Draw a voltage divider circuit and determine I_B, I_C and V_{CE}.	
2.	Calculate I_C, I_B and I_E for the following circuit 	
3.	Design base resistor bias circuit for a common emitter amplifier such that operating point is V_{CE} = 8V and I_C = 2 mA. You are supplied with a fixed 15V d.c. supply and a silicon transistor with β = 100. Take base-emitter voltage V_{BE} = 0.6V. Calculate also the value of load resistance that would be employed.	9

Computer Science and Telecommunication Engineering, NSTU

Course Title: Data Structure Analysis **(CT#2)**

Year-1, Term - 2, Session 2020-21

Course Code: CSTE 1201, Full Marks: 25, Time: 50 minutes

Stacks

1. Consider the following arithmetic expression P, written in postfix notation: 4

   P: 12, 7, 3, -, /, 2, 1, 5, +, *, +

   Evaluate P using stack.

2. Suppose A is the following list of 10 numbers: 5

   40, 33, 11, 50, 70, 90, 40, 60, 99, 22

   find the final position of the number 40 using quick sort algorithm. Suppose the numbers in the list are to be sorted numerically.

Queues

3. How a queue can be maintained by a circular array? - Explain with example 4
4. Which of the following statement is true about deque – 2

   A. a linear list in which elements can be added or removed at both end and from the middle
   B. each element has been assigned a priority
   C. deque is maintained by a circular array
   D. none

Trees

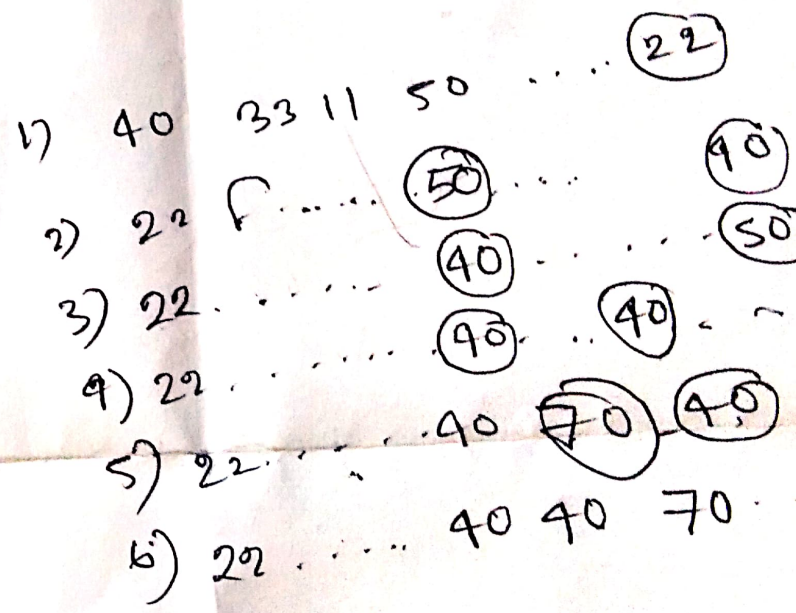
5. Suppose T is the binary tree stored in memory as in Fig 1. Draw the diagram of tree T. 4

ROOT: 5

AVAIL: 9

	INFO	LEFT	RIGHT
1	20	0	0
2	30	1	13
3	40	0	0
4	50	0	0
5	60	2	6
6	70	0	8
7	80	0	0
8	90	7	14
9		10	
10		0	
11	35	0	12
12	45	3	4
13	55	11	0
14	95	0	0

Fig. 1



6. Consider the tree T drawn in question 5. Write down the sequences of nodes yield from the preorder and post order traversals. 4
7. Which of the following statement is true about tree data structure – 2

   E. The sequential representation of binary tree is usually inefficient unless the binary tree is complete
   F. The sequential representation of binary tree is usually efficient unless the binary tree T is complete
   G. The sequential representation of binary tree is usually efficient unless the binary tree is complete or nearly complete
   H. None

এক কথায় উত্তর দাও-

১। ভারতের প্রথম রাজনৈতিক সংগঠনের নাম কী?

২। বঙ্গভঙ্গের পর নবগঠিত রাজধানীর নাম কী ছিল?

৩। বঙ্গভঙ্গ রদ ঘোষণা করেছিলেন কে?

৪। কতসালে বঙ্গভঙ্গ রদ ঘোষণা করা হয়েছিল?

৫। দ্বি-জাতি তত্ত্বের প্রবক্তা কে?

৬। "আমাদের ভাষা সমস্যা" প্রবন্ধটি কার লেখা?

৭। বাংলা ভাষার দাবি আদায়ের লক্ষ্যে কোন সংগঠনটি সর্বপ্রথম সংগঠিত হয়েছিল?

৮। খাজা নাজিমউদ্দিন ছাত্রদের সাথে কয় দফা চুক্তি স্বাক্ষর করেছিলেন?

৯। ১৯৫২ সালে পাকিস্তানের প্রধানমন্ত্রী কে ছিলেন?

১০। কোন আইন অনুযায়ী ভারতীয় উপমহাদেশ বিভক্ত করা হয়েছিল?

সংক্ষিপ্ত উত্তর লিখ- (যে কোনো ৩টি প্রশ্নের উত্তর দাও)

(ক) পাকিস্তান রাষ্ট্রের সৃষ্টির পর পূর্ব পাকিস্তান কী কী সমস্যার সম্মুখীন হয়েছিল?

(খ) বঙ্গভঙ্গের প্রধান কারন কী ছিল?

(গ) বঙ্গভঙ্গ কেনো রদ করা হয়েছিল?

(ঘ) লাহোর প্রস্তাব কেনো বাস্তবায়িত হতে পারেনি?

Department of CSTE, Class Test-1, Subject: Electronic devices and Circuit theory

1.	Draw a PN junction and explain its operation in zero bias, forward bias and reverse bias condition with necessary characteristics.	8
2.	Write down diode equation and explain it in no bias, forward bias and reverse bias condition.	5
3.	Distinguish between Zener breakdown and avalanche breakdown.	5
4.	Distinguish I-V characteristics between Silicon and Germanium.	4
5.	Distinguish between ideal diode and normal diode.	3

Department of Computer Science and Telecommunication Engineering

Course: Numerical Analysis Course Code: CSTE-1203

CT-1

Total mark: 25 Time: 35 min

	a)	Extract the general equation for Chopping Roundoff error.	5
	b)	A civil engineer has measured the height of a 10-floor building as 2950 cm and the true values are 2945 cm. Find the absolute and relative errors.	6
a)		Perform six iterations of the Newton-Rapson method to find thesmallest positive root of the equaon; $f(x) = x^3 - 5x + 1 = 0$	7
b)		Using following data find the Newton's interpolating polynomial and also find the value of y at x=24.	7

X:	20	35	50	65	80
Y:	3	11	24	50	98

Course Title: Data Structure Analysis (CT#1)
Year-1, Term - 2, Session 2020-21
Course Code: CSTE 1201, Full Marks: 25, Time: 50 minutes

ASH2010088

Array

1. Apply binary search technique to the following array, when search item is 85:
   Sorted Array: 22, 30, 33, 40, 44, 55, 60, 66, 77, 80, 88, 100 — 5
2. What are the limitations of binary search algorithm? — 2
3. According to row-major order, what will be the address of A[5][7] for a 7×9 matrix array A. Suppose the address of the first element of A is 450, and there are w = 4 words per memory cell. — 5
4. Consider the linear arrays A(5:50) and B(-5:20).
   iii. Find the number of elements in each array. — 5
   iv. Suppose Base(A) = 300 and w = 4 words per memory cell for A. Find the address of A[15] and A[35].

Linked List

5. The following list of names is assigned (in order) to a linear array INFO: — 4
   Mary, June, Barbara, Paula, Diana, Audrey, Karen, Nancy, Ruth, Eileen, Sandra, Helen
   That is, INFO[1] = Mary, INFO[2] = June, …. INFO[12] = Helen.
   Assign values to an array LINK and a variable START so that INFO, LINK and START form an alphabetical listing of the names.
6. The operating system of a computer may periodically collect all the deleted space onto the free storage list. This technique is called - — 2
   A. Buffering
   B. Garbage collection
   C. Storage allocation
   D. Buffer collection
7. Which of the following statement is true about linked list data structure – — 2
   A. We can apply a binary search algorithm with a sorted linked list
   B. A binary search algorithm cannot be applied to a sorted linked list
   C. There is a way of indexing the middle element in the linked list
   D. None