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2BCATH1

## BCA-2/1

B.Sc. Second Semester Examination, 2023-24

### COMPUTER APPLICATION

#### First Paper

##### . Mathematics-II

Time : 3 hours

Max. Marks : 75

Note : Attempt all 7 questions. Section-A contains question no. 1 (comprising of very short answer type questions) which is compulsory and carries 6 marks. Section B contains question Nos. 2, 3 & 4 which are short answer type questions and carry 8 marks each. Section C contains question nos. 5, 6 & 7 which are long answer type questions carrying 15 marks each.

#### SECTION - A

1. (a) If  $z = -2 + 11i$ ,  $w = 2 - i \in \mathbb{C}$ , then find the values of :

(i)  $\overline{z^2 - w^2}$

(ii)  $\overline{(z - w)^2}$

- (b) Find the directional derivative of  $\phi(x, y, z) = xyz^2$  at point P(1, 2, 1) along the vector  $\bar{a} = \hat{i} + \hat{j} - \hat{k}$ .

## SECTION – B

2. State comparison test for convergence and divergence of an infinite series. Use it to determine the nature of the series :

$$1 + \frac{1}{2!} + \frac{1}{3!} + \frac{1}{4!} + \dots$$

OR

State Cauchy-Riemann (C-R) equations for the function  $f(z) = u(x, y) + iv(x, y)$ , defined and continuous in some neighbourhood of a point  $z = x + iy \in \mathbb{C}$  and differentiable at  $z$  itself. Also, show that the C-R equations are satisfied for the function :

$$f(z) = e^x (\cos y + i \sin y); \text{ for all } z \in \mathbb{C}.$$

3. Define periodic function. Check, whether the following functions are periodic or not ? If yes, find their fundamental period :

$$(i) \quad \sin\left(\frac{2\pi x}{7}\right); \quad (ii) \quad \cos\left(\frac{3x}{11}\right)$$

OR

Find a unit normal vector  $\hat{n}$  of the cone of revolution  $z^2 = 4(x^2 + y^2)$  at the point  $P \equiv (1, 0, 2)$ .

4. Define Laplace Transform of a piece-wise continuous function  $f(t)$ . Show that the Laplace transform of exponential function  $e^{at}$  is given by :

$$\mathcal{L}(e^{at}) = \frac{1}{s-a}.$$

**OR**

Find radius of convergence of the following power series :

$$(i) \sum_{n=1}^{\infty} \frac{x^n}{n^2 \cdot 3^n}$$

$$(ii) \sum_{n=1}^{\infty} \frac{4^n x^n}{n}$$

### SECTION – C

**Note :** Attempt any two parts of each equation in this section.

**5. (a)** Write short notes on :

- (i) Convergence and divergence of an infinite series.
- (ii) Taylor's and Maclaurin's expansion.

**(b)** Check whether the following functions are harmonic or not :

- (i)  $u(x, y) = (2x + 1)y$ ;
- (ii)  $v(x, y) = x^3 - 3xy^2$ .

**(c)** Find the Fourier transform of the function  $f : \mathbb{R} \rightarrow \mathbb{R}$  defined by :

$$f(x) = \begin{cases} 1, & \text{if } |x| < 1 \\ 0, & \text{otherwise} \end{cases}$$

**6. (a)** Find a function  $v(x, y)$  so that  $f(z) = u(x, y) + iv(x, y)$  is analytic function, where  $z = x + iy \in \mathbb{C}$  and  $u(x, y) = x^2 - y^2 - y$ .

- (b) Define Solenoidal vector field. Find the value of k so that the vector field given by,

$$\bar{F}(x, y, z) = e^x \sin y \hat{i} + e^x \cos y \hat{j} + (2k - 1)z \hat{k}$$

is Solenoidal.

- (c) State the formulas for Laplace Transform of first and second derivatives of a function  $f(t)$ , where  $f''$  is piecewise continuous function. Use it to solve the Initial Value Problem (I.V.P.)

$$y' + y = 1; y(0) = 0.$$

7. (a) Write short notes on :

- (i) Fourier Series of a periodic function.  
(ii) Fourier Sine and Cosine Transforms.

- (b) Define curl of a vector field. Prove that the curl of the vector field.

$$\bar{F}(x, y, z) = e^{7x} \hat{i} + 3 \cos(y^2) \hat{j} + 7z^2 \hat{k}$$

vanishes identically.

- (c) Define Unit-Step function and find its Laplace Transform.

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BCA-2/2

B.Sc. Second Semester Examination, 2023-24

COMPUTER APPLICATION

Second Paper

Basic Electronics

Time : 3 hours

Max. Marks : 75

Note : Attempt all 7 questions. Section-A contains question no. 1 (comprising of very short answer type questions) which is compulsory and carries 6 marks. Section B contains question Nos. 2, 3 & 4 which are short answer type questions and carry 8 marks each. Section C contains question nos. 5, 6 & 7 which are long answer type questions carrying 15 marks each.

### SECTION - A

1. (a) Mention majority and minority charge carriers in n-type semiconductors.  
(b) Give the alternative names of tunnel diode and varactor diode.

(c) What does y and z refer to in y-parameters and z-parameters ?

### SECTION – B

2. What is meant by doping ? Explain giving suitable example.

OR

Explain rectification with the help of neat diagrams

3. Write action of a BJT in CB configuration.

OR

What is Q-point ? Give the alternative name of a Q-point. How it is determined ?

4. What is biasing ? Why is it required ? Explain.

OR

What is MOSFET ? Explain the structure of a MOSFET giving neat diagram.

### SECTION – C

5. (a) Explain clipping with help of neat diagrams.  
(b) Explain pn junction characteristics with the help of neat diagrams.

OR

- (a) Explain full wave rectification with the help of neat diagrams.  
(b) Explain dc load line and write down the steps to plot it.

6. Explain operation of JFET giving neat diagram. Plot its characteristics curve and compare its functions with that of a BJT.

OR

What is meant by stabilization circuit ? Why is it required ? Explain voltage stabilization with zener diodes giving neat diagrams.

7. Differentiate any three :

- (a) Drift current from diffusion
  - (b) ac load line from dc load line
  - (c) Electrons from holes
  - (d) SMPS from UPS.
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**BCA-2/6****BCA Second Semester Examination, 2023-24****COMPUTER APPLICATION****Sixth Paper****Principles of Programming Language****Time : 2 hours****Max. Marks : 60**

**Note :** Attempt all 7 questions. Section-A contains question no. 1 (comprising of very short answer type questions) which is compulsory and carries 6 marks. Section B contains question Nos. 2, 3 & 4 which are short answer type questions and carry 6 marks each. Section C contains question nos. 5, 6 & 7 which are long answer type questions carrying 12 marks each.

**SECTION – A**

**1. Answer the following questions :**

- (a) What is class ? How will you create it ?
- (b) What do you mean by constant and variable ? Explain with example.

## **SECTION – B**

- 2.** What are Data Types ? Explain all the data types with size and their ranges either OOP based or Procedural Language.

**OR**

What is an Array ? How to declare the Array ?  
Declare the Name, Age and City of five persons in  
an Array.

- 3.** What do you mean by binding ? Give examples of  
some of the binding and their bindings times.

**OR**

What is enumeration in Programming ? Explain  
with example.

- 4.** Differentiate between Compiler and Interpreter.

**OR**

What is Virtual Computer ? Explain.  
BCA-2/6 (2)

## **SECTION – C**

**5.** (a) Explain the features of OOP base language.

(b) What is structure ? Explain with example.

**OR**

(a) Why do we use Inheritance ? Explain the different types of inheritance.

(b) What is Perl ? How to Script it ? Explain.

**6.** (a) What is Polymorphism ? Discuss the different techniques of Polymorphism.

(b) Explain the characteristics Programming Language.

**OR**

(a) What is the structure and operation of Translator ? Explain.

(b) What is High Order Function ? How to declare it ? Explain.

7. (a) What is Vector ? Discuss the some functions of vectors.
- (b) What is Pointer ? Why do we use Pointer ?  
How will you declare Pointer ?

OR

- (a) What are the Paradigms of Programming ?  
Explain at least one.
- (b) What is Event Driven Programming ? Explain with example.
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## **BCA-2/5**

### **BCA Second Semester Examination, 2023-24**

#### **COMPUTER APPLICATION**

#### **Fifth Paper**

#### **Linux and Shell Programming**

**Time : 3 hours**

**Max. Marks : 60**

**Note :** Attempt all 7 questions. Section-A contains question no. 1 (comprising of very short answer type questions) which is compulsory and carries 6 marks. Section B contains question Nos. 2, 3 & 4 which are short answer type questions and carry 8 marks each. Section C contains question nos. 5, 6 & 7 which are long answer type questions carrying 12 marks each.

#### **SECTION – A**

**1. Answer the following questions in short :**

- (a) Define operating system**
- (b) What is 'Shell' ?**

- (c) How to find current working directory ?
- (d) '700' file permission code represents for what ?

## SECTION – B

2. Explain the features of Linux OS.

OR

What is multi-programming ? How it is different from multi-tasking ?

3. Discuss the multi-programming ? How it is different from multi-tasking ?

OR

Explain the following Linux commands with examples :

- (a) cat
- (b) rm
- (c) chdir
- (d) sort

4. Explain architecture of Linux operating system with a neat diagram.

OR

Explain various types of shell available in the Linux.

### SECTION – C

5. (a) Explain Conditional Statements in shell programming.

(b) Explain looping structures in shell programming.

OR

Write a shell program where command line arguments are input for the program. There should be a menu (add, sub, mul, div, ext) based calculator. On selecting any one option it should be operated on the numbers passed as the arguments and on exit the exit program should

6. Explain filters in details. Make use of suitable examples to support your answer.

OR

Explain the following Linux commands :

- (a) touch
- (b) sleep
- (c) nice
- (d) man
- (e) expr

7. (a) Discuss different text-entry modes used in VI editor.

(b) How a running process may be terminated ?  
Explain.

OR

Write installation process of Linux OS in detail.

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## BCA-2/4

### BCA Second Semester Examination, 2023-24

#### COMPUTER APPLICATION

#### Fourth Paper

#### Data Structures

**Time : 3 hours**

**Max. Marks : 60**

**Note :** Attempt all 7 questions. Section-A contains question no. 1 (comprising of very short answer type questions) which is compulsory and carries 6 marks. Section B contains question Nos. 2, 3 & 4 which are short answer type questions and carry 6 marks each. Section C contains question nos. 5, 6 & 7 which are long answer type questions carrying 12 marks each.

#### SECTION - A

1. Give a brief description of :

- (a) Searching
- (b) Sorting
- (c) Traversing

Breadth — 10, 19

Inorder —

Postorder —

## SECTION - B

2. (a) Describe Algorithm analysis in terms of Time Complexity and Space Complexity.

- (b) What is Extended Binary Tree ? .

OR

- (a) State the different approaches to design an algorithm and describe any one in brief.

- (b) What is Double Ended Queue ? Write the insert function of double ended queue.

3. Convert the following infix expression into its equivalent postfix expression :

$$(A + B \uparrow D) / (E - F) + G$$

OR

- What is link list ? Define different types of link list with the help of example.

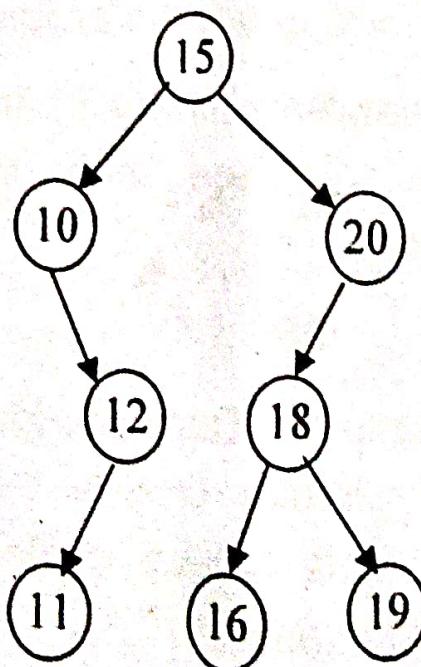
4.. What is a sparse matrix ? Compare sparse matrix and simple matrix for their storage allocation.

OR

Convert  $X : A + (B * C - (D/E-F) * G) * H$  into postfix form showing stack status after every step in tabular form.

### SECTION – C

5. (a) Find the Level Order, Inorder, Preorder and Postorder Traversal of the given Tree :



(b) Differentiate between Internal and External Fragmentation.

**OR**

- (a) Explain briefly :  
(i) First Fit      (ii) Best Fit      (iii) Next Fit
- (b) What is Huffman Tree ? Explain with the help of suitable example.
6. Write short notes on :  
(i) Priority Queue    (ii) Threaded Binary Tree  
(iii) Adjacency Matrix.

**OR**

Construct AVL Tree for the following sequence of numbers : 50, 20, 60, 10, 8, 15, 32, 46, 11, 48.

7. (a) What is Hashing ? What is linear probing and how it differs from quadratic probing ?
- (b) Differentiate between Binary Search Tree and Complete Binary Tree with the help of suitable example.

**OR**

- (a) What is Queue ? Discuss Limitations of Queue. How Circular Queue overcome the problem of Simple Queue explains with the help of suitable example.
- (b) Explain Breadth First Search with the help of a suitable example.

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2BCATH3

## BCA-2/3

### BCA Second Semester Examination, 2023-24

#### COMPUTER APPLICATION

Third Paper

#### Digital Electronics and Computer Organization

**Time : 3 hours**

**Max. Marks : 75-60**

**Note :** Attempt all 7 questions. Section-A contains question no. 1 (comprising of very short answer type questions) which is compulsory and carries 6 marks. Section B contains question Nos. 2, 3 & 4 which are short answer type questions and carry ~~6~~ 6 marks each. Section C contains question nos. 5, 6 & 7 which are long answer type questions carrying 15 marks each.

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#### SECTION - A

1. Write short note on the following :

- (a) SSD
- (b) Cloud Storage
- (c) Light Pen

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(1)

## **SECTION - B**

- 2. Explain Computer Generation in terms of hardware used.**

**OR**

**What is the difference between RAM and ROM ?**

- 3. Explain Half Adder with suitable diagram and truth table.**

**OR**

**What is Computer ? Write its characteristics also explain block diagram of computer.**

- 4. Explain the difference between Static Memory and Dynamic Memory.**

**OR**

**What is Flip-Flop ? Explain S-R Flip-Flop using proper circuit diagram.**

**( 2 )**

## SECTION – C

5. (a) Minimize the following Boolean function

$$F(A, B, C, D) = \sum m (1, 3, 4, 6, 8, 9, 11, 13, 15)$$

Also design its minimize expression circuit.

- (b) Explain Decoder with proper block diagram.

Also design it with the help of basic gates.

OR

- (a) Minimize the following Boolean function

$$F(A, B, C, D) = \sum m (1, 3, 4, 6, 9, 11, 12, 14)$$

Also design its minimize expression circuit.

- (b) What is Multiplexer ? Draw block diagram of Multiplexer. Design  $8 \times 1$  multiplexer with the help of  $4 \times 1$  multiplexer..

6. Simplify the following expression to sum of product using Quinne Mclusky Method

$$F(a, b, c, d) = \sum m (2, 6, 8, 9, 10, 11, 14, 15). \text{ Also draw its simplified expression circuit.}$$

**OR**

Simplify the following expression to sum of product using Quinne Mclusky Method

$$F(a, b, c, d) = \sum m (0, 1, 2, 4, 6, 8, 9, 11, 13, 15).$$

Also draw its simplified expression circuit.

7. Explain the following any two :

- (a) Cache Memory
- (b) EEPROM
- (c) Full Adder

**OR**

- (a) Latches
- (b) Half Subtractor
- (c) Universal Gate

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How to make  
Banana Shake ? Aryan