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1 SEM BCA (NCBCS) 1.5 (C)

2023

( December )

**COMPUTER SCIENCE AND  
APPLICATIONS**

Paper : 1.5

**( Personality Development )**

Full Marks : 75

Time : Three hours

***The figures in the margin indicate  
full marks for the questions.***

1. Write short answers on the following :

5×5=25

- (a) Personal Development
- (b) Id and Ego
- (c) Trait
- (d) Curriculum Vitae
- (e) Communication Barrier

Contd.

2. Answer **any five** from the following :  $10 \times 5 = 50$

- (a) Elaborate on the determinants of personality and how it impacts human behaviour.  $2 + 8 = 10$
- (b) Define attitudes and their components. Explain how attitudes are formed and how they can influence behaviour in organizational settings.
- (c) How does self-esteem relate to an individual's self-concept and self-image? Explain the factors that can enhance or diminish self-esteem and their implications for personal and professional life w.r.t needs defined by Maslow.
- (d) Explain the concept of the Big Five personality traits (Openness, Conscientiousness, Extraversion, Agreeableness, and Neuroticism). Provide examples of how these traits can influence interpersonal relationships and work performance.

- (e) Describe the concept of cognitive dissonance. Provide real-life examples and discuss how individuals and organizations can manage cognitive dissonance to maintain consistency in attitudes and behaviours.
- (f) Explain the communication process, including the sender, message, channel, receiver and feedback and give its importance.

(e) Convert  $(AF05.4D)_{16}$  to Binary number system.

2. Answer the following in short : **(any five)**  
 $3 \times 5 = 15$

- (a) Subtract -26 from 67 using 2's complement.
- (b) Which gates are called as the Universal gates? What are its advantages?
- (c) State and explain the DeMorgan's theorem.
- (d) Design the circuit by using NAND gates  
 $F = ABC' + DE + AB'D'$
- (e) Explain Canonical SOP form with example.
- (f) How are signed numbers represented in binary form?

3. Briefly explain the following : **(any two)**  
 $3.5 \times 2 = 7$

- (a) Synchronous and Asynchronous counters
- (b) Encoder
- (c) ASCII code

4. Answer **any six** from the following :

$$8 \times 6 = 48$$

- (a) Explain full adder circuit with truth table.
- (b) Design a 4-bit adder-subtractor circuit and explain the operation in detail.
- (c) Simplify the following using K-map and implement using NOR gates  
 $F(A, B, C, D) = \Sigma(0, 1, 4, 5, 10, 11, 14, 15)$
- (d) What is multiplexer? Realize the function  $f(A, B, C) = m(1, 3, 5, 6)$  using multiplexer.
- (e) Explain the working of J-K flip flop with a diagram.
- (f) Design and explain the 3 bit up-down synchronous counter.
- (g) Describe the function of serial in serial out shift register with proper diagram.

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**1 SEM BCA (CBCS) DD 1-3**

**2023**

(December)

**COMPUTER APPLICATION**

Paper : 1-3

(Digital Design)

Full Marks : 60

Time : Three hours

**The figures in the margin indicate  
full marks for the questions.**

1. Answer **any six** questions :  $2 \times 6 = 12$

(a) Convert  $(11100011)_2$  to Gray code.

(b) Write **any two** applications of counter.

(c) Simplify the expression

$$Y = \overline{A}BC + A\overline{B}C + A\overline{B}\overline{C} + ABC$$

using Boolean algebra.

(d) State and prove **any two** absorption law.

(e) Find the expression for

$$Y = \sum m(0, 5, 7)$$

Contd.

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**1 SEM BCA (CBCS) DD 1.3**

**2023**

( December )

**COMPUTER APPLICATION**

Paper : 1.3

**( Digital Design )**

Full Marks : 60

Time : Three hours

***The figures in the margin indicate full marks for the questions.***

1. Answer ***any six*** questions :  $2 \times 6 = 12$

(a) Convert  $(11100011)_2$  to Gray code.

(b) Write *any two* applications of counter.

(c) Simplify the expression

$$Y = \overline{A}\overline{B}\overline{C} + \overline{A}B\overline{C} + A\overline{B}\overline{C} + ABC$$

using Boolean algebra.

(d) State and prove *any two* absorption law.

(e) Find the expression for

$$Y = \sum m(0, 5, 7)$$

*Contd.*

(f) Draw the logic diagram for 4-to-1 multiplexer.

(g) State the differences between SOP and POS.

2. (a) Describe the function of parallel in parallel out shift register with logic diagram. 5

(b) Explain the method for error detection during transmission. 7

3. (a) Explain NOR based S-R flip-flop with truth table. 6

**Or**

Design full adder circuit and simplify the expression.

(b) Draw and explain synchronous up counter. 6

4. (a) Convert the following :  $1 \times 4 = 4$

(i)  $(72.45)_{10}$  to binary

(ii)  $(10111.1011)_2$  to decimal

(iii)  $(BC2)_{16}$  to decimal

(iv)  $(1275)_8$  to hexadecimal

(b) Simplify the expression

$Y = \sum m(3, 4, 5, 7, 9, 13, 14, 15)$  using K-map method. 4

(c) State the differences between synchronous and asynchronous sequential circuit. 4

5. (a) Draw and explain 3-to-8 decoder. 6

**OR**

Draw and explain decimal to BCD encoder.

(b) Find out the characteristics equation for S-R latch. 6

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**1 SEM BCA (NCBCS) 1.2 (C)**

**2023**

(December)

**COMPUTER APPLICATION**

Paper : 1.2

**(Mathematics-I)**

Full Marks : 75

Time : Three hours

***The figures in the margin indicate full marks for the questions.***

Answer the following : 1×6=6

(a) Write

$$\sim (p \wedge q) \equiv ?$$

(b) What is the argument of zero complex number ?

(c) Write true **or** false :

'Every relation is function'

Contd.

(d) When is a matrix  $A$  said to be singular ?

(e) State whether the following relationship is correct or not :

$${}^nC_r = {}^nC_{n-r}$$

(f) Under what condition two matrices are conformable for multiplication.

2. Answer the following questions :  $2 \times 7 = 14$

(a) If  $P(A/B) = P(A)$  show that

$$P(B^c) = 1 - P(B|A)$$

(b) Calculate the number of relation from

$$A = \{a, b, c, d\} \text{ to } B = \{3, 4\}$$

(c) What is the principal argument of  $\sqrt{3} - i$  ?

(d) Mean of 100 items was 50. Later it was discovered that two items were measured as 29 and 18 instead of 92 and 81. Find the corrected mean.

(e) Let  $X$  and  $Y$  be two sets such that  $n(X \cup Y) = 50$ ,  $n(X) = 28$ ,  $n(Y) = 32$  find  $n(X \cap Y)$ .

(f) Find the rank of the matrix

$$\begin{pmatrix} 1 & 1 & 1 & 1 \\ 0 & -2 & 0 & 0 \\ 0 & 0 & 3 & -3 \\ 4 & 4 & 4 & 4 \end{pmatrix}$$

(g) Write *two* differences between matrix and determinant.

3. Answer **any two** of the following :  $4 \times 2 = 8$

(a) Test the validity arguments :

If a man is a bachelor, he is unhappy.

If a man is unhappy, he dies young.  
Therefore, Bachelor die young.

(b) Let  $N$  be the set of natural numbers and  $R$  be a relation on  $N \times N$  defined by  $(a, b) R (c, d)$  whenever  $ad = bc$  show that  $R$  is an equivalence on  $N \times N$ .

- (c) Draw the Hasse diagram of  $(P(s), \subseteq)$  where  $P(s)$  is power set and  $S = \{a, b, c\}$

4. Answer **any two** of the following :  $4 \times 2 = 8$

- (a) If  $(L, \wedge, \vee)$  is completed distributive lattice, then show that

$$(a \vee b)' = a' \wedge b'$$

$$\text{and } (a \wedge b)' = a' \vee b'$$

- (b) In how many ways can five physics books, four mathematics books, three history books and two computer books be arranged on a shelf so that all books of the same subject are together ?

- (c) Prove that if  $f: X \rightarrow Y$  and  $g: Y \rightarrow X$  be two mapping such that  $g \cdot f = I_X$  then show that  $g$  is an onto mapping.

5. Answer **any three** of the following :

$$5 \times 3 = 15$$

- (a) Describe Poisson distribution as a limiting form of a binomial distribution.

- (b) Show that mean and variance of Poisson distribution are same.

- (c) The mean of a binomial distribution is 6 and standard deviation is given by

$$\sqrt{\frac{3}{2}}. \text{ Find the distribution. Also find } P(X=0).$$

- (d) Write two importance of normal distribution.

If the variance of a Poisson distribution is 2, find  $P(r \geq 4)$ .

6. Answer **any three** of the following :

$$4 \times 3 = 12$$

- (a) Prove that

$$(1 + \cos \theta + i \sin \theta)^n + (1 + \cos \theta - i \sin \theta)^n = 2^{n+1} \cos^n \frac{\theta}{2} \cos \frac{n\theta}{2}$$

- (b) If  $z_1$  and  $z_2$  are two complex number then show that

$$(i) \quad \left| \frac{z_1}{z_2} \right| = \frac{|z_1|}{|z_2|}, \quad z_2 \neq 0$$

$$(ii) \arg\left(\frac{z_1}{z_2}\right) = \arg(z_1) - \arg(z_2), \quad z_1 \neq 0, \quad z_2 \neq 0.$$

- (c) Find the smallest positive integer  $n$  for which

$$\left(\frac{1+i}{1-i}\right)^n = 1$$

- (d) Find the values of  $(1 + \sqrt{-3})^{3/4}$ .

7. Answer **any three** of the following :  $4 \times 3 = 12$

- (a) Construct a  $3 \times 2$  matrix such that

$$a_{ij} = \frac{3i}{i+j}$$

- (b) If  $A = \begin{pmatrix} -1 & 0 \\ 0 & 1 \end{pmatrix}$ ,  $B = \begin{pmatrix} 0 & 1 \\ 1 & 0 \end{pmatrix}$  show that

$$(A+B)^2 \neq A^2 + 2AB + B^2$$

- (c) Prove that

$$\begin{vmatrix} 1+a & b & c \\ a & 1+b & c \\ a & b & 1+c \end{vmatrix} = 1+a+b+c$$

- (d) Determine for what values of  $\lambda$  and  $\mu$  the equations

$$2x + 3y + 5z = 9$$

$$7x + 3y - 2z = 8$$

$$2x + 3y + \lambda z = \mu$$

have no solution a unique solution, infinite number of solution.

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**1 SEM BCA (NCBCS) 1·1 (C)**

**2023**

( December )

**COMPUTER APPLICATION**

Paper : 1·1

**( Fundamental of Computers )**

Full Marks : 75

Time : Three hours

**The figures in the margin indicate full marks for the questions.**

1. Answer the following as directed :  $1 \times 5 = 5$

(a) A compiler is a type of \_\_\_\_\_ software.  
(Choose the correct answer)

(i) System

(ii) Application

(b) 1 GB = \_\_\_\_\_ MB.

(Fill in the blank)

Contd.

(c) Write the name of one first-generation computer.

(d) Bar Code Reader is a \_\_\_\_\_ device.  
(Fill in the blank)

(e) What is a volatile memory?

2. Answer the following in short : **(any five)**  
 $2 \times 5 = 10$

(a) Write *any two* characteristics of a digital computer.

(b) Write *two* distinct characteristics of 1st generation computers.

(c) Briefly explain the uses of DBMS.

(d) What is an Application Software? Give example.

(e) Differentiate between impact printer and non-impact printer.

(f) Give *two* advantages of Windows over Dos Operating System.

3. Answer **any five** from the following :

$$10 \times 5 = 50$$

(a) What are the different types of computers according to the technology used? Explain with examples.

(b) Compare different generations of computers based on the technology used.

(c) What are registers? List out the commonly found registers in the CPU and explain their functions.

(d) What is System Software? Explain various types of System Softwares.

(e) What is a program? How is it different from software? Explain different types of programming languages.

(f) What are the types of memories available in the computer system? How are they organized in a hierarchy?

(g) What is the Central Processing Unit (CPU) in a computer? Explain various components and their functions of the CPU.

4. Briefly explain the following : **(any two)**

$$5 \times 2 = 10$$

(a) Computer Virus

(b) Primary memory

(c) Use of computer in education

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**1 SEM BCA (CBCS) AUD-I (FoM-I)**

**2023**

( December )

**COMPUTER APPLICATION**

Paper : BCA-Audit-I

**( Foundation of Mathematics-I )**

Full Marks : 60

Time : Three hours

***The figures in the margin indicate full marks for the questions.***

**PART-A**

1. Answer very briefly from the following :  
**(any three)** 1×3=3

(a) What is the total number of terms in the expansion of  $(x + y)^n$ ?

(b) What is mathematical induction?

Contd.

(c) What is left hand limit of a function?

(d) Define factorial of a non-negative integer.

2. Prove by the principle of mathematical induction:

(a) (i)  $1+2+3+\dots+n = \frac{n(n+1)}{2}$   
for all natural numbers  $n$  3

Or

(ii)  $1^2+2^2+3^2+\dots+n^2 = \frac{n(n+1)(2n+1)}{6}$   
for all values of  $n$   $n \in N$  (Natural numbers)

(b) (i) For any natural numbers  $n$ ,  
 $7^n - 2^n$  is divisible by 5. 4

Or

(ii) For any natural numbers  $n$ ,  $6^n + 4$   
is divisible by 5. 4

3. Answer **any two** from the following:  $5 \times 2 = 10$

(a) Expand the following using binomial theorem:

(i)  $(2x+7y)^5$

(ii)  $(a+5b)^4$

(b) Find the 4<sup>th</sup> term of the expansion of the series  $(x+3y)^7$ .

(c) Find the 2nd and 5th term  $(2x+y)^6$

4. (a) (i) A function  $f(x)$  is defined as follows:

$$f(x) = x \quad \text{when } x > 0$$

$$= 0 \quad \text{when } x = 0$$

$$= -x \quad \text{when } x < 0$$

Does the  $\lim_{x \rightarrow 0} f(x)$  exist? 2

Or

- (ii) A function  $f(x)$  is defined in  $(0,3)$  in the following way :

$$\begin{aligned} f(x) &= x^2 && \text{when } 0 < x < 1 \\ &= x && \text{when } 1 \leq x < 2 \\ &= \frac{1}{4}x^3 && \text{when } 2 \leq x < 3 \end{aligned}$$

Does the  $\lim_{x \rightarrow 1} f(x)$  exist?

- (b) Find the derivatives of the following functions : (**any two**) 2+2=4

(i)  $x^4 + 6$

(ii)  $e^{\sqrt{x}}$

(iii)  $\log_{10} x$

(iv)  $\cos x (\log x)$

(c) (i) What is integration? 1

(ii) Evaluate any of the following: 3

1.  $\int (x^2 - 1)(4 + 3x) dx$

2.  $\int x \log x dx$

### PART-B

5. Answer **any two** from the following :  $5 \times 2 = 10$

- (a) From the following set of values calculate the following measures :

X: 70 60 50 90 40 20 50

Find (i) Arithmetic mean of X

(ii) Median of X

(iii) Range of X

(iv) Mode of X

(v) Standard deviation of X

- (b) From the following table draw the histogram and cumulative frequency polygon:

| Class Interval | Frequency |
|----------------|-----------|
| 0-50           | 3         |
| 50-100         | 42        |
| 100-150        | 63        |
| 150-200        | 105       |
| 200-250        | 120       |
| 250-300        | 99        |
| 300-350        | 51        |
| 350-400        | 47        |
| 400-450        | 4         |

- (c) Compare Bar diagram with Pie diagram with a suitable example.

6. Answer **any two** from the following:

5×2=10

- (a) Show that Karl Pearson's correlation coefficient always lies between -1 and 1.

- (b) Find  $r_{xy}$  (correlation coefficient from the following data):

X : 66 64 62 67 64 68 62 71  
Y : 65 67 65 69 65 69 66 68

- (c) Explain the process of finding Spearman's rank correlation.

7. Answer **any two** from the following : 5×2=10

- (a) Explain the concept of 'Secular Trend' in time series.

- (b) Describe various components of time series.

- (c) Briefly explain the advantages of time series analysis.