

K22U 1509

Reg. No. : .....

Name : .....

**IV Semester B.C.A. Degree CBCSS (OBE) Regular/Supplementary/  
Improvement Examination, April 2022  
(2019 Admission Onwards)  
GENERAL AWARENESS COURSE  
4A14BCA : Discrete Mathematical Structures**

Time : 3 Hours

Max. Marks : 40

**PART – A**

**(Short Answer)**

Answer **all** questions. **(6x1=6)**

1. Define set.
2. Define Tautology.
3. Distinct elements of A are mapped into distinct elements of B is called
4. Pictorial representation of a finite partial order on a set is called
5. A graph which allows more than one edge to join a pair of vertices is called a
6. A path of graph G, that includes each edge of G exactly once and intersects each vertex of G at least once is called

**PART – B**

**(Short Essay)**

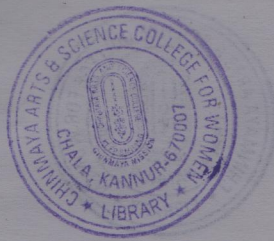
Answer **any 6** questions. **(6x2=12)**

7. Determine the truth table of  $\sim p$  (q p).
8. Let p be "He is tall" and q be "He is handsome". Write each of the following statements in symbolic form using p and q :
  - a) He is tall and handsome.
  - b) He is neither tall nor handsome.

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9. Find conjunctive normal form of  $p \vee (p \wedge q)$ .
10. Brief note on disjunctive normal form.
11. Prove that  $\forall a \in B, a \cdot a = a$ .
12. Simplify  $z(y + z)(x + y + z)$ .
13. Define Tree with example.
14. What is Hamiltonian graph ?

PART – C

(Essay)

Answer any 4 questions.

(4×3=12)

15. Illustrate the following identities by means of Venn diagrams.
  - a)  $A(B \cap C) = (A \cap B) \cap C$
  - b)  $(A \cap B) \cup C = (A \cup C) \cap (B \cup C)$
16. Write down any three properties of complementation of sets.
17. Define inverse mapping with example.
18. Explain Pigeonhole principle.
19. Explain Travelling salesman's problem.
20. Define BFS for a graph and explain with example.

PART – D

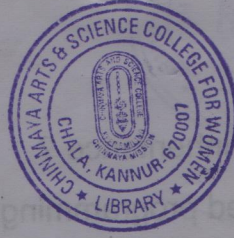
(Long Essay)

Answer any 2 questions.

(2×5=10)

21. Prove that a graph is connected if and only if it has a spanning tree.
22. Show that  $(p \wedge r) \vee (q \wedge r)$  and  $(p \vee q) \wedge r$  are not logically equivalent.
23. Let A, B, C are the sets. Prove that  $A - (B - C) = (A - B) \cup C$  if and only if  $A \cap C = \phi$ .
24. If  $f : A \rightarrow B$  and  $g : B \rightarrow C$  are bijections, then prove that  $g \circ f : A \rightarrow C$  is also a bijection.





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**IV Semester B.C.A. Degree CBCSS (OBE) Regular/Supplementary/  
Improvement Examination, April 2022  
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**Core Course**

**4B08BCA : SOFTWARE ENGINEERING**

Time : 3 Hours

Max. Marks : 40

**PART – A  
(Short Answer)**

Answer **all** questions :

**(6×1=6)**

1. What do you mean by Software ?
2. \_\_\_\_\_ document is the final outcome of the requirements analysis and specification phase.
3. The GUI part of software system is almost always developed using \_\_\_\_\_ model.
4. ADT stands for \_\_\_\_\_
5. RAD stands for \_\_\_\_\_
6. DFD stands for \_\_\_\_\_

**PART – B  
(Short Essay)**

Answer **any 6** questions :

**(6×2=12)**

7. What is functional independence of modules ?
8. What is the main objective of code walk-through ?
9. What do you mean by testing ?
10. Explain control flow graph.
11. What do you mean by feasibility study ?

P.T.O.





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- 12. What do you mean by multiple inheritance ?
- 13. What do you mean by structured programming ?
- 14. How is the SRS document validated ?

**PART – C  
(Essay)**

Answer **any 4** questions :

**(4×3=12)**

- 15. What is the use of software documentation ?
- 16. Explain importance of standard style of coding.
- 17. Explain SDLC.
- 18. Explain main two approaches in software design.
- 19. What is the rôle of requirement analysis in software design ?
- 20. Mention the characteristics of a good software design.

**PART – D  
(Long Essay)**

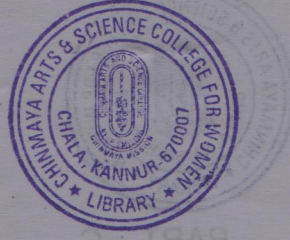
Answer **any 2** questions :

**(2×5=10)**

- 21. Levels of software product testing.
- 22. Explain different approaches of software design.
- 23. Characteristics of a good SRS document.
- 24. Discuss the life cycle of classical waterfall model.

(6×2=12)





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**IV Semester B.C.A. Degree CBCSS (OBE) Regular/ Supplementary/  
Improvement Examination, April 2022  
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**Core Course**

**4B09BCA : COMPUTER ORGANIZATION**

Time : 3 Hours

Max. Marks : 40

**PART – A  
(Short Answer)**

Answer **all** questions.

**(6×1=6)**

1. What is the purpose of a programming language ?
2. Convert the expression  $(A+B)*C$  to RPN.
3. What is parallel processing ?
4. Define hit ratio.
5. Define Content Addressable Memory.
6. Expand VLSI.

**PART – B  
(Short Essay)**

Answer **any 6** questions.

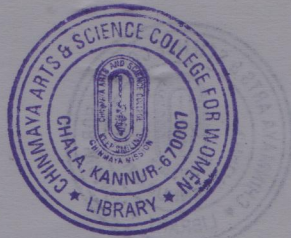
**(6×2=12)**

7. Define a three state gate.
8. What is the purpose of BUN instruction ?
9. Write note on synchronous and asynchronous serial transmission.
10. Explain the necessity of DMA.
11. List the address sequence capabilities required in control memory.
12. What are the physical forms available for establishing an interconnection network ?
13. Differentiate RAM and ROM.
14. Write note on virtual memory.

P.T.O.



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PART – C  
(Essay)

Answer any 4 questions.

(4×3=12)

15. Write note on stored program organization.
16. Explain about conditional branching with diagram.
17. Explain in detail about instruction pipeline.
18. Write note on daisy chaining priority interrupt.
19. Explain about the role of crossbar switch in interconnection structures.
20. Explain about register stack organization.

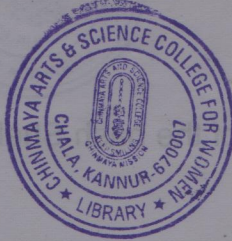
PART – D  
(Long Essay)

Answer any 2 questions.

(2×5=10)

21. Explain in detail about instruction formats.
22. Explain in detail about the different types of addressing modes.
23. Explain about the cache memory mapping techniques.
24. Explain the techniques used in Asynchronous data transfer.





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**IV Semester B.C.A. Degree CBCSS (OBE) Regular/Supplementary/  
Improvement Examination, April 2022  
(2019 Admission Onwards)  
Core Course  
4B10BCA : LINUX ADMINISTRATION**

Time : 3 Hours

Max. Marks : 40

**PART – A  
(Short Answer)**

Answer **all** questions :

**(6×1=6)**

1. What command is used to remove files ?
2. What is a shell ?
3. What is LILO ?
4. Which command is used to make a file system available to the system ?
5. What is meant by Kernel in Linux system ?
6. What is GUI ?

**PART – B  
(Short Essay)**

Answer **any 6** questions :

**(6×2=12)**

7. How to copy a file in Linux ?
8. What are the basic components of Linux ?
9. What are filters ?

P.T.O.





10. What are the key features of the bash Shell ?
11. What is soft link ?
12. What is the use of free software ?
13. What is GRUB in Linux ?
14. What is syslog ?

**PART - C**  
**(Essay)**

Answer **any 4** questions :

**(4x3=12)**

15. Briefly describe the Shell's responsibilities.
16. What are shell variables ?
17. What is the use of the 'mkdir' command in Linux ?
18. How do you change permissions under Linux ?
19. How many types of users are there in Linux?
20. Explain the use of ls command.

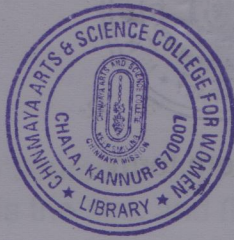
**PART - D**  
**(Long Essay)**

Answer **any 2** questions :

**(2x5=10)**

21. How do you perform system maintenance in Linux ?
22. How does mounting work in Linux ?
23. What is Linux and describe some of its unique features.
24. Explain different types of loops are there in Linux.





K22U 1567

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**IV Semester B.Sc. Degree CBCSS (OBE) Regular/Supplementary/  
Improvement Examination, April 2022  
(2019 Admission Onwards)  
COMPLEMENTARY ELECTIVE COURSE IN MATHEMATICS  
4C04MAT – BCA : Mathematics for BCA IV**

Time : 3 Hours

Max. Marks : 40

**PART – A**

**Short Answer**

Answer **any 4** questions. **1** mark **each** :

1. Find the probability of getting two heads when five coins are tossed.
2. Define a slack variable in a linear programming problem.
3. True or false : Any connected, undirected graph  $G = (V, E)$  with  $|E| = |V| - 1$  is a tree.
4. Give an example of a spanning tree in a network.
5. Give the Euler's formula to solve  $\frac{dy}{dx} = f(x, y)$ . (4x1=4)

**PART – B**

**Short Essay**

Answer **any 7** questions. **2** marks **each** :

6. From a pack of 52 cards, two cards are drawn together at random. What is the probability of both the cards being kings ?
7. In a cricket tournament a cricketer hits eight times '6' out of thirty-two balls. Calculate the probability that he would not hit a 6.

P.T.O.





8. Reduce to the standard problem form

$$\text{Maximise } z = 2x_1 - x_2 + x_3$$

$$\text{Subject to the constraints } x_1 + 3x_2 - x_3 \leq 20,$$

$$2x_1 - x_2 + x_3 \leq 12$$

$$x_1 - 4x_2 - 4x_3 \geq 2$$

$$x_1, x_2, x_3 \geq 0.$$

9. Define a basic feasible solution of an LP problem.

10. A business organization is engaged in producing two products M and N. Each unit of product M requires 4 kg of raw material and 8 labour hours for processing, whereas each unit of product N requires 6 kg of raw material and 6 hours of labour of the same type. Every week, the firm has an availability of 120 kg of raw material and 192 labour hours. One unit of product M sold yields Rs. 80 and one unit of product N sold gives Rs. 70 as profit. Formulate this problem as a linear programming problem to determine as to how many units of each of the product should be produced per week so that the firm can earn the maximum profit.

11. Find the dual of the following LPP

$$\text{Minimise } z = 3x_1 + 5x_2 - x_3$$

$$\text{Subject to the constraints } x_1 - x_2 + x_3 \leq 3$$

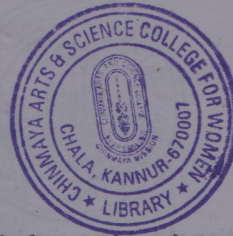
$$2x_1 - 3x_2 \leq 4$$

$$x_1, x_2 \geq 0.$$

12. Problem : Develop a network from the following data.

Activity	A	B	C	D	E	F	G	H
Immediate Predecessors	-	-	A	B	C, D	C, D	E	F





13. Find the maximum flow from source to sink from the data given below where node s is the source, node t is the sink and (i, j) represents the capacity of the directed arc from i to j.

Directed Arc	Capacity
(s, a)	4
(s, b)	2
(a, c)	2
(c, t)	2
(c, b)	1
(b, c)	2
(b, d)	3
(d, t)	4

14. Find the value of y at x = 0.1 given that  $y' = x^2 + y$ ,  $y(0) = 1$ ,  $h = 0.05$  by modified Euler's method.

15.  $\frac{dy}{dx} = y - x$ ,  $y(0) = 2$ . Find  $y(0.1)$  correct to four decimal places using second order Runge-Kutta method. (7×2=14)

**PART – C**  
**Short Essay**

Answer any 4 questions. 3 marks each :

16. Two dice are thrown together. What is the probability that the number obtained on one of the dice is multiple of number obtained on the other dice ?
17. What is the probability of getting a sum of 22 or more when four dice are thrown ?
18. Find a feasible solution by graphical method

Maximise  $z = 3x_1 + 5x_2$

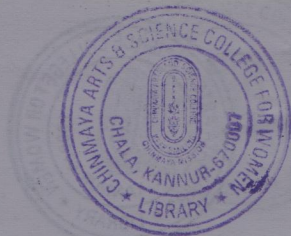
Subject to the constraints  $x_1 + 2x_2 \leq 2000$

$x_1 + x_2 \leq 1500$

$x_2 \leq 600$

$x_1, x_2 \geq 0$ .





19. Use simplex method to maximise  $z = 6x_1 + 4x_2$

Subject to the constraints  $-2x_1 + x_2 \leq 2$

$$x_1 - x_2 \leq 2$$

$$3x_1 + 2x_2 \leq 9$$

$$x_1, x_2 \geq 0.$$

20. Find the minimum spanning tree in the following undirected graph where (i, j) denotes the arc connecting i and j.

Arc	Length
(a, b)	4
(a, c)	8
(b, e)	10
(b, d)	8
(b, c)	9
(c, d)	2
(c, f)	1
(d, e)	7
(d, f)	9
(e, f)	5
(e, g)	6
(f, g)	2

21. Use Trapezoidal rule with  $n = 4$  to estimate  $\int_0^1 \frac{1}{1+x} dx$ .

22. Solve by modified Euler's method, the differential equation  $\frac{dy}{dx} = x^2 + y$ ,  $y = 1$

when  $x = 0$  for  $x = 0.02$ .

(4×3=12)

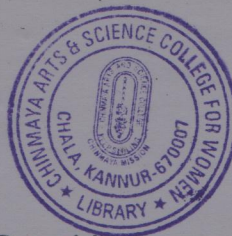
#### PART – D Long Essay

Answer **any 2** questions. **5 marks each** :

23. A box contains six  $10\Omega$  resistors and ten  $30\Omega$  resistors. The resistors are all unmarked and are of the same physical size. Two resistors are selected from the box. Find the probability that :

- Both are  $10\Omega$  resistors.
- The first is a  $10\Omega$  resistor and the second is a  $30\Omega$  resistor.
- Both are  $30\Omega$  resistors.





24. Use simplex method to solve the following LP problem :

Minimise  $z = x_1 - 2x_2$

Subject to the constraints  $2x_1 + 3x_3 = 1$

$3x_1 + 2x_2 - x_3 = 5$

$x_1, x_2, x_3 \geq 0.$

25. Let the villages in a region are to be connected by roads. The direct distance in km between each pair of villages along a possible road and its cost of construction per km in ( $10^4$ Rs) are given in the following table. Distances are given in the upper triangle and cost in the lower triangle. Find the minimum cost at which all the villages can be connected by roads.

		DISTANCE				
		1	2	3	4	5
COST	1		18	12	15	10
	2	3		15	8	22
	3	4	3		6	20
	4	5	5	6		7
	5	2	2	5	7	

26.  $\frac{dy}{dx} = y - x, y(0) = 2.$  Find  $y(0.1)$  and  $y(0.2)$  correct to four decimal places

using forth order Runge-Kutta method.

(2x5=10)