22102353

QP CODE: 22102353

Reg No : ....

Name : ....

B.Sc/BCA DEGREE (CBCS) REGULAR / IMPROVEMENT /REAPPEARANCE EXAMINATIONS, JULY 2022

First Semester

Complementary Course - MM1CMT03 - MATHEMATICS - DISCRETE MATHEMATICS (I)

(Common to B.Sc Computer Science Model III, Bachelor of Computer Application,B.Sc Cyber Forensic Model III)

2017 Admission Onwards

FB3972CA

Time: 3 Hours | Max. Marks : 80

Part A

*Answer any **ten** questions.*

*Each question carries **2** marks.*

1. Define simple and compound propositions with examples.
2. What are the negations of the statements $\forall x(x^2 > x) and \exists x(x^2 = 2)$
3. Define an argument, premises and conclution.
4. Define set. Give any two methods for representing sets.
5. Let$A_i = \{1, 2, 3, ..., \text{i}\}$ for i = 1,2,3,... Then find $\cup_{i=1}^{n} A_i$ and $\cap_{i=1}^{n} A_i$
6. Prove or disprove $\lceil x + y \rceil = \lceil x \rceil + \lceil y \rceil$for all real numbers x and y.
7. Stat Divition algoritham. also write the quotient and remainder when 101 is divided by 11
8. Show that 899 is prime.
9. State Goldbach's conjecture.
10. Define a relation from a set A toB. Give an example
11. Draw the diagraph of the relation R= {(1,1), (1,3), (2,1), (2,2), (2,4), (3,1), (3,4), (4,2),(4,3),(4,4) } on the set {1,2,3,4}.
12. Determine wheather (P(S), C) is a lattice, where S is a set.

(10×2=20)

Part B

*Answer any **six** questions.*

*Each question carries **5** marks.*

13. Construct truth table for (a) $p \oplus q \ \rightarrow p \oplus \neg q$ (b) $(p \vee q) \wedge \neg r$

14. Explain Quantifiers.

15. Prove that (a) $\neg \forall x(p(x) \equiv \exists x \neg p(x)$
(b) $\neg \exists x q(x) \equiv \forall \neg q(x)$

16. Define bijective functions with an example.

17. Show that the set of all integers is a countable set.

18. Encrypt the message DO NOT PASS GO by (i) f(p) = (p+13) mod 26

19. Use division algorithem to find g c d(111,201)

20. Let A = { 1 , 2 , 3 } and B = { 4 , 5 , 6 , 7 ,8 } . Which orderd pairs are in the relation R_1 and R_2 represented by the matrix (i) $M_{R1} = \begin{bmatrix} 0 & 1 & 0 & 0 & 0 \\ 1 & 0 & 1 & 1 & 0 \\ 1 & 0 & 1 & 0 & 1 \end{bmatrix}$
(ii) $M_{R2} = \begin{bmatrix} 1 & 0 & 0 & 1 & 0 \\ 0 & 1 & 1 & 0 & 0 \\ 0 & 0 & 1 & 1 & 1 \end{bmatrix}$?

21. Define a partial order relation on a set.Let R be the relation on the set of people such that x R y if x and y are people such that x is older than y.show that R is a partial ordering

(6×5=30)

Part C

*Answer any **two** questions.*

*Each question carries **15** marks.*

22. (a) State and prove De Morgan's laws.
(b) Show that $\neg[p \vee (\neg p \wedge q)] and \neg p \wedge \neg q$ are logically equivalent by developing a series of logical equivalences.
(c) prove that $\neg q \wedge (p \rightarrow q) \rightarrow \neg p$ is a tautology.

23. Explain sequences and summation. Also explain special integer sequences with examples.

24. State and prove Chinese Remainder Theorem.

25. a) Define an equivalence relation and equivalence class
b) Let X be a set and define x R y if and only if x and y are equal (x,y $\in$ X). Show that this is an equivalence relation. Find the equivalence classes.

(2×15=30)