23104818

QP CODE: 23104818

Reg No : ....

Name : ....

B.Sc / BCA DEGREE (CBCS)REGULAR/IMPROVEMENT/REAPPEARANCE EXAMINATIONS, FEBRUARY 2023

First Semester

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

(Common for B.Sc Computer Science Model III, Bachelor of Computer Applications,B.Sc Cyber Forensic Model III)

2017 Admission Onwards

2F3A921D

Time: 3 Hours

Max. Marks : 80

Part A

*Answer any **ten** questions.*

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

1. Define Tautology and contradiction. give examples.
2. What are the negations of the following statements.
   (a) There is an honest politician.
   (b) All Americans eat cheeseburgers.
3. Use resolution to show that the hypothesis
   "Jasmin is skiing or it is not snowing" and "it is snowing or Bart is playing Hockey" imply that "Jasmin is skiing or Bart is playing Hockey"
4. Define composition of two functions. Give an example also.
5. How can we produce the terms of the sequnce 5, 11, 17, 23, 29, 35, ...
6. Find the value of $\sum_{i=1}^{4}\sum_{j=1}^{3} ij$
7. State the prime number theorem.
8. Define Greatest Common Divisor and Least Common Multiple.
9. State Fermat's little theorem.

10. List the ordered pairs in the relation R from A = {0,1,2,3,4} to {0,1,2,3} where (a,b) $\in$ R if and only if (i) a = b (ii) a > b

11. List the ordered pairs in the relation on {1,2,3,4} corresponding to the matrix

$$\begin{bmatrix} 1 & 1 & 1 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & 1 \\ 1 & 0 & 0 & 1 \end{bmatrix}$$

12. How many partitions are formed from the set S = {a,b,c,d}, write all the partitions.

(10×2=20)

Part B

Answer any ***six*** *questions.*

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

13. Which of the following sentences are propositions ? What are the truth values of those that are propositions?
 (a) Bosten is the capital of Massachusetts. (b) Answer this question. (c) 2+3=5 (d) x+2=1 (e) Today is Monday.

14. Construct truth table for (1) $p \vee q \oplus p \wedge q$ (2)$(p \vee q) \vee r$

15. (a) If P(x) denote $x^2 > 0$ show that $\forall P(x)$ is false where the universe of discourse consists of all integers.
 (b) What is the truth value of $\forall x(x^2 \geq x)$if the domain consists of all real numbers and what is the truth value if the domain consists of all integers?

16. Find bit string corresponding to the symmetric difference of two sets.

17. Define bijective functions with an example.

18. Let m be a positive integer. If $a \equiv b(mod\ m)\ and\ c \equiv d(mod\ m)\ then\ (a\ +\ c) \equiv (b\ +\ d)\ (modm)$

19. Encrypt the message DO NOT PASS GO by applying the encryption function f(p) = 3p + 7(mod 26)

20. Show that divides is a partial order on set of integers . Draw its Hasse diagram on the set of divisors of 32.

21. What do you mean by a well ordered set ? What is the principle of well ordered induction ?

(6×5=30)

Part C

*Answer any **two** questions.*

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

22. State and prove Modusponens, disjunctive syllogism and resolution rule

23. Use Venn diagrams to prove (i) Distributive laws (ii) De-Morgan's laws (iii) Associative laws.

24. (a) Find the g c d of 414 and 662 using the division algorithm
    (b) State and prove the unique factorization 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)