19103223

QP CODE: 19103223

Reg No : ....

Name : ....

B.Sc.DEGREE (CBCS) EXAMINATION, NOVEMBER 2019

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

94EE1A99

Time: 3 Hours

Maximum Marks :80

Part A

Answer any ten questions.

Each question carries 2 marks.

1. Define conjunction and disjunction of propositions
2. Define Universal Quantifier . Give example.
3. Define Modus Ponens rule.
4. using set identities prove that $\overline{A \cup (B \cap C)} = (\overline{C} \cup \overline{B}) \cap \overline{A}$
5. Let $A_i = \{i, i+1, i+2,...\}$ for i = 1, 2, 3,... Then find $\cup_{i=1}^{n} A_i$ and $\cap_{i=1}^{n} A_i$
6. How can we produce the terms of the sequnce 5, 11, 17, 23, 29, 35, ...
7. Evaluate (a) 13 mod 3 (b) -97 mod 11
8. State the fundamental theorem of Arithmetic. Give an example of Prime factorisation
9. State Fermat's little theorem
10. Define a relation R from A to itself. Give an example.
11. How can the matrix representing a relation 'R' on a set A be used to determine whether the relation is asymmetric?
12. Suppose A = {1,2,3,4,5,6}, A_1 = {1,2,3}, A_2 = {4,5}, A_3 = {5,6} . Is A_1, A_2, A_3 form a partition of A.

(10×2=20)

Part B

Answer any six questions.

Each question carries 5 marks.

13. Define a bit string and length of a bit string. Also find the length of 101010011. And find the bit wise XOR of 10101110 and 01010000.

Turn Over

14. Show that $\neg\forall x(p(x) \to q(x))$ and $\exists x(p(x) \wedge \neg q(x))$ are logically equivalent.

15. Use rules of inference to show that the hypothesis "Ravi works hard", " If Ravi works hard, then he is a dull boy " and " If Ravi is a dull boy, then he will not get the job" imply the conclusion, "Ravi will not get the job"

16. Define bijective functions with an example.

17. Display the graph of the function $f(x) = x^2$ from the set of integers to the set of integers.

18. 1. Find the g c d ($11 \times 13 \times 17$, $2^9.3^7.5^5.7^3$)
    2. What is the l c m ($3^{13}.5^{17}$, $2^{12}.7^{21}$)

19. Find the g c d (124,323) and express it as the linear combination of 124 and 323.

20. Let R be the relation on the set of integers such that a R b if and only if a = b or a = -b. Show that R is an equivalence relation.

21. What do you mean by total ordering ?What is a totally ordered set . Give example.

(6×5=30)

Part C

Answer any two questions

Each question carries 15 marks.

22. State and prove Distributive laws and assosiative laws of logical equivalance

23. What are different types of functions. Give any two examples of countable sets. Justify your answer.

24. 1.(a) Encrypt the message WATCH YOUR STEP by
    (i) the encryption function $f(p) = p + 14 \pmod{26}$ (ii) By Caesar's cipher
    2. Decrypt the following messages encrypted using Caesar's cipher
    (a) EOXH MHBQV (b) WHVW WRGDB

25. a) Prove that the relation R on a set A is transitive if and only if $R^n \subseteq R$ for n=1,2,3, ...
    b) Let R = {(1,1), (2,1), (3,2), (4,3)} Find the powers R^n, n=2,3,4,.......

(2×15=30)