QP CODE: 21102623

21102623

Reg No : ....

Name : ....

B.Sc/BCA DEGREE (CBCS) EXAMINATIONS, OCTOBER 2021

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

15257B0E

Time: 3 Hours | Max. Marks : 80

Part A

*Answer any **ten** questions.*

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

1. Let P(x) denot the word x contains "a" what are the truth values of
   (a) P(orange) (b) P(lemon) (c) P(true) (d) P(false).
2. Express each of the following statements "Every student in this class has studied Calculus" and "Some students in this class has visited Mexico". using predicates and Quantifiers.
3. Determine the validity of the following argument
   If 7 is less than 4 or 7 is a prime number
   7 is not less than 4
   Conclusion : 7 is a prime number
4. Define ordered n-tuple. State condition for two ordered n-tuple to be equal.
5. Let U={1,2,3,.....,10}be the universal set, using bit string find union and intersection of the sets {1,3,5,9} and (2,4,6,8}.
6. How can we produce the terms of the sequence if the first 10 terms are $1, 2, 2, 3, 3, 3, 4, 4, 4, 4$
7. Find counter example to the statement about congruence
   If $ac \equiv \ bc(mod\ m)$ where a,b,c and m are integers with $m \geq \ 2\ then\ a \equiv \ b(mod\ m)$
8. Show that 101 is prime
9. Find (1) g c d (120, 500) (2) l c m ($2^3.3^5.7^2$, $2^4.3^3$)
10. Is 'divides' relation on the set of positive integers transitive? Explain.
11. Find the matrix representation of R^2 if R is represented by the matrix $\begin{bmatrix} 0 & 1 & 1 \\ 1 & 0 & 0 \\ 1 & 0 & 1 \end{bmatrix}$
12. Define a lattice. give example.

(10×2=20)

Part B

*Answer any **six** questions.*

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

13. Construct the truth table of the compound proposition $(\neg p \leftrightarrow \neg q) \leftrightarrow (q \leftrightarrow r)$
14. Show that (a) $p \vee (q \wedge r) and (p \vee q) \wedge (p \vee r)$ (b) $p \leftrightarrow q\ and \neg p \leftrightarrow \neg q$ are logically equivalent.

15. Show that $\forall x(p(x) \wedge q(x)) and \forall x p(x) \wedge \forall x q(x)$ are logically equivalent.

16. Draw the graph of the function f(x) $= \lfloor 2x+1 \rfloor$.

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

18. Let a and b are integers and let m be a positive integer then $a \equiv b (mod m)\ iff\ a\ mod\ m = b\ mod\ m$

19. What are the solutions of the linear congruence $3x \equiv 4 (mod\ 7)$

20. Draw the directed graph that represent each of the following relations.
1.{(a,a), (a,b), (b,c), (c,b), (c,d), (d,a), (d,b)}
2.{(a,b), (b,a), (b,b), (c,a), (c,b), (c,c)}

21. Let A = Set of all words in English language. The relation R on A is defined by a R b if and only if the words a & b starts with the same alphabet. Show that R is an equivalence relation.

(6×5=30)

Part C

*Answer any **two** questions.*

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

22. (a) Show that the hypothesis "if you send me an e- mail message ,then Iwill finish writting the programme " ." if you do not send me an e- mail message then I will go to sleep early" and if I go to sleep early then I will wake up feeling refreshed'. lead to the conclution "If I do not finish writing the programme then I will wake up feeling refreshed."
(b) Show that the premises " A student in this class has not read the book" and " Every one in this class passed the first exam " imply the conclution " Someone who passed the first exam has not read the book".

23. Define One to One and Onto functions. How can we use these functions to find cardinality of sets. Illustrate with any two examples.

24. State and prove Chinese Remainder Theorem.

25. Show that 'divides / ' is a partial order on the set of integers. Draw a Hasse diagram when '/' on set {1,2,3,4,6,8,12}

(2×15=30)