QP CODE: 19101224

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Reg No : .....

Name : .....

B.Sc.DEGREE (CBCS) EXAMINATION, DECEMBER 2018

First Semester

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

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

2017 Admission (Reappearance)

219D3EDB

Maximum Marks: 80 **Time: 3 H**

Part A

Answer any **ten** questions.

Each question carries **2** marks.

1. Construct the truth table of $p \vee q \rightarrow p \wedge q$
2. Name the rule of inference which is used in the arguement
   "If it rains today, then we will not have a Bar be que today"
   "If we do not have a Bar be que today, then we will have a Bar be que tomorrow"
   Therefore, "if it rains today then we will have a Bar be que tomorrow"
3. State Universal generalisation and existential instantiation
4. Define power set. Write power set of a set containing three elements.
5. Distinguish between increasing and strictly increasing functions.
6. Define composition of two functions. Give an example also.
7. Let m be a positive integer. The integers a and b are congruent modulo m iff there is an integer k such that a = b+km
8. State Goldbach's conjecture.
9. Let m be a positive integer and let a, b and c be integers. If $ac \equiv bc \ (mod\ m)\ and\ g\ c\ d(c, m) = 1,\ then\ a \equiv b(mod\ m)$
10. Define a relation R from A to itself. 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. Which elements of the Poset ({2,3,5,6,18,20,21}, /) are maximal and which are minimal?

(10×2

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. Determine whether $(p \vee q) \wedge (\neg p \vee r) \rightarrow (q \wedge r)$ is a Tautology.
15. Explain Quantifiers.
16. Distinguish between arithmetic progression and geometric progression.
17. Show that the set of odd positive integers is a countable set.
18. If n is a composite integer, then n has a prime divisor less than or equal to $\sqrt{n}$
19. Find all solutions of $x \equiv 2\ mod\ 3$
    $x \equiv 1\ mod\ 4$
    $x \equiv 3\ mod\ 5$

20. How many reflexive relations are there on a set of 'n' elements? Explain.

21. Explain with an example, R is a symmetric relation if and only if $M_R = (M_R)^t$?

(6×5

Part C

Answer any **two** questions.

Each question carries **15** marks.

22. (i) Express each of these statements using quantifiers. Then form the negation of the statement.
(a) Some students are very intelligent
(b) No rabbit knows Calculus.
(c) There is no dog that can fly.
(ii) Let P(x) ,Q(x),R(x) and S(x) be the statements "x is a humming bird", "x is large ","x lives on honey"," x is richly colored"respectlvely. Assuming the domain consists of all birds express the statements in the argument using quantifiers and P(x), Q(x) , R(x) ,S(x)
(a) All humming birds are richly colored.
(b) No large birds live on honey.
(c) Birds that do not live on honey are dull in colour.
(d) Humming birds are small.

23. Define sets. What are the methods to represents sets. Explain operations of sets and give their bit string representati

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

25. Show that the relation Congruent modulo 3 is an equivalence relation on set of integers. What are the equivalence classes ? Verify that these equivalence classes forms a partition of set of integers.

(2×15