QP CODE: 18103697

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Reg No : ....

Name : ....

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

First Semester

Core Course - MM1CRT01 - FOUNDATION OF MATHEMATICS

(Common to B.Sc Computer Applications Model III Triple Main, B.Sc Mathematics Model I, B.Sc Mathematics Model II Computer Science)

2018 Admission only

27CF6C97

Maximum Marks: 80 **Time: 3 Hours**

Part A

Answer any **ten** questions.

Each question carries **2** marks.

1. Give an example for Existential quantifier.
2. Define Disjunctive syllogism for propositional logic.
3. What do you mean by a proof of contradiction.
4. Let $A_i = \{i, i+1, i+2, \ldots, \}$. Find $\cap_{i=1}^{n} A_i$
5. Is every function invertible? Give an invertible function
6. Write any two properties of the floor function
7. Define a relation from a set A to the set B and give example.
8. List the ordered pairs in the relation on $\{1, 2, 3\}$corresponding to the matrix $\begin{pmatrix} 1 & 0 & 1 \\ 0 & 1 & 0 \\ 1 & 0 & 1 \end{pmatrix}$
9. Define a Diagraph.
10. Discuss the nature of roots of the cubic $x^3 + 3Hx + G = 0.$
11. Prove that $x^5 + x^3 + x + 1 = 0$ has exactly one real root?
12. Check the validity of the following statement with proper reasoning.
 "x=-1 is always a root of the even degree reciprocal equation of second kind"?

(10×2=20)

Part B

Answer any **six** questions.

Each question carries **5** marks.

13. 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.

14. Show that $\neg \forall x[P(x) \rightarrow Q(x)] \equiv \exists x[P(x) \wedge \neg Q(x)]$.

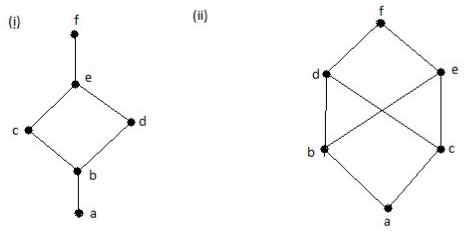
15. Show that the premises ' A student in the class has not read the book' and ' Everyone in this class passed the first exam' imply the conclusion ' Someone who passed the first exam has not read the book'.

16. What are the different set operations? Explain using Venn diagrams.

17. Define the identity function on a set A . Show that it is a bijection.

18. Let $S=\{1,2,3,4,5,6\}$.Show that the collection of sets $A_1=\{1,2,3\}$, $A_2=\{4,5\}$ and $A_3=\{6\}$ forms a partition of S.List the ordered pairs in the equivalence relation R produced by this partition.

19. Determine whether the posets with these Hasse Diagrams are lattices.



20. Solve the equation $x^3-6x^2+13x-10=0$,given that its roots are in AP.

21. Find the equation whose roots are the roots of the equation $x^4-5x^3+7x^2-17x+11=0$ each diminished by 2.

(6×5=30)

Part C

Answer any **two** questions.

Each question carries **15** marks.

22. (a) Construct the truth table for the following compound propositions:

$(i)(p \leftrightarrow q) \oplus (\neg p \leftrightarrow \neg r)$

$(ii)(p \oplus q) \rightarrow (p \wedge q)$.

(b) Use truth table to establish which of the following statements are tautologies, which are contradictions and which are contingencies.

$(i)(p \rightarrow q) \leftrightarrow (\neg p \vee q)$

$(ii)(p \wedge \neg q) \wedge (\neg p \vee q)$

$(iii)[(p \rightarrow q) \wedge \neg p] \rightarrow \neg q$

23. a) State and prove distributive laws for three sets A, B, C

b) Let R be the relation on the set of all people who have visited a particular Web page such that xRy if and only if person x and person y have followed the same set of links starting at this Web page (going from Web page to Web page until they stop using the Web. Show that R is an equivalence relation.

24.

1. Describe the terms Equivalence relation and Equivalence class.
2. Let m be a positive integer with m > 1.Show that the relation $R=\{\ (a,b)\ : a \equiv\ b\ (mod\ m)\ \}$is an equivalence relation.

25. a) Solve $x^4+2x^3-7x^2-8x+12=0$?

b) Solve $3x^5-10x^4-3x^3-3x^2-10x+3=0$?

(2×15=30)