23104691

QP CODE: 23104691

Reg No : ....

Name : ....

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

First Semester

Core Course - MM1CRT01 - FOUNDATION OF MATHEMATICS

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

2017 Admission Onwards

C789FB92

Time: 3 Hours

Max. Marks : 80

Part A

*Answer any **ten** questions.*

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

1. State distributive laws of equivalence.
2. Define Existential quantifier.
3. Define Universal instantiation.
4. Use Venn diagram to show the relationship A is a subset of B
5. Define the sets $A \cup B$ and $A \cap B$.
6. Let f_1, f_2be functions from R to R defined by $f_1(x) = x^2$ and $f_2(x) = x - x^2$. What is $(f_1 f_2)(x)$?
7. Let R be the relation $R = \{(a, b) \ / \ a \ divides \ b\}$ on the set of integers.Find R^{-1}.
8. Draw the diagraph that represent the relation $\{(1,1),(1,2),(1,3),(2,2),(2,3),(3,3)\} \ on \ \{1,2,3\}$
9. Check whether the relation $R = \{(a,b) : \ a \ and \ b \ are \ of \ same \ age \ \}$an equivalence relation.Explain.
10. Frame a quartic equation with rational coefficients one of whose roots is $\sqrt{5} + \sqrt{2}$.

11. If $\alpha, \beta, \gamma, \delta$ are the roots of the equation $x^4 + 4x^3 - 5x^2 - 8x + 6 = 0$, find the values of $\alpha + \beta + \gamma + \delta$ and $\alpha\beta\gamma\delta$.

12. Define biquadratic equation? Write the general form of the quartic equation which can be solved using Ferrari's method?

(10×2=20)

Part B

*Answer any **six** questions.*

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

13. Check whether $p \vee \neg(p \wedge q)$ a tautology.

14. Show that $\exists x[P(x) \wedge Q(x)]$ and $\exists x P(x) \wedge \exists x Q(x)$ are not logically equivalent.

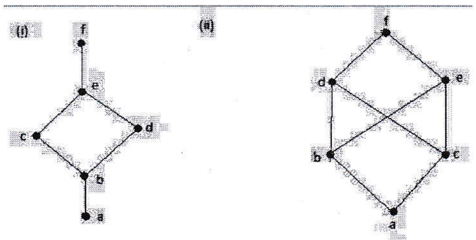
15. Define Modus tollens and Modus ponens. Write the truth table of the above rules of inference for propositional logic.

16. Prove that $\overline{A \cap B} = \overline{A} \cup \overline{B}$

17. Define and plot the greatest integer function

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 by Cardan's method $x^3 - 9x - 12 = 0$.

21. Solve $x^6 - 9x^5 + 21x^4 - 21x^2 + 9x - 1 = 0$?

(6×5=30)

Part C

*Answer any **two** questions.*

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

22. (a) Prove that $\sqrt{2}$ is irrational by the method of contradiction.

(b) Show that the following statements about the integer n are equivalent.

(i) n is even

(ii) $n - 1$ is odd.

(iii) n^2 is even.

23. a) Let $f : A \rightarrow B$ and S, T be subsets of A. Show that $f(S \cup T) = f(S) \cup f(T)$ and $f(S \cap T) \subseteq f(S) \cap f(T)$

b) Consider the equivalence relation $R = \{(x, y)/x - y$ is an integer$\}$. What are the equivalence classes of 1 and $\frac{1}{2}$ for this relation

24. Let R and S be relations on a set A represented by the matrices

$M_R = \begin{bmatrix} 0 & 1 & 0 \\ 1 & 1 & 1 \\ 1 & 0 & 0 \end{bmatrix}$ $and\ M_S = \begin{bmatrix} 0 & 1 & 0 \\ 0 & 1 & 1 \\ 1 & 1 & 1 \end{bmatrix}$ .Find the matrices that represents

$(a)\ R \cup S\ (b)\ R \cap S\ (c)\ S \circ R\ (d)\ R \circ R\ (e)\ R \oplus S$

25. a) If α, β, γ are the roots of $x^3 + px + q = 0$ form the equation whose roots are $\alpha^2 + \beta\gamma, \beta^2 + \gamma\alpha, \gamma^2 + \alpha\beta$.

b) Find the equation whose roots are the roots of $2x^5 - 9x^3 + 4x + 3 = 0$ each increased by 2.

(2×15=30)