Reg. No .... Name **23U137**

B. Sc. DEGREE END SEMESTER EXAMINATION : NOVEMBER 2023

SEMESTER 1 : MATHEMATICS (COMMON FOR BSC CA/BCA)

COURSE : **19U1CRCMT1/19U1CPCMT1 : FOUNDATION OF MATHEMATICS**

(For Regular 2023 Admission and Improvement/Supplementary 2022/2021/2020/2019 Admissions)

Time : Three Hours Max. Marks: 75

PART A

Answer any 10 (2 marks each)

1. What is the value of x after each of these statements is encountered in a computer program, if x = 1 before the statement is reached?
 a) if x +2 = 3 then x := x +1
 b) if (x +1 = 3) OR (2x +2 = 3) then x := x +1
2. If U={2,4,6,8,10,12,14,16,18,20}, A={4,6,10,12,18} and B={4,8,12,16,20}. Find the bit strings representing A and AUB.
3. Express the statements “Some student in this class has visited Mexico” and “Every student in this class has visited either Canada or Mexico” using predicates and quantifiers.
4. a) Define a lattice.
 b) Give an example of a poset with five elements that is a lattice and an example of a poset with five elements that is not a lattice.
5. If A={a,b,c} and B={1,2,3,4}. Find the number of functions from A into B and B into A.
6. Draw the graph of the polynomial function f(x)=x^2 -2x-3.
7. Find $\sum_{j \in S} j^2$ and $\sum_{j \in S} j$,where S={1,3,5,7}.
8. Find the number of relations from A = {a, b, c, d} to B = {x, y}.
9. Verify that 496 is a perfect number.
10. What is the composite of the relations R and S, where R is the relation from {1, 2, 3} to {1, 2, 3, 4} with R = {(1, 1), (1, 4), (2, 3), (3, 1), (3, 4)} and S is the relation from {1, 2, 3, 4} to {0, 1, 2} with S = {(1, 0), (2, 0), (3, 1), (3, 2), (4, 1)}?
11. For any three integers, a, b, c, prove If a|b and a|c, then a|(bp + cq), for all integer values of p and q.
12. Let A = {a1, a2, a3} and B = {b1, b2, b3, b4, b5}. Which ordered pairs are in the relation R represented by the matrix M_R
 0 1 0 0 0
 1 0 1 1 0
 1 0 1 0 1

(2 x 10 = 20)

PART B

Answer any 5 (5 marks each)

13. Let A={a,b,c,d,e},B={1,2,3,4,5},C={0,4,7,8}. Consider the relations R from A to B and the relation S from B to C ,defined by R={(a,2),(a,5),(b,3),(c,1),(c,3),(d,5)} and S={(1,7),(2,0),(2,7),(5,0),(5,4)}. Find the matrices M_R,M_S and $M_{S0R.}$
14. What are the terms a_0,a_1,a_2,a_3 of the {an} where a_n=2^n+$(-2)^n$
15. Show that set of all integers is countable.
16. Show that n (n+1) (2n+1) is divisible by 6.

17. For any sets,Prove that A-B=$A \cap \overline{B}$

18. Show that there exist irrational numbers x and y such that xy is rational.

19. Determine whether the relation R on the set reflexive, symmetric, antisymmetric and transitive, where of all Web pages is (a, b)e R If and only if
a) everyone who has visited Web page a has also visited Web page b.
b) there are no common links found on both Web page a and Web page b.
c) there is at least one common link on both Web page a and Web page b.
d) there is a Web page that includes links to both Web page a and Web page b.

20. a) Define a partial ordering.
b) Show that the divisibility relation on the set of positive integers is a partial order.

(5 x 5 = 25)

PART C

Answer any 3 (10 marks each)

21. Construct a truth table for each of these compound propositions.
a) $(p \vee q) \rightarrow (p \oplus q)$
b) $(p \oplus q) \rightarrow (p \wedge q)$
c) $(p \vee q) \oplus (p \wedge q)$
d) $(p \leftrightarrow q) \oplus (\neg p \leftrightarrow q)$
e) $(p \leftrightarrow q) \oplus (\neg p \leftrightarrow \neg r)$

22. a) Define the floor and ceiling functions and display the graphs of these functions.
b) Prove that if x is a real number, then [2x] =[x]+[x+1/2].

23. Draw the Hasse diagram for the partial ordering $\{(A,B) \mid A \subseteq B\}$ on the power set P(S) where S = {a, b, c}.

24. Prove that 3^{2n+1}+ 2 is divisible by 7.

(10 x 3 = 30)