22323/C 230

Reg. No. | | | | | | | | |

Third Semester B.C.A.2 Examination, November/December 2018
DISCRETE MATHEMATICAL STRUCTURES (Repeater)

Time : 3 Hours Max. Marks : 80

Instructions : *a) Answer the questions of all Section as per the instructions.*
b) Simple calculator are allowed.

PART – A

I. Answer **any ten** questions. **(10×2=20)**

1) Determine the set A if $A - B = \{1, 3, 7, 11\}$, $B - A = \{2, 6, 8\}$ and $A \cap B = \{4, 9\}$.
2) Give combination with example.
3) Write the explicit formula for the sequence –4, 16, –64, 256, . . .
4) Construct the truth table $(p \rightarrow q) \cap \sim q$.
5) Define universal quantifiers.
6) State induction principle.
7) Find the number of positive divisors 960.
8) Define transitive relation.
9) List all partitions of $A = \{a, b, c\}$.
10) Let $A = \{1, 2, 3, 4\}$ find $A \times A$.
11) Let a function $f : R \rightarrow R$ defined by $f(x) = x^3 + 2x^2 - 1$. Determine the image of the subset $A = \{-2, 3\}$ of R.
12) Consider the functions f and g defined by $f(x) = x^3$ and $g(x) = x^2 + 1$ $\forall x \in R$ find $f \circ g$.

PART – B

II. Answer **any six** questions. **(6×5=30)**

13) Prove that Addition principle using Venn diagram.
14) Let $A = \begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 1 \\ 1 & 0 & 0 \end{bmatrix}$ & $B = \begin{bmatrix} 1 & 1 & 1 \\ 0 & 0 & 1 \\ 1 & 0 & 1 \end{bmatrix}$ compute (i) $A \vee B$ (ii) $A \wedge B$.
15) State any five laws of logic.
16) Give the direct proof of the statement "If k and l are odd then k + l is even and kl is odd".
17) Prove by mathematical induction that $1^2 + 2^2 + 3^2 + ... + n^2 = \frac{1}{6} n(n+1)(2n+1)$.
18) Find the GCD of 595 and 252 and express it in the form 595 m + 252n.
19) Let $A = \{a, b, c, d\}$ and $R = \{(a, a), (a, b), (b, a), (b, b), (b, c), (b, d), (c, d)\}$. Draw the diagraph of R and matrix representation R.
20) If R is a relation an $A = \{a_1, a_2 . . . a_n\}$ then prove that $M_R = M_R \odot M_R$.

P.T.O.

PART – C

III. Answer **any three** questions. **(3×10=30)**

21) a) Explain operations on sets. **5**

b) In a class of 52 students. 30 are studying C++, 28 are studying Pascal and 13 are studying both languages. How many in this class are studying at least one of these languages ? How many are studying neither of these languages ? **5**

22) a) State any five rules of inference along with their names.

b) Test whether the following argument is valid

$p \to q$
$r \to s$
$p \vee r$
$\therefore q \vee s$ **(5+5=10)**

23) State and prove fundamental theorem of arithmetic. **10**

24) a) Let A = {1, 2, 3} and B = {a, b, c} and the relation R = {(a, 1), (a, 3), (b, 2), (c, 2), (c, 3)} compute $\overline{R}$ and R^C.

b) Explain operations on relations. **(5+5=10)**

25) a) Let A = {1, 2, 3} find all permutations of the set A. Compute inverse of P.

b) Let $f(n) = 3n^4 - 5n^2$ and $g(n) = n^4$ be defined for the positive integers n. Then show that f and g have the same order. **(5+5=10)**
