Paper Code: B

PNR No:: 119201MTH89086

COURSE CODE : MTH401
COURSE TITLE : DISCRETE MATHEMATICS

Time Allowed: 01 hr ***Max.Marks: 40***

Read the following instructions carefully before attempting the question paper.

1. Match the Paper Code shaded on the OMR Sheet with the Paper code mentioned on the question paper and ensure that both are the same.

2. This question paper contains 40 questions of 1 mark each. 0.25 marks will be deducted for each wrong answer.

3. Do not write or mark anything on the question paper except your registration no on the designated space.

4. Submit the question paper and the rough sheet(s) along with the OMR sheet to the invigilator before leaving the examination hall.

Q1. Let R = {(a , b)|a and b have common mother tongue } be a relation defined on the S where S is the set of all students of a campus Then
(a)R is not reflexive (b)R is not symmetric (c)R is not transitive (d)R is not antisymmetric

Q2. What is the negation of the statement $\forall x(x^2 > x)$?
(a)$\exists x(x^2 \leq x)$ (b) $\exists x \neg(x^2 \leq x)$ (c) $\exists x \neg(x^2 < x)$ (d) $\exists x(x^2 < x)$.

Q3. $p \wedge (p \vee q) \equiv p$ is called_____.
(a)Identity Law (b)Domination law (c)Idempotent law (d)Absorption law

Q4. What is the degree of following recurrence relation $a_n = 2\,a_{n-1}$ for $n \geq 1$, $a_0 = 3$
(a) 1 (b) 2 (c) 3 (d) 4

Q5. Let R = {(a , b)| ab ≥ 0} be a relation which is defined on the set A where A is the set of Integers . Then
(a)R is reflexive (b)R is symmetric (c)R is transitive (d)All of above

Q6. Which of the following is recurrence relation for the sequence 3, 6, 9, 15, 24, 39,..... where given $a_1 = 3$ and $a_2 = 6$
(a) $a_n = a_{n-1}{}^2$ (b) $a_n = a_{n-1} + a_{n-2}$ (c) $a_n = a_{n-1} - a_{n-2}$ (d) none of the above

Q7. Which of the following statement is false?
(a)If 1+1=2 then 2+2=5 (b)If 1+1=3 then 2+2=4
(c)If 1+1=3 then 2+2=5 (d)If pigs can fly,then 1+1=3

Q8. If 'n' elements be there in the set ,then no. of relations which are both symmetric and reflexive is
(a)$2^{\frac{n(n+1)}{2}}$ (b) $2^{\frac{n(n-1)}{2}}$ (c)$2^{n(n-1)}$ (d) $2^{n(n+1)}$

Q9. Among the operators $\neg$, $\wedge$, $\vee$, $\rightarrow$, which one has the highest precedence?
(a) $\neg$ (b) $\wedge$ (c) $\vee$ (d) $\rightarrow$

Q10. Which of the following is equivalent to $\neg(p \leftrightarrow q)$?
(a)$\neg p \leftrightarrow \neg q$ (b) $p \leftrightarrow \neg q$ (c) $\neg p \rightarrow q$ (d) $p \rightarrow \neg q$

Q11. Which of the following represents the sequence 1, 2, 5,11,26,..... where $t_0 = 1$ and $t_1 = 2$
(a) $t_n = t_{n-1} + t_{n-2}$ (b) $t_n = t_{n-1} + 3\,t_{n-2}$ (c) $t_n = 2\,t_{n-1} + 2$ (d) none of the above

Q12. Let R be a relation defined on the set A . Then two elements x and y of a set are said to be incomparable if
(a)xRy or yRx (b)xRy and yRx (c)neither xRy nor yRx (d)None of these

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Q13. $\{a_n\}$ is the solution of the recurrence relation $a_n = 8a_{n-1} - 16a_{n-2}$ if
(a) $a_n = 4^n$ (b) $a_n = (-4)^n$ (c) $a_n = n^2 4^n$ (d) none of the above

Q14. Which of the following is non homogeneous recurrence relation?
(a) $H_n = H_{n-1} + H_{n-2}$ (b) $H_n = H_{n-1} + H_{n-2} + H_{n-3}$ (c) $H_n = 2H_{n-1}$ (d) $H_n = H_{n-1} + 4$

Q15. If $a_n = a_{n-1} + 2a_{n-2}$ then characteristic equation is given by
(a) $r^2 - r + 2 = 0$ (b) $r^2 - r = 0$ (c) $r^2 - r - 2 = 0$ (d) none of the above

Q16. Which of the following is linear recurrence relation?
(a) $a_n = a_{n-1}^3$ (b) $a_n = a_{n-1} + a_{n-2}^2$ (c) $a_n = a_{n-1} + a_{n-2}$ (d) none of the above

Q17. Negation of the statement, "If your age is 18 years, then you can vote" is:
(a)Your age is not 18 years and you cannot vote. (b)You age is 18 years and you cannot vote.
(c)Your age is not 18 years and you cannot vote. (d)Your age is not 18 years and you cannot vote.

Q18. Generating function for sequence $\{a_k\}$ with $a_k = 3$ is given by
(a) $\sum_{k=0}^{\infty} x^k$ (b) $\sum_{k=0}^{\infty} 3x^k$ (c) $\sum_{k=0}^{\infty} 9x^k$ (d) none of the above

Q19. If A = {a, b, c} and B = {e, f} then total number of relations from A to B = ?
(a) 2^5 (b) 2^6 (c) 5^5 (d) 2^3

Q20. The no. of non empty relations from A = {1,2,3} to B = {a, β} is
(a) 2^6 (b) 2^3 (c) $2^6 - 1$ (d) $2^5 - 1$

Q21. Using the rules of precedence how can $\neg p \wedge r$ be rewritten using parentheses?
(a) $(\neg p) \wedge r$ (b) $\neg(p \wedge r)$ (c) $p \wedge (\neg r)$ (d)none of these

Q22. Suppose that the number of bacteria in a colony triples every hour " If 100 bacteria are used to begin a new colony , how many bacteria will be in the colony in 10 hours?"
(a) 5904 (b) 59049 (c) 590490 (d) 5904900

Q23. Let R ={(A,B) : if A is superset of B } defined on a collection of sets then,
(a)equivalence relation (b)a poset (c)only reflexive (d)only transitive

Q24. Which of the following has the same truth value as "$p \rightarrow q$"?
(a)$q \rightarrow p$ (b)$\neg q \rightarrow \neg p$ (c)$\neg p \rightarrow \neg q$ (d)none of these

Q25. The minimal elements of the poset {2, 4, 5, 10, 12, 20, 25}, |) are
(a)2 and 5 (b)2, 4, 5 (c) 2 (d)None of these

Q26. Let A={1 , 2, 3, 4}.The relation R whose matrix is $\begin{bmatrix} 1 & 0 & 1 & 0 \\ 0 & 1 & 0 & 1 \\ 1 & 0 & 1 & 0 \\ 0 & 1 & 0 & 1 \end{bmatrix}$ is
(a)only symmetric (b)only reflexive (c)only transitive (d)an equivalence relation

Q27. Consider the given relation R , defined on A = {1 , 2 , 3, 4}
R = {(1,1), (1,2), (2,2), (3,4), (4,4)}, then which one of the following is true
(a)R is reflexive (b)R is symmetric (c) [illegible] (d) [illegible]

Q28. The negation of the statement "All birds can fly" is
(a) A bird can fly (b)There exists a bird which cannot fly.
(c)No bird can fly (d) None of the above.

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Q29. Let R={(a,b): If a and b born on same day } defined on the A , where A is the set of person living in a same city ,then R is
(a)only reflexive (b)only symmetric (c)only transitive (d)an equivalence relation

Q30. In the concept of tower of Hanoi if 3 disks are given at peg 1 then how many moves are required to transfer all disks from peg 1 to peg 3 according to the rules of game?
(a) 5 (b) 7 (c) 6 (d) 8

Q31. $p \vee p \equiv p$ is called___.
(a)Identity Law (b)Domination law (c)Idempotent law (d)Absorption law

Q32. Let R = {(a , b)|a divides b} be a relation which is defined on the set A where A is the set of Integers . Then

(a)R is reflexive (b)R is antisymmetric (c)R is transitive (d)All of above

Q33. What is the truth value of "$p \rightarrow q$" if p is false and q is true?
(a)True (b) False
(c) It depends on the statement p and q (d) none of these

Q34. Suppose that a person deposits Rs. 10000 is a saving account at a bank yields 11% per year interest compounded annually. How much amount will person have in account after n years?
(a) $a_n = 1.11\ a_{n-1}$ (b) $a_n = 0.11\ a_{n-1}$ (c) $a_n = 1.10\ a_{n-1}$ (d) $a_n = 11.1\ a_{n-1}$

Q35. Let R={(a,b): If a and b belong to the same section K1500} defined on the A , where A is the set of person ,then R is
(a)only reflexive (b)only symmetric (c)only transitive (d)an equivalence relation

Q36. Let R={(a,b):a,b children of same father } defined on the set A . Then,
(a)only reflexive (b)only symmetric (c)only transitive (d)an equivalence relation

Q37. If the conclusion of the statement "$p \rightarrow q$" is true then "$p \rightarrow q$" is true.The proof which uses this strategy is called _____.
(a)Trivial Proof (b)Vacuous proof
(c)Proof by counterexample (d)none of these

Q38. If for sequence {an} , an is $2 . (-3)^n + 5$ then the value of a_0 is
(a) 1
(b) 2
(c) 7
(d) 4

Q39. "Two natural numbers are said to be relatively prime if and only if their GCD is 1".This is a_____.
(a)Conditional (b) Contradiction (c)Biconditional (d)Implication

Q40. If 3,3 are the roots of the characteristic equation for linear homogeneous recurrence relation of degree 2 with constant coefficients then form of the solution is , where and b are the constants
(a) $a\ n\ 3^n$
(b) $a\ n^3\ 3^n$
(c) $(a + b\ n)\ 3^n$
(d) none of the above

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7	a	31	c
8	b	32	d
9	a	33	a
10		34	a
11	b	35	d
12	c	36	d
13	a	37	a
14	d	38	c
15	c	39	c
16	c	40	c
17	b		
18	b		
19	b		
20	c		
21	a		
22	d		
23	b		
24	b		