HOLIDAY HOMEWORK

1. Let R be a relation on the set N be defined by {(x, y) ∀ x, y ∈N, 2x + y = 41}. Then, R is
   a. (a) Reflexive (b) Symmetric (c) Transitive (d) None of these
2. For real numbers x and y, we write x R y ↔ x – y + $\sqrt{2}$ is an irrational number. Then, the relation R is
   (a) Reflexive (b) Symmetric (c) Transitive (d) None of these
3. The relation R = {(1, 1), (2, 2), (3, 3), (1, 2), (2, 3), (1, 3)} on set A = {1, 2, 3} is
   (a) Reflexive but not symmetric
   (b) Reflexive but not transitive
   (c) Symmetric and transitive
   (d) Neither symmetric nor transitive
4. Consider the non-empty set consisting of children in a family and a relation R defined as a R b if a is brother of b. Then R is
   (a) symmetric but not transitive
   (b) transitive but not symmetric
   (c) neither symmetric nor transitive
   (d) both symmetric and transitive
5. Let P = {(x, y) : x^2+ y^2= 1, x, y ∈R}. Then, P is
6. Reflexive (b) Symmetric (c) Transitive (d) Anti-symmetric
7. Let S be the set of all real numbers. Then, the relation R = {(a, b) : 1 + ab > 0} on S is
   (a) Reflexive and symmetric but not transitive
   (b) Reflexive and transitive but not symmetric
   (c) Symmetric, transitive but not reflexive
   (d) Reflexive, transitive and symmetric
8. Let R be the relation in the set Z of all integers defined by R = {(x, y) : x – y is an integer}. Then R is
9. reflexive (b) symmetric (c) transitive (d) an equivalence relation
10. For the set A = {1, 2, 3}, define a relation R in the set A as follows R = {(1, 1), (2, 2), (3, 3), (1, 3)} Then, the ordered pair to be added to R to make it the smallest equivalence relation is
    a. (a) (1, 3) (b) (3, 1) (c) (2, 1) (d) (1, 2)

11. Let A = {1, 2, 3}and R = {(1, 2), (2, 3)} be a relation in A. Then, the minimum number of ordered pairs may be added, so that R becomes an equivalence relation, is

a. (a) 7 (b) 5 (c) 1 (d)4

12. Let A = {1, 2, 3}. Then, the number of relations containing (1, 2) and (1, 3), which are reflexive and symmetric but not transitive, is

a. (a) 1 (b) 2 (c) 3 (d) 4

13. Let f : R → R be a function defined by f(x) = x^3 + 4, then f is

a. (a) Injective (b) Surjective (c) Bijective (d) None of these

14. Let X = {0, 1, 2, 3} and Y = {−1, 0, 1, 4, 9} and a function f :X →Y defined by y = x^2, is

15. one-one onto (b) one-one into (c) many-one onto (d) many-one into

16. Let g:R→R g(x) = x^2 – 4x – 5, then

17. g is one-one on R (b) g is not one-one on R

18. g is bijective on R (d) None of these

19. The mapping f : N → N given by f(n) = 1 + n^2 , n ∈ N when N is the set of natural numbers, is

20. The function f: R → R given by f(x) = x^3 – 1 is

a. (a) a one-one function (b) an onto function

b. (c) a bijection (d) neither one-one nor onto

21. A function f : X→Y is said to be onto, if for every y ∈ Y, there exists an element x in X such that

a. (a) f(x) = y (b) f(y) = x (c) f(x) + y = 0 (d) f(y) + x = 0

22. Let R be the relation in the set {1, 2, 3, 4} given by R = {(1, 2), (2, 2), (1, 1), (4, 4), (1, 3), (3, 3), (3, 2)}.

(a) R is reflexive and symmetric but not transitive

(b) R is reflexive and transitive but not symmetric

(c) R is symmetric and transitive but not

(d) R is equivalence relation

23. Let A = {1, 2, 3} and B = {a, b, c}, then the number of bijective functions from A to B are

a. (a) 2 (b) 8 (c) 6 (d) 4

24. The number of surjective functions from A to B where A = {1, 2, 3, 4} and B = {a, b} is

a. (a) 14 (b) 12 (c) 2 (d) 15

25. The function f : R → R defined by f (x) = (x – 1) (x – 2) (x – 3) is

a. (a) one-one but not onto (b) onto but not one-one

26. (c) both one-one and onto (d) neither one-one nor onto

27. If$\begin{bmatrix} 2 & 1 \\ 3 & 2 \end{bmatrix}A\begin{bmatrix} -3 & 2 \\ 5 & -3 \end{bmatrix}$=$I_2$,then A=

a. (a) $\begin{bmatrix} 1 & 1 \\ 1 & 0 \end{bmatrix}$ (b) $\begin{bmatrix} 1 & 1 \\ 0 & 1 \end{bmatrix}$ (c) $\begin{bmatrix} 1 & 0 \\ 1 & 1 \end{bmatrix}$ (d) $\begin{bmatrix} 0 & 1 \\ 1 & 1 \end{bmatrix}$

28. If A=$\begin{bmatrix} 3 & 2 \\ 0 & 1 \end{bmatrix}$,then$(A^{-1})^3$ is equal to

a. (a)$\frac{1}{27}\begin{bmatrix} 1 & -26 \\ 0 & 27 \end{bmatrix}$ (b)$\frac{1}{27}\begin{bmatrix} 1 & 26 \\ 0 & 27 \end{bmatrix}$ (c)$\frac{1}{27}\begin{bmatrix} 1 & -26 \\ 0 & -27 \end{bmatrix}$

(d)$\frac{1}{27}\begin{bmatrix} -1 & -26 \\ 0 & -27 \end{bmatrix}$

29. If A= $\begin{bmatrix} 0 & 3 \\ 2 & 0 \end{bmatrix}$ and A^{-1}=mA,then m is equal to

a. (a)-1/6 (b)1/3 (c)-1/3 (d)1/6

30. If I_3 is the identity matrix of order 3,then ${I_3}^{-1}$=

a. (a)O (b)3I_3 (c) I_3 (d)Not necessarily exist

31. If A and B are 2 non-zero matrices such that AB=0,then

(a)both A and B are singular (b)either of them is singular

(c)neither of them is singular (d)none of these

32. If A is a singular matrix then **A.adjA**=

(a)is a scalar matrix (b)is a zero matrix

(c) is an identity matrix (d)none of these

33. For how many integral values of x in the closed interval [-4,-1], matrix $\begin{bmatrix} 3 & -x-1 & 2 \\ 3 & -1 & x+2 \\ x+3 & -1 & 2 \end{bmatrix}$is singular?

(a) Zero (b) 2 (c) 1 (d) 3

34. If A and B are square matrices of sixe nXn,such that A^2-B^2=(A+B)(A-B),then which one of the following is always true-

(a)AB=BA (b) either of A or B is a zero matrix

(c) Either of A or B is an identity matrix (d) A=B

35. If[$a_{ij}]_{nxn}$ be a diagonal matrix with diagonal element all different and B=[$b_{ij}]_{nxn}$ be some matrix .Let AB=[$c_{ij}]_{nxn}$,then c_{ij} is equal to

a) $a_{jj}b_{ij}$ (b) $a_{ii}b_{ij}$ (c) $a_{ij}b_{ij}$ (d) $a_{ij}b_{ji}$

36. If A is a skew matrix of odd order, then $|adjA|$ is equal to

(a) 0(b) n (c) n^2 (d) none of these

37. A square matrix P satisfies $P^2 = I - P$ where I is the identity matrix. If $P^n = 5I - 8P, then\ n =$

(a) 4(b) 5 (c) 6 (d) 7

38. If A=$\begin{bmatrix} 4 & x+2 \\ 2x-3 & x+1 \end{bmatrix}$ is symmetric ,then x=

(a) 3(b) 5 (c) 2 (d) 4

39. If A is 3X4 matrix and B is a matrix such that A'B and BA' are defined, then B is of the type

(a)3X 4 (b) 3X3 (c) 4X4 (d) 4X3

CASE STUDY QUESTIONS

1. Aman and Ramesh are playing Ludo at home during Covid-19.While rolling the dice, Aman's sister Lata observed and noted the possible outcomes of the throw every time belongs to set {1,2,3,4,5,6}.Let A be the set of players while B be the set of all possible outcomes. Let A={A,R},B={1,2,3,4,5,6}.Using the information given above, answer the following:

(i)Let R:B→B be defined by R ={(x,y): y =x}is

(a) Reflexive and transitive but not symmetric
(b) Reflexive and symmetric but not transitive
(c) Reflexive but not symmetric and transitive
(d) Equivalence

(ii) Let R :B→B be defined by R={(1,2)(2,2)(1,3)(3,4)(3,1))(4,3)(5,5)}.Then R is (a)Symmetric (b) Reflexive

(c) Transitive (d) None of these three

(iii) Let R :B→B be defined by R={(2,1)(1,2)(2,2)(3,3)(4,4)(5,5)(6,6)},then R is

(a)Symmetric (b) Reflexive and Transitive (c) Transitive and symmetric (d) Equivalence

(iv) Lata wants to know the number of relations possible from A to B .How many relations are possible?

(a)36 (b) 64 (c) 6! (d) 2^{12}

(v) Lata wants to know the number of functions from A→B, How many numbers of functions are possible?

(a)36 (b) 64 (c) 6! (d) 2^{12}

2.A Robot works on the software which follows function f(x)=$\frac{x-2}{x-1}$ .If the value of domain is put in place of x.This robot works and performs various works. Based on the above in information, answer the following:

(i) What will the value/values of x ,on which this robot works

(a)On all real values (b)On all real values except 1

(c)On all real values except 2 (d)On all real values except {1,2}

(ii) If range denotes the number of works performed, then range of the works performed will be

(a) $R-\{1\}$ (b) $R-\{2\}$

(c) $R-\{1,2\}$ (d)On all real values

(iii) If this function is defined from f:R-{1}→ $R-\{1\}$

(a)Injective (b) Surjective

(c)Bijective (d) Into

(iv) If a Robot follows the f:R-{1}→ R,then f(x) is (a)Injective (b) Surjective

(c)Bijective (d) Into

(v) If a Robot follows the f:N-{1}→ $R-\{1\}$,then f(x) is

(a)Injective (b) Surjective

(c)Bijective (d) Into