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(FOR THE CANDIDATES ADMITTED DURING THE ACADEMIC YEAR 2022 ONLY)

22UBC2A2

REG.NO. :

N.G.M.COLLEGE (AUTONOMOUS) : POLLACHI

END-OF-SEMESTER EXAMINATIONS : MAY-2023

COURSE NAME: B.C.A **MAXIMUM MARKS: 50**

SEMESTER: II **TIME : 3 HOURS**

PART - III

MATHEMATICAL FOUNDATION FOR COMPUTER APPLICATIONS

SECTION – A (10 X 1 = 10 MARKS)

ANSWER THE FOLLOWING QUESTIONS. (K1)

MULTIPLE CHOICE QUESTIONS.

1. What is the Cartesian product of A = {1, 2} and B = {a, b}?
   a) {(1, a), (1, b), (2, a), (b, b)} b) {(1, 1), (2, 2), (a, a), (b, b)}
   c) {(1, a), (2, a), (1, b), (2, b)} d) {(1, 1), (a, a), (2, a), (1, b)}
2. The function (gof) is _____ , if the function f and g are onto function?
   a) Into function b) one to one function c) onto function d) one-to-many function
3. If a pair of nodes is joined by more than one edge, then such edges are called_____.
   a) multiple or parallel edges b) Self-Edge or self –Loop
   c) Weighted Graph d) directed or undirected
4. If matrices A and B are inverse of each other then_____.
   a) AB = BA = I b) AB = 0, BA = I c) AB = BA = 0 d) AB = BA
5. When we perform an experiment, then the set S of all possible outcomes is called _____.
   a) Random Experiment b) Sample Space c) Event d) Tossing Space

ANSWER THE FOLLOWING IN ONE (OR) TWO SENTENCES. (K2)

6. Define Power Set.
7. Define Relation.
8. What is meant by regular graph?
9. Interpret singular matrix.
10. Write multiplication law of probability.

SECTION – B (5 X 3 = 15 MARKS)

ANSWER EITHER (a) OR (b) IN EACH OF THE FOLLOWING QUESTIONS. (K3)

11. a) Given that N = {1, 2, 3, ..., 100}, then
    (i) Write the subset A of N, whose element are odd numbers.
    (ii) Write the subset B of N, whose element are represented by x + 2, where x ∈ N

(OR)

b) Given that E = {2, 4, 6, 8, 10}. If n represents any member of E, then, write the following sets containing all numbers represented by
   (i) n + 1 (ii) n^2

(CONTD……2)

12.a) Let $A = \{1,2,3,4\}$ and $B = \{3,4,5,6\}$
Find the elements of each relation R stated below. Also, find the domain and range of R.
i. aRb if and only if a<b
ii. aRb if and only if a and b are both odd numbers.

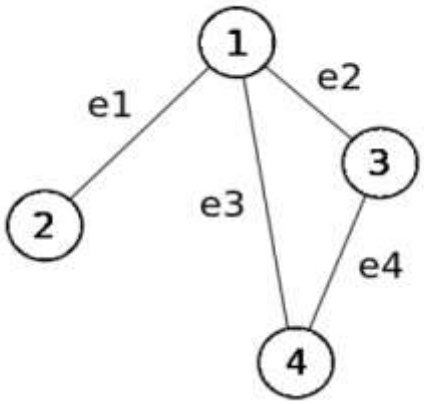
(OR)

b) Is the function f(x) = x+1 from the set of integers to the set of integers onto?

13.a) Show that the degree of a vertex of a simple graph G on n vertices cannot exceed n-1.

(OR)

b) Write the incidence matrix of the graph G given in figure



14.a) Calculate the rank of the following matrix:

$$\begin{pmatrix} 0 & 16 & 8 & 4 \\ 2 & 4 & 8 & 16 \\ 16 & 8 & 4 & 2 \\ 4 & 8 & 16 & 2 \end{pmatrix}$$

(OR)

b) Find the adjoint of $\begin{pmatrix} 4 & 2 \\ -1 & 3 \end{pmatrix}$

15. a) Two identical symmetric dice are thrown. Find the probability of obtaining a total score of 8.

(OR)

b) A letter is known to have come either from TATANAGAR or from CALCUTTA. On the envelope just two consecutive letters TA are visible. What is the probability that the letter came from CALCUTTA?

SECTION – C (5 X 5 = 25 MARKS)

ANSWER EITHER (a) OR (b) IN EACH OF THE FOLLOWING QUESTIONS. (K4 (Or) K5)

16. a) For all sets A, B and C, Is $(A - B) \cap (C - B) = (A \cap C) - B$?
Justify your answer.

(OR)

b) From 50 students taking examinations in Mathematics, Physics and Chemistry, each of the student has passed in at least one of the subject, 37 passed Mathematics, 24 Physics and 43 Chemistry. At most 19 passed Mathematics and Physics, at most 29 Mathematics and Chemistry and at most 20 Physics and Chemistry. What is the largest possible number that could have passed all three examination?

(CONTD……3)

17. a) Let X = {a, b, c}. Define f :X → Xsuch that f = {(a,b) , (b,a) , (c,c) }.
Determine i)f^{-1} ii) f^2 iii) f^3 iv) f^4

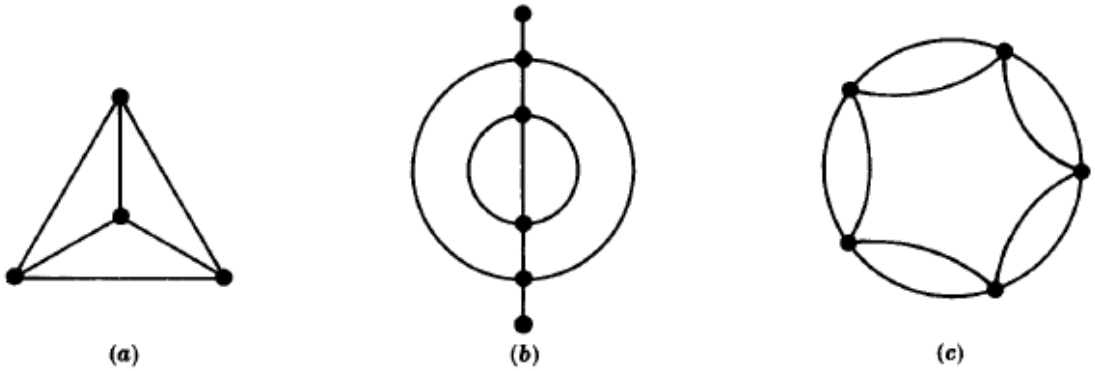
(OR)

b) Let Z denote the set of integers and the relation R in Z be defined by aRb iff. a-b is an even integer.Then show that R is an equivalence relation.

18. a) Let *G* be a simple graph with 12 edges. If *G* has 6 vertices of degree 3 and the rest of the vertices have degree less than 3, then find the (i) minimum number of vertices and (ii) maximum number of vertices.

(OR)

b) Count the number V of vertices, the number E of edges, and the number R of regions of each map in Figure ; and verify Euler's formula. Also find the degree d of the outside region.



19.a) Find the inverse of the matrix $\begin{pmatrix} 1 & 1 & 3 \\ 1 & 3 & -3 \\ -2 & -4 & -4 \end{pmatrix}$

(OR)

b) Find the Eigen values of $\begin{pmatrix} 1 & -1 & 0 \\ 1 & 2 & 1 \\ 0 & 1 & 1 \end{pmatrix}$

20. a) From a city population, the probability of selecting
(i) a male or a smoker is 7/10
(ii) a male smoker is 2/5 and
(iii) a male, if a smoker is already selected is 2/3. Find the probability of selecting (a) a non-smoker (b) a male and (c) a smoker, if a male is first selected.

(OR)

b) There are two bags. First bag contains 5 red, 6 white balls and the second bag contains 3 red, 4 white balls. One bag is selected at random and a ball is drawn from it. What is the probability that it is (i) red (ii) white.

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