18CMU08/18CTU08

PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)

BSc DEGREE EXAMINATION MAY 2024
(Second Semester)

Common to Branches – **COMPUTER SCIENCE & COMPUTER TECHNOLOGY**

MATHEMATICS - II

Time: Three Hours Maximum: 50 Marks

SECTION-A (5 Marks)
Answer **ALL** questions
ALL questions carry **EQUAL** marks (5 x 1 = 5)

1 The statement which is true if p and q are both true or both false and is false when one of them is false and another is true is called as----------
(i) conditional statement (ii) inverse
(iii) Bi conditional statement (iv) converse statement

2 What is the value of x and y if the following ordered pairs are equal?
(2x-1 , -5) = (x , y+1)
(i) x=1,y=0 (ii) x=-1,y=1 (iii) x=-1,y=0 (iv) x=1,y=-6

3 A function $f : A \to A$ defined by f(x)=x for each xϵ A is called ----------
(i) constant function (ii) identity function
(iii) one-one function (iv) on to function

4 A vertex is said to be pendent vertex if its degree is-------
(i) one (ii) zero (iii) five (iv) two

5 A Path that passes through each edge exactly once but vertices may be repeated is called----------
(i) Hamiltonian path (ii) Euler circuit
(iii) Euler path (iv) Hamiltonian circuit

SECTION - B (15 Marks)
Answer **ALL** Questions
ALL Questions Carry **EQUAL** Marks (5 x 3 = 15)

6. a By means of truth table show that $(p \wedge q) \wedge \square (p \vee q)$ is a contradiction.

OR

b Show that the statement $(p \wedge \square q) \vee (\square p \wedge q)$ is contingency.

7. a Let A = {a,b}, B = {p,q} and C = {q,r}. Find,
(a) A x (B $\cup$ C) (b) (A x B) $\cup$ (A x C)

OR

b The relation R on the set S of all real numbers is defined as: a R b if and only if 1 + ab>0 . Show that this relation is reflexive and symmetric but not transitive.

8. a If R and C be the set of all Real and Complex numbers, respectively, then prove that the function defined as : $f : C \to R$ such that f(z) = $|z|$, for all z ϵ C is neither one-one nor onto.

OR

b Let A = {1,2,3,4} , B = {a,b,c,d} and C = { x,y,z}. Consider the function $f : A \to B$ and $g : B \to C$ defined by f = {(1,a) , (2,c) , (3,b) , (4,a)} and g = {(a,x) , (b,x) , (c,y) , (d,y)}. Find the composition function (g0f).

9. a Prove that a simple graph G with n vertices and k components cannot have more than ½(n-k)(n-k+1) edges.

OR

b Show that the maximum number of edges in a complete bipartite graph with n vertices are $n^2/4$..

Cont...

10. a Define adjacency matrix.and write the adjacency matrix for the given graph.

OR

b Determine the number of loops and multiple edges in a multi graph G from its adjacency matrix $A = \begin{bmatrix} 1 & 1 & 2 & 0 \\ 1 & 2 & 1 & 3 \\ 2 & 1 & 0 & 1 \\ 0 & 3 & 1 & 0 \end{bmatrix}$

SECTION -C (30 Marks)

Answer **ALL** questions

ALL questions carry **EQUAL** Marks (5 x 6 = 30)

11. a Construct the truth table for the following and write the truth set.

$$p \Rightarrow \{(q \vee r) \wedge \neg (p \Leftrightarrow \neg r)\}$$

OR

b Examine the validity of the following argument.

$$\begin{array}{l} p \vee q \\ p \Rightarrow \neg q \\ \underline{p \Rightarrow r} \\ \therefore r \end{array}$$

12. a Define the following,

(i) Binary Relation (ii) Universal Relation (iii) Identity Relation
(iv) Void Relation (v) Inverse Relation (v) Reflexive Relation

OR

b Show that the relation $\leq$ defined on the set of positive integers I_+ is a partial order relation.

13. a If $f : A \to B$ and $g : B \to C$ are two one-one onto functions, then prove that

(i) g 0 f: A → C is one-one onto, and
(ii) g 0 f is invertible, ie, $(g\ 0\ f)^{-1} = (f^{-1}\ 0\ g^{-1}) : C \to A$.

OR

b Let X and Y be two nonempty sets and let $f : X \to Y$ is an into mapping and also $A \subseteq X$, $B \subseteq X$, then prove that (i) $f(A \cap B) \subseteq f(A) \cap f(B)$, and (ii) $f^{-1}(A \cap B) = f^{-1}(A) \cap f^{-1}(B)$

14. a Define (i) Simple Graph (ii) Multi Graph (iii) Degree of a vertex
(iv) Walk (v) Path (vi) Trial

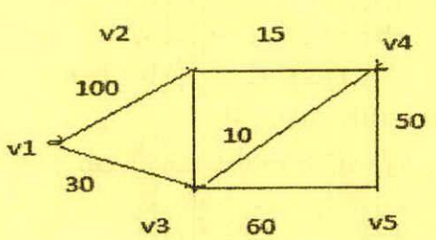
OR

b Prove that, a graph G is disconnected if and only if its vertex set V can be portioned into two non-empty, disjoint subsets V_1 and V_2 such that there exists no edge is G whose one end vertex is in subset V_1 and the other in subset V_2.

15. a Show that an indirect graph G is Eulerian if and only if it is connected and each vertex has even degree.

OR

b Apply Dijkastra algorithm to find the shortest path from vertex v_1 to $v_5$in the given graph.



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