

**PSG COLLEGE OF ARTS & SCIENCE**  
(AUTONOMOUS)

**BSc DEGREE EXAMINATION MAY 2024**  
(Second Semester)

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

**MATHEMATICS FOR COMPUTING – II**

Time: Three Hours

Maximum: 75 Marks

**SECTION-A (10 Marks)**

Answer ALL questions

ALL questions carry EQUAL marks

(10 × 1 = 10)

Module No.	Question No.	Question	K Level	CO
1	1	The word and phrases that are used to form a compound proposition are called _____. a) primary                      b) connectives c) conjunction                d) atomic	K1	CO1
	2	The statement $(p \wedge q) \Rightarrow q$ is a _____. a) contradiction                b) exclusive c) tautology                      d) argument	K1	CO1
2	3	If $A = \{1,2,3\}$ and $B = \{2,3\}$ then $n(A \times B) =$ _____. a) 3                      b) 2                      c) 5                      d) 6	K2	CO2
	4	R is symmetric if and only if _____. a) $R=R$ b) $R = R^{-1}$ c) $R = R'$ d) $R = M_R$	K2	CO2
3	5	Let $f : A \rightarrow B$ be a function then the set A is called _____. a) domain                      b) co-domain                      c) function                      d) relation	K1	CO3
	6	Let $f$ be a function from A to B and $g$ is function from B to A. Then $g$ is the _____ function of $f$ . a) partial                      b) composite                      c) inverse                      d) identity	K1	CO3
4	7	The _____ of a vertex $v$ in a directed graph is the number of edges beginning from it. a) in degree                      b) degree c) incidence                      d) out degree	K2	CO4
	8	A multigraph G is said to be _____ if it can be drawn without any break in the curve and without repeating any edge. a) traversable                      b) planar c) undirected                      d) directed	K1	CO4
5	9	If graph G is connected with $n$ vertices, then rank of incidence matrix $M$ is _____. a) $n$ b) $n - 1$ c) $n + 1$ d) $2n$	K2	CO5
	10	If a graph G is connected and each vertex has even degree then there is an _____ circuit in G. a) Hamiltonian                      b) Euler c) connected                      d) Planar	K1	CO5

**SECTION - B (35 Marks)**

Answer ALL questions

ALL questions carry EQUAL Marks

(5 × 7 = 35)

Module No.	Question No.	Question	K Level	CO
1	11.a.	With the help of truth tables, prove the following i) $p \vee q = \sim(\sim p \wedge \sim q)$ ii) $p \vee \sim q = (p \vee q) \wedge \sim(p \wedge q)$	K3	CO1
		(OR)		
	11.b.	If $p, q$ and $r$ are three statements, then show that $[(p \Rightarrow q) \wedge (q \Rightarrow r)] \Rightarrow (p \Rightarrow r)$ . Also write its truth set.		

Cont...

2	12.a.	Classify the types of relations with an example.	K3	CO2
	(OR)			
	12.b.	If R is an equivalence relations in a set A, then prove that $R^{-1}$ is also an equivalence relation.		
3	13.a.	If R is a set of real numbers, then show that the function, $f : R \rightarrow R$ defined by $f(x) = 5x^3 - 1$ is one-one onto function.	K4	CO3
	(OR)			
	13.b.	If $f : A \rightarrow B$ and $g : B \rightarrow C$ are invertible functions, then prove that $g \circ f : A \rightarrow C$ is also invertible and $(g \circ f)^{-1} = f^{-1} \circ g^{-1}$ .		
4	14.a.	Prove that the number of vertices of odd degree in a graph is always even.	K4	CO4
	(OR)			
	14.b.	Prove that if the intersection of two paths in a graph G is disconnected, then their union has atleast one circuit.		
5	15.a.	Define adjacency matrix with an example and discuss the results about adjacency matrix.	K2	CO5
	(OR)			
	15.b.	Define the following with an example. i) Planar graph    ii) Maps and iii) Region of a graph.		

**SECTION -C (30 Marks)**

Answer ANY THREE questions

ALL questions carry EQUAL Marks

(3 × 10 = 30)

Module No.	Question No.	Question	K Level	CO
1	16	Examine the validity of following arguments $p \Rightarrow q$ i) $\frac{p \wedge q}{\therefore q}$ ii) $\frac{q \Rightarrow p}{\therefore p \vee q}$ $p \vee q$ $p \Rightarrow q \quad p \Rightarrow \sim q$ iii) $\frac{\sim q}{\therefore \sim p}$ iv) $\frac{p \Rightarrow r}{\therefore r}$	K4	CO1
2	17	Define Hasse Diagrams with example and briefly explain the tips are necessary to read Hasse diagram for a relation.	K4	CO2
3	18	Classify the different types of functions with examples.	K3	CO3
4	19	Prove the following i) A simple graph G with n vertices and k components cannot have more than $\frac{1}{2}(n-k)(n-k+1)$ edges. ii) If a simple graph G with n vertices has more than $\frac{1}{2}(n-1)(n-2)$ edges, then G is connected.	K4	CO4
5	20	Derive Euler's formula and hence prove that, (i) $3r \leq 2e$ and (ii) $e \leq 3n - 6$ , where G is a loop-free connected planar graph with 'n' vertices, 'e' (>2) edges and 'r' regions.	K4	CO5