BCA
(SEM.II) BCA-2005:
MATHEMATICS – II

REVISED QUESTIONS ANSWERS

MODEL PAPER–I	
Questions	**Answers**
Q.21.Order of the power set of a set of order n is_____. (a) n (b) 2n (c) n^2 (d) 2^n	(d) 2^n
Q.26.If A is a subset of B and B is a subset of C, then cardinality of $A \cup B \cup C$ is equal to _____. (a) Cardinality of C (b) Cardinality of B (c) Cardinality of A (d) None of the mentioned	(d) None of the mentioned
Q.45 Find the distance between two points (5, 6, 7) and (2, 6,). (a) 3 units (b) 0 units (c) 4 units (d) 5 units	(a) 3 units **Solution**: $\sqrt{(2-5)^2+(6-6)^2+(7-7)^2}$ $\sqrt{(-3)^2} = 3\text{units}$
Q.57 If set A contains 5 elements and the set B contains 6 elements, then the number of one-one and onto mappings from A to B is_____. (a) 720 (b) 120 (c) 2 (d) none of these	(d) none of these
Q.81.P is a point on the line segment joining the points (3, 5, -1) and (6, 3, -2). If y-coordinate of point P is 2, then its x-coordinate will be_____.	None of them is correct

(a) 2 (b) 173 (c) 152 (d) -5	
Q.93.Set A has 3 elements and the set B has 4 elements. Then the number of injective functions that can be defined from set A to set B is_____. (a) 144 (b) 12 (c) 124 (d) 64	None of option is correct. **Solution:** Total Injective Functions= $P(n,m) = \frac{n!}{(n-m)!}$ For Set A with 3 elements and Set B with 4 elements: $P(4,3) = \frac{4!}{(4-3)!} = \frac{4!}{1!}$ $= \frac{4\times3\times2\times1}{1} = 24$ So, the correct answer is 24
MODEL PAPER – II	
Q.41.A function $f: N \to N$ is defined by $f(x)=x^2+12$. What is the type of function here? (a) Bijective (b) Subjective (c) injective (d) neither subjective nor injective	(d) neither subjective nor injective
Q.49.Let the function f be defined by $f(x)=\frac{9+3x}{7-2x}$ then $f^{-1}(x)$ is _____ (a) $\frac{9-3x}{7+2x}$ (b) $\frac{7x-9}{2x+3}$ (c) $\frac{2x-7}{3x+9}$ (d) $\frac{2x-3}{7x+9}$	(b) $\frac{7x-9}{2x+3}$ **Solution:** $y = \frac{9+3x}{7-2x}$ $y(7-2x) = (9+3x)$ $7y-2xy = 9+3x$ $7y-9 = 2xy+3x$ $7y-9 = x(2y+3)$ $\frac{7y-9}{2y+3} = x$ $f^{-1} = \frac{7x-9}{2x+3}$ Thus; the inverse function is $f^{-1} = \frac{7x-9}{2x+3}$

Q.57.Suppose a relation R = {(3, 3), (5, 5), (5, 3), (5, 5), (6, 6)} on S = {3, 5, 6}. Here R is known as _____. (a) equivalence relation (b) reflexive relation (c) symmetric relation (d) transitive relation	(c) reflexive relation
Q.62.f(x, y) = sin(x) + cos(y) + xy^2; x = cos(t); y = sin(t) Find $\frac{df}{dt}$ at t = $\frac{\pi}{2}$ (a) 2 (b) -2 (c) 1 (d) 0	(b) -2 **Solution**: $f(x,y) = \sin(x) + \cos(y) + xy^2$ $x = \cos(t)$ and $y = \sin(t)$ By partial Derivatives: $\frac{\partial f}{\partial x} = \cos x + y^2$, $\frac{\partial f}{\partial y} = -\sin y + 2xy$ $\frac{dx}{dt} = -\sin t, \frac{dy}{dt} = \cos t$ At t= $\frac{\pi}{2}$,we have x=0, y=1: $\frac{\partial f}{\partial x} = 2, \frac{\partial f}{\partial y} = -\sin 1$ $\frac{df}{dt} = (2)(-1) + (-\sin 1)(0) = -2$
Q.69.What is the saddle point? (a) Point where function has maximum value (b) Point where function has minimum value (c) Point where function has zero value (d) Point where function neither have maximum value nor minimum value	(d) Point where function neither have maximum value nor minimum value
Q.71.The condition $\frac{a_1}{a_2} = \frac{b_1}{b2} = \frac{c_1}{c_2}$ is for the planes whose normals are _____ to each other. (a) Perpendicular (b) Parallel (c) Differential (d) Tangential	(b) parallel

Q.79.Which of the following represents the set A = {11, 13, 15, 17, 19}? (a) A = { x:x is a natural number greater than 11} (b) A = { x:x is an odd number greater than 11} (c) A = { x:x is a odd number between 10 to 20} (d) A = { x:x is a natural number less than 20}	(c) A = { x:x is a odd number between 10 to 20}
Q.82.d/dx (sin5x +6) = (a) cos(5x+6)/5 (b) –cos(5x+6).5 (c) cos(5x+6).5 (d) cos(5x+6).6	None of them is correct **Solution**: $\frac{d}{dx} = \sin 5x$ $\frac{d}{dx} = 5\cos 5x$ So, the final result is : d/dx(sin5x+6)=5cos5x
Q.89.If y = tanx, then dy/dx = (a) $\tan^2 x$ (b) $\cos x$ (c) $\log\lvert\sec x\rvert$ (d) $\sin x - x\cos x$	None of them is correct **Solution**: If y=tanx, then its derivative with respect to x is: dy/dx= $\sec^2 x$
Q.100.How many binary relations are there on a set S with 9 distinct elements? (a) 2^{90} (b) 2^{100} (c) 2^{81} (d) 2^{60}	(c) 2^{81} The number of binary relations on a set S with n elements is given by: 2^{n^2} For a set S with 9 elements: Total binary relations 2^{9^2} =2^{81}
MODEL PAPER – III	
Q.6. Which of the following represents the set B = { x : x is an interger, x^2 + 1 = 10}? (a) B = { 3 } (b) B = { -3, 3} (c) B = { } (d) B = { -3, …, 3}	(b) B = { -3, 3 } **Solution**: x^2 + 1 = 10 x^2 = 10-1=9 x= ±3 Since x is an **integer**, the set B includes both −3 and 3.So, B = { -3, 3 }

Q.31. _____ number of reflexive relations are there on a set of 11 distinct elements.
(a) 2^{110} (b) 3^{121}
(c) 2^{90} (d) 2^{132}

(a) 2^{110}
Solution: A relation on a set S with n elements is a subset of S×S. So, There are 11×11=121 possible pairs in S×S.
Since all 11 diagonal elements are mandatory in a reflexive relation, we only have freedom to choose whether to include or exclude the remaining 121−11=110 pairs. Each of these 110 pairs can either be included or not, so we have 2^{110} possible reflexive relations.

Q.32. The number of reflexive as well as symmetric relations on a set with 14 distinct elements is _____
(a) 4^{120} (b) 2^{70}
(c) 3^{201} (d) 2^{91}

(d) 2^{91}
Solution: Let A be a set consists of n distinct elements. There are $2^{(n*(n-1))/2}$ number of reflexive and symmetric relations that can be formed. So, here the answer is $2^{14*(14-1)/2} = 2^{91}$.

Q.33. The number of symmetric relations on a set with 15 distinct elements is _____
(a) 2^{196} (b) 2^{50}
(c) 2^{320} (d) 2^{78}

(*) None of them is correct
Solution: The number of symmetric relations on a set with 15 elements is determined as in Symmetric Property, If (a,b) is in the relation, then (b,a)must also be included.
By classify the possible pairs;
Reflexive Pairs ((a,a)for each element) have 15 choices, each either included or not, giving 2^{15} possibilities.
Off-Diagonal Pairs ((a,b) with a≠b) form unordered pairs. their count is [(15(14))/2]= 105. Each can either be included or not, giving 2^{105} possibilities.
So the total count of symmetric relations is $2^{15}\times2^{105}=2^{120}$.

Q.38. If a set A has 8 elements and a set B has 10 elements, how many relations are there from A to B?
(a) 2^{90} (b) 3^{80}
(c) 1^{64} (d) 2^{80}

(d) 2^{80}
Solution : A relation R from A to B is a subset of A×B. As the maximum number of subsets (Elements in the power set) is 2^{mn}, there are 2^{mn} number of relations from A to B and so the answer is 2^{80}.

Q.41. Let a set S = {2, 4, 8, 16, 32} and <= be the partial order defined by S <= R if a divides b. Number of edges in the Hasse diagram of is _____.
(a) 6 (b) 5
(c) 9 (d) 4

(d) 4
Solution : The relation a≤b a divides b and the elements: S={2,4,8,16,32} and its relations:
2→4 (since 2 divides 4),
4→8 (since 4 divides 8),
8→16 (since 8 divides 16),
16→32 (since 16 divides32)
So, the Count of Edges or total number of edges is equal to the number of covering relations, which is 4.

Q.75. If A matrix $\begin{bmatrix} 2 & a \\ 5 & 3 \end{bmatrix}$ does not an inverse then a is equal to:
(a) 6/5 (b) 5/6
(c) 6 (d) 5

(a) 6/5
$A = \begin{bmatrix} 2 & a \\ 5 & 3 \end{bmatrix}$
The determinant of a 2x2 matrix is calculated as:
det(A)=[(2)(3)]−[(a)(5)]
det(A)=6−5a
To make the matrix non-invertible, we set the determinant equal to zero:
$6-5a=0$
$a=\frac{6}{5}$

❑❑