Progressive Education Society's
Modern College of Arts, Science & Commerce
Ganeshkhind, Pune – 16
End Semester Examination: Jan.2023
Faculty: Science and Technology

Program:	**BCA**	**Semester: I**	
Program (Specific):	**BCA(Science)**		
Class:	**FYBCA**	**Course Type**	**CC**
Name of the Course:	**Applied Mathematics**	**Max. Marks**	**70**
Course Code:	**22-BCA-114**	**Time**	**3 hours**
Paper:	**-**		

Instructions to Candidates: -

1. ***There are 4 sections in the question paper. Write each section on a separate page.***
2. ***All Sections are compulsory.***
3. ***Figures to the right indicate full marks.***
4. ***Draw a well labelled diagram wherever necessary.***

SECTION: A

Q.1) Attempt the following.

a) Multiple Choice Question **[5x1=5]**

i) … of the following is a finite set.
A) {1,2,3,…,10} B) {1,2,3,…..}
C) [0,1] D) (0,1)

ii) $p \vee (q \vee r)$ is logically equivalent to…
A) $(p \vee q) \vee r$ B) $(p \wedge q) \vee r$
C) $(p \vee q) \wedge r$ D) $(p \wedge q) \wedge r$

iii) The class interval of the grouped data

5-9	10-14	15-19	20-24

are of the type ….
A) Inclusive Class. B) Discrete Class.
C) Exclusive Class. D) Variable Class.

iv) If distribution is positively skew then _____
A) mean > median. B) mean < mode.
C) mean = mode. D) mean < median.

v) Rejecting Ho when it is true is _____
A) Type II error. B) Correct Decision.
C) Type I error. D) Critical region.

b) Answer the following: **[5x1=5]**

i) State binomial theorem.
ii) Interpret given correlation coefficient between marks of student and height of student is zero
iii) draw digraph for the given relation R={(1,2),(3,4),(1,3),(2,1),(2,4),(3,2),(4,1),(4,4)}
iv) Define the term Critical Region.
v) If p = 0.6, E(X) = 6. Find n & var(X).

SECTION: B

Q.2) Answer the following questions(any 5) **[5x3=15]**

a) Let A = {1,2,3,4,5,6}. A relation R is defined on the set A as below. aRb if and only if a is multiple of b. Find domain and range of R. (write set R)

b) Explain the term with illustration i) SRSWOR and ii) SRSWR.

c) Show that $(\sim q \wedge (p \quad q)) \quad \sim p$ is a tautology.

d) Compute coefficient of variation for the following data.
36,15,25,10,14

e) The weight of the sack is normally distributed with mean 50 Kg and standard deviation 1.5 Kg. Find the probability that the weight of a randomly selected sack is more than 51.5 Kg. Given that the area under the SNV curve between 0 & 1 is 0.3413.

f) Define following term i) Hypothesis ii) Type I error iii) Type II error

SECTION:C

Q.3) Answer the following questions(any 5) **[5x4=20]**

a) Arithmetic mean standard deviations of 12 items are 22 and 3 respectively. Later on it was observed that the item 32 was wrongly taken as 23. Compute correct mean and standard deviation.

b) Show that $(p \quad q) \vee (q \quad r) \equiv (p \wedge q) \quad r$

c) Find correlation coefficient between X & Y given that
n = 05, $\sum X = 20$, $\sum Y = 20$,
$\sum X^2 = 90$, $\sum Y^2 = 90$, $\sum XY = 73$.

d) If P(A) = 0.6, P(B) =0.5, P(A∩B) = 0.3 then find,
P(A') ii) P(AUB) iii) P(A'∩B) iv) P(A'∩B')

e) Determine whether each of the following is bijective mapping from R to R.
a) f (X) = 4X + 3 b)f (X) = $X^2 + 4$

f) Let A = $\{a_1,a_2,a_3\}$, B = $\{b_1,b_2,b_3,b_4\}$. Find the elements in relation R from the following zero-one matrix, draw its graph and also find domain and Range of R.

$$\begin{bmatrix} 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & 1 \\ 1 & 1 & 0 & 1 \end{bmatrix}$$

g) Describe De Morgan's law, Distributive law and Complementation law with one illustrative example.

SECTION:D

Q.4) Answer the following questions(any 5) **[5x5=25]**

a) Let A = $\{x \in N \mid 2 \leq X \leq 4\}$, A = $\{x \in N \mid 1 \leq X \leq 5\}$
Find $A \cap B$, AUB, A-B, $A \oplus B$, $A' \cap B$

b) Use Warshall's algorithm to find the transitive closure of the relation.
R = {(1,2),(2,3),(3,4),(2,1)} on A = {1,2,3,4}.

c) The daily expenditure of 100 families is given below.

Expenditure	20-29	30-39	40-49	50-59	60-69
No. of Families	14	_____	27	_____	15

If the mode of the distribution is 42.5, find the missing frequencies.

d) Given S.D.(x) = 15, S.D.(y) = 10, $\bar{X}$ = 80, $\bar{Y}$ = 50, r = 0.4, find the line of regression of X on Y. Also estimate X when Y = 60.

e) Let A,B,C be any three events on sample space Ω. Write expressions for the events,
i) At least one of the events A,B,C occurs.
ii) Only A occurs.
iii) A and B occur but not C.
iv) All three events occur.
v) At least one of the given events.

f) A group consists of 4 girls and 7 boys. In how many ways can a team of 5 members be selected if the team has

(i) no girls

(ii) at least one boy and one girl

(iii) at least three girls

g) A study of a certain operation shows the following distribution for 180 workers. Calculate the Median. Also find it graphically.

Class interval	10-30	30-50	50-70	70-90	90-110
Frequency	10	40	80	35	15