SEAT No._____

[21/A-20]

Note: (i) Simple/Scientific calculator is allowed (ii) Graph paper will provided on request.
(iii) Statistical table will be allowed/provided on request (iv) Q.3 to 6, each sub question has 5 marks

Q.1 Multiple Choice Questions. (10×1)

(1) For $r_{xy} = 0$, the variable X and Y are .....
   (a) Linearly Related   (b) Independent   (c) Linearly Not related   (d) None of the above

(2) The geometric mean of the two regression coefficient viz., b_{yx} and b_{yx} is ....
   (a) r   (b) r^2 (c) 1   (d) 0

(3) The degrees of freedom for a t – test of a mean if the sample size is 10 is
   (a) 8   (b) 9   (c) 10   (d) 11

(4) The idea of product moment correlation was given by......
   (a) R.A. Fisher   (b) Karl Pearson   (c) Galton   (d) Spearman

(5) A hypothesis may be classified as ....
   (a) Simple   (b) Composite   (c) Null   (d) All of above

(6) Level of Significance is the probability of ......
   (a) Type-I Error   (b) Type-II Error   (c) Not committing error   (d) None of the above

(7) Test of hypothesis H_0: $\mu = 70$ Vs H_1: $\mu \geq 70$ leads to ......
   (a) One-sided Left-tailed Test   (b) One sided Right-tailed Test   (c) Two-tailed test   (d) All of the above

(8) Degree of freedom for chi-square in case contingency table of order (4X3) is ....
   (a) 12   (b) 6   (c) 9   (d) 8

(9) For a normal distribution, the area covered between $\mu \pm 2\sigma$ is ....
   (a) 99.7%   (b) 95.4%   (c) 68.2%   (d) None of the above

(10) If Z is a standard normal variable then, the probability of the items lying between Z=-1 and Z=1 is;
   (a) 0.27   (b) 0.43   (c) 0.75   (d) 0.68

Q.2 Short Type Questions (Answer Any Ten). (10×2)

(1) Define power of the test and critical region.
(2) List the properties of regression and correlation coefficient.
(3) Give the example of positive and negative correlation in field of biosciences.
(4) Define two types of errors in testing hypothesis.
(5) List the properties of normal distribution.
(6) What are the principle steps involved in statistical hypothesis test?
(7) Discuss test procedure for testing H_0: $P = P_0$ (Say).
(8) Discuss scatter diagram method of studying correlation coefficient.
(9) In testing hypotheses $H_0 : \mu = 5$ml V/s $H_1: \mu \neq 5$ ml, the following information is known: n=10, $\bar{X} = 4.95$ml and $\sigma = 0.10$ ml. Carry out an appropriate statistical test to test the hypotheses and comment on it.
(10) Let X be the random variable with standard normal distribution. Find the $P(-0.73 \leq X \leq 0)$ and $P(-1.37 \leq X \leq 2.01)$.
(11) Calculate Karl Pearson's correlation coefficient between (age, playing habits proportion) for observations given below:

Age	20	21	22	23	24	25
Playing Habits prop.	0.80	0.75	0.60	0.4	0.3	0.15

(12) For regression line of Y on X, the intercept coefficient is -2.50, slope coefficient is -0.98 and coefficient of determination is line is 0.64. What is the value of coefficient of correlation between X and Y.

Q.3(a) Two regression lines involving variables X and Y are; Y = 5.6+1.2X and X = 12.5+0.6y. Find the means of X and Y and correlation coefficient between X and Y.

C.P.T.O.)

(1)

(b) Fit the line of regression playing habits proportion on age, the information provided in Q.2 (11). Also compute the value of playing habits proportion when age is 27.

OR

Q.3(a) Discuss in details all methods of studying relation between two variables.

(b) The following are the results of five assay of different but known potency,

Drug Potency (X)	60	80	90	100	120
Assay (Y)	61	79	91	102	119

Find the equation of the line of regression Y on X and estimate Y when X = 95.

Q.4(a) Discuss the test procedure for the difference between two population proportion and means for large sample.

(b) Measurements of BMI for a sample of ten healthy adult males are 21, 23, 32, 24, 47, 22, 45, 37, 24 and 35. On the basis of these data can we conclude that the mean BMI of population from which the sample drawn is 35.

OR

Q.4(a) Discuss the test procedure for the specified population mean when population variance known or unknown.

(b) A manufacturer of ball pen refills claims that not more than 2% of his products are defective. A retail dealer buys a batch of 720 refills from manufacturer. He conducts a study. On inspection he finds that 26 refills are defective. Would you consider that the manufacturer's claim justified by the data (Use $\alpha = 0.05$).

Q.5(a) Discuss in detail independence of attributes in a 2 x 2 contingency table. State hypothesis and discuss the test procedure.

(b) In an experiment to study the dependence of hypertension on smoking habit, the following data were obtained on 180 individuals.

	Non-Smoker	Moderate Smoker	Heavy Smoker
Hypertension	21	36	30
No Hypertension	48	26	19

Test the hypothesis that the presence or absence of hypertension is independent of smoking habits.

OR

Q.5(a) Discuss the test procedure for the difference between two population means for dependent and independent sample observation.

(b) Blood glucose level of pigeons compared with rabbits. Apply proper statistical test to know the significance of difference of blood glucose levels of the two using the following data and comment on your result.

Sr. No.	1	2	3	4	5	6	7	8	9	10
Pigeons	200	186	176	184	170	172	170	163	176	173
Rabbits	145	125	100	112	127	139	151	140	159	132

Q.6(a) Write a brief note on normal distribution also discuss the applications of the normal distribution.

(b) The mean height of the 500 students is 150 cm and the standard deviation is 15 cm. Assuming that the heights are normally distributed, find how many students heights lie between 120 cm to 155 cm.

OR

Q.6(a) A random variable X is normally distributed with mean 2 and variance 4. Then find the,

i. $P(X \leq 2)$ ii. $P(1 < X < 3)$ iii. $P(-1.29 < X < 1.29)$

(b) Pulse rates of adult men are normally distributed with a mean of 70 and standard deviation of 8. Find the probability that a randomly selected man have pulse rate (*i*) Greater than 86 (*ii*) Between 62 to 72 (*iii*) Less than mean.

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