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KK Shah Jarodwala Maninagar Science College, Rambaug, Ahmedabad-380008

B. Sc. Semester – VI Statistics

Assignment No - 1

Paper - 307

1	Define marginal and conditional distributions in case of bivariate normal distribution. Show that, If X and Y have bivariate normal distribution, than X has $N(\mu, \sigma^2)$
2	If X and Y have bivariate normal distribution with parameters (3,1, 16, 25, 0.6) Determine the following probabilities i) $\Pr[3 < Y < 8]$, ii) $\Pr[3 < Y < 8 / X = 7]$, iii) $\Pr[- 3 < X < 3 / Y = - 4]$
3	If X and Y have bivariate normal distribution, then derive the distribution of Y / X.
4	Derive the moment generating function of Bivariate Normal Distribution.
5	State and prove Chebyshev's inequality.
6	Examine whether the law of the large numbers for the sequence $\{x_k\}$ of independent random variables defined as : $P(X_k = \pm \frac{k}{2}) = \frac{1}{2}^{-(2k+1)}, \quad P(X_k = 0) = 1 - \frac{1}{2}^{-2k}$
7	State and prove the weak law of large numbers.
8	Which measure of dispersion is used in Chebyshev's inequality?
9	State other forms of Chebyshev's inequality.
10	For Bivariate normal distribution of R. V. s (X,Y), if population coefficient of correlation is zero, it indicates that (x, Y) are uncorrelated but not independent. Do you agree?

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1	Define terms: Statistical hypothesis, null and alternative hypothesis, critical region, level of significance.
2	If $X \sim P(x) = \frac{1}{\theta}$, $0 < x < \theta$ $= 0$, elsewhere The hypothesis $H: \theta=1$ vs $K: \theta = 2$ is to be tested by means of single observation X . If the critical region is (a) $X > 0.3$, find probabilities of type I and type II errors. Also, find power function of the test ($\theta > 1$).
3	In usual notations, state and prove Neyman Pearson Lemma.
4	A random sample of size n is drawn from a Bernoulli distribution with parameter p Determine Most powerful critical region to test $H_0: p = p_0$ vs $H_1: p = p_1$.
5	What is Randomised block design? Give its lay out.
6	Explain a test procedure to estimate one missing yield in Latin Square Design
7	Derive the efficiency of randomised block design with respect to completely randomised design.
8	Define type I and type II errors.
9	What are most powerful and uniformly powerful critical regions?
10	State formula for one missing and two missing yields in Randomised block design.

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Assignment No – 1

Paper - 309

1	What do you mean by quality? Discuss the use of quality control in Industry.
2	Explain the theory of runs.
3	State difference between control charts for variables and attributes.
4	Define assignable causes and chance causes with respect to statistical quality control.
5	Obtain the control limits for average and range charts.
6	Describe C chart
7	Describe in brief, \bar{X} and S chart.
8	Explain, process under control and process out of control, $3 - \sigma$ and specification limits
9	Derive the control limits for np charts.

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B. Sc. Semester – VI Statistics

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Paper – 310

1	What is operations research? State its importance.
2	Define Linear Programming. Derive the standard form of L.P.P.
3	Comment on the solutions obtained by Graphical method of the following LPP i) Maximize $Z = 6X + 4Y$, subject to $5x + 3y \leq 15$, $x \geq 8$, $y \geq 5$, $x \geq 0$, $y \geq 0$ ii) Maximize $Z = 3X + 6Y$ subject to $x + 3y \leq 6$, $x + y \leq 2$, $x, y \geq 0$.
4	Write a note on Slack and Surplus variables.
5	Explain, transportation problem in brief.
6	State various methods of solving transportation problem for initial basic feasible solution.
7	Describe assignment problem and write its mathematical form
8	State Hungarian method of solving assignment problem.
9	Define: objective function, solution, nonnegativity condition, feasible solution and optimum solution for a LPP.
10	What is unbalanced transportation?
11	State the limitation of graphical method.

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Paper – 310

1	Write a note on population growth.
2	Explain exponential population growth.
3	What is survival function? Also, define hazard rate function. State difference between them.
4	Explain discrete time population growth model.
5	What is Epidemiology? Explain term: odds and odds ratio.
6	Describe relative risk.
7	Give applications of epidemiology.
8	What is the procedure to estimate odds ratio (OR)?
9	Define birth rate.
10	What is odd?
11	Define odds ratio.