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III Semester B.A./B.Sc./B.Com./B.B.A./B.B.A. T.T.M./B.B.M./B.C.A./ B.S.W./B.A. Afsal-Ul-Ulama Degree (CCSS Reg./Supple./Improv.) Examination, November 2012
COMPLEMENTARY COURSE IN MATHEMATICS (For BCA)
3CO3 MAT (BCA) : Probability Distributions and Statistical Inference

ime : 3 Hours   Max. Weightage : 30

Answer **all** questions. Weightage for a bunch of **four** questions is 1.

1. Fill in the blanks :

   a) Let Ω be the sample space, then probability of Ω is _____

   b) What is the variance of a Poisson distribution with parameter λ ?

   c) In statistical testing. Rejecting Ho when Ho is false is called _____ of the test.

   d) Write the test statistic for testing population mean when population variance σ^2 is known

   e) If two variables are perfectly positive correlated then the value of correlation coefficient is _____

   f) Geometric mean of regression coefficient is _____

   g) What is the value of skewness (β_1) for the normal distribution ?

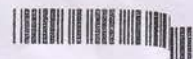   h) Row sum of a trancision probability matrix is _____   (Wt. 2×1=2)

Answer **any 6** questions (Weightage **1 each**).

2. Derive the mean of a Poisson distribution.

3. For a Binomial random variable X with parameters n = 10 and p = $\frac{1}{3}$

   Find 1) P(X = 0)   2) P (X > 9).

4. Define Type I and Type II errors in testing of hypothesis.   8

5. What are the properties of a normal curve ?
                                                                                        9
6. What is a scatter diagram ?

7. What are the assumptions of t-test ?

8. What are the postulates of Poisson Process ?

9. What are the classification of stochastic process ?

10. Define Birth and Death process.   (Wt. 6×1:
                                                                                        20

Answer **any 7** questions (Weightage **2 each**).

11. Let x is a normal variate with mean 30 and S.D.S. Find

    1) $P(26 \le X \le 40)$ 2) $P(X \ge 45)$

                                                                                        21
12. Write short notes on :

    a) Normal random variable   b) Most powerful test

13. Explain the test procedure for testing single mean when S.D is unknown $(n < 30)$.
                                                                                        A
14. Test the hypothesis that $\sigma = 10$ vs $\sigma > 10$, given that sample S.D S =15 for a   22
    sample of size 30 from a normal population $(\alpha = 0.05)$.
                                                                                        23
15. Sample of two type of light bulbs were tested for length of life and the following
    data were obtained.

	Type I	Type II
Sample No.	8	7
Sample Mean	1234 hrs.	1036 hrs.
Sample S.D	36 hrs.	40 hrs.

                                                                                        24

    Test at 5% level, whether or not the avg. length of life are same.

16. Explain the method of least squares. Using method of least squares fit $y = ab^x$.

17. In a correlation analysis the following data are obtained v(x) = 9.

    $8x - 10y + 66 = 0$ and $40x - 18y = 214$.

    Find 1) Mean of X and Y

            2) Correlation coefficient between X and Y.

8. What are the characteristics of a Queuing system ?

9. Consider a M.C $\{X_n\}$ with state space $\{0, 1\}$ has Trancision probability matrix

$$P = \begin{bmatrix} 0.7 & 0.3 \\ 0.4 & 0.6 \end{bmatrix}$$

Find 1) $P[X_n = 1 / X_{n-1} = 0]$

2) $P[X_2 = 1 / X_0 = 1]$

(Wt. 6×1

20. Suppose that the customers arrives at a Poisson rate of 1 per every 12 minutes and that the service time is exponential at a rate of one service per 8 minutes.

1) What is the average no. of customers in the system ?
2) The avergage waiting time in the system.

21. Find the rank correlation coefficient for the following data.

X: 6 5 3 10 2 4 9 7 8 1

Y: 5 8 4 7 10 2 1 6 9 3   (Wt. 7×2=14)

$(n < 30)$.

Answer **any 2** questions. (Weightage **4 each**).

=15 for a

22. Define M/M/I queue and derive the steady state probability.

23. Let X and Y are two variables and

following

X: 65 66 67 67 68 69 70 72

Y: 67 68 65 68 72 72 69 71

Find the regression lines of X on Y and Y on X.

24. From the data given below using Chi-square test check whether there exist any distinction is made in the appointment on the basis of sex. (use $\alpha = 0.05$).

it $y = ab^x$.

Sex	Employed	Not Employed	Total
Male	1480	5720	7200
Female	120	680	800
Total	1600	6400	8000

(Wt. 2×4=8)