

E 3946

(Pages : 3)

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B.C.A. DEGREE (C.B.C.S.S.) EXAMINATION, OCTOBER 2016

Third Semester

Complementary Course—ADVANCED STATISTICAL METHODS

(For the Programme B.C.A.)

[2013 Admission onwards]

Time : Three Hours

Maximum : 80 Marks

Part A (Short Answer Questions)

Answer all ten questions, each question carries 1 mark.

1. Define standard normal variate.
2. Define parameter with an example.
3. Define standard error.
4. What is meant by interval estimation ?
5. Define level of significance.
6. Define null hypothesis.
7. What is meant by most powerful test ?
8. Differentiate small sample and large sample.
9. Give an example of a test statistic which follows Chi-square distribution.
10. Define population and sample with example.

(10 × 1 = 10)

Part B (Brief Answer Questions)

Answer any eight questions, each question carries 2 marks.

11. State any two properties of binomial distribution.
12. Give four situations in which a Poisson distribution can be modelled.
13. Derive the moment generating function of a Poisson distribution.
14. A random variable X is distributed as normal with mean 20 and variance 4. Evaluate Probability of $X > 20$.

Turn over

15. Give the principal steps in testing of hypotheses.
16. When will you say that an estimator is sufficient ?
17. Give two applications of Chi-square distribution.
18. Give the layout of an $r \times s$ contingency table.
19. Give the interpretations P-values obtained from statistical tests at 1% level of significance ?
20. State Neyman-Pearson lemma for deriving most powerful test.
21. Define t variate with n degrees of freedom.
22. Derive the confidence interval estimate for the mean of a normal population when its standard deviation is unknown.

(8 × 2 = 16)

Part C (Descriptive or Short Essays)*Answer any six questions, each question carries 4 marks.*

23. Give the properties of normal distribution.
24. Describe any one method for estimating parameter of a distribution.
25. Derive the confidence interval for estimating variance of a normal population.
26. Based on a random sample of size m from Poisson distribution with parameter λ , show that sample mean is consistent for λ .
27. Derive the confidence interval of the parameter p of a binomial distribution.
28. A random sample of size 20 is taken from a normal population, the sample mean and sample variance are respectively 20.5 and 4. Obtain 95% confidence interval for the population mean.
29. What is test for goodness of fit ? State the null and alternative hypotheses for goodness of fit test.
30. Explain the test procedure for testing equality of two population means.
31. How will you fit binomial distribution using an observed data set ?

(6 × 4 = 24)

Part D (Essays)*Answer any two questions, each question carries 15 marks.*

32. State the inter-relationship between normal, Chi-square, t and F variates.
33. Derive the sampling distribution of sample variance based on a random sample of size n from normal population.

34. Explain the Chi-square test procedure for testing homogeneity of populations.
35. The following data was obtained in an investigation about the effect of vaccination for small pox. Examine whether vaccination is effective in preventing small pox at 5% level of significance.

	Vaccinated	Not vaccinated
Affected by small pox	3	12
Not affected by small pox	8	5

(2 × 15 = 30)