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PGIIIS - N 1598 B - 14
M.Sc. IIIrd Semester (CBCS) Degree Examination
Statistics
(Statistical Methods)
Paper - OET 3.1
(New)

Time : 3 Hours Maximum Marks : 80

Instructions to Candidates:

*Answer any **Six** questions from Part A and **Five** questions from Part B*

Part - A **(6×5=30)**

1. Explain a sample Space along with examples
2. Write down the probability distribution of the sum of the numbers when two ideal dies are rolled once
3. Define binomial distribution and mention its applications
4. Describe the 't-test' for testing the mean of a normal distribution
5. Explain various types of Statistical hypothesis
6. Outline wileoxon's Signed ranks test
7. Explain the method of least squares
8. Explain the principles of experimentation

Part - B **(5×10=50)**

9. a) State and prove Bay's Theorem

   b) find the probability of getting at least one head when *n* ideal dies are rolled once.

   (5+5)

10. a) State and prove addition rule of probability

    b) There are three supermarkets S_1,S_2 and S_3 in a city. The respective percentages of defective items in S_1,S_2, S_3 are 10,11and 12. A customer randomly enters a supermarket and choosen an item. What is the probability that it is a good item?

    (5+5)

11. a) Explain the terms

i) Types of test procedures and

ii) Types of errors in testing of hypothesis.

b) Outline the steps in writing an optimum test **(5+5)**

12. a) The height of men of a certain tribe is normally distributed with variance 64ft². A random sample of 50 men of that tribe gave an average height of 5.8 feet. At 5% level, can we conclude that the average height in the population is 5.9 feet given that $P(|Z|>1.96)=0.05$

b) Explain the 'chi-Square test' for testing about the variance When the mean of a normal population is given **(5+5)**

13. a) Discuss 'Paired t-test'.

b) Explain a test for comparing the variances of two independent normal populations.

(5+5)

14. a) What are nonparametric tests? What are their merits and demerits?

b) Discuss a test for testing the association between two attributes in a contingency table **(5+5)**

15. a) Explain linear correlation with examples

b) The following is a random sample from a distribution with median M. Compute the value of wileoxon signed ranks test statistic under $H_0 : \mu = 5, 6, 7, 4, 8, 9, 8$ **(5+5)**

16. Write short notes on any two of the following

a) LSD

b) Poisson distribution

c) Coefficient of Variation

d) U-test **(5each)**

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PGIIIS - N 1596 B - 14
M.A./M.Sc. IIIrd Semester (CBCS) Degree Examination
Statistics
(Design and Analysis of Experiments)
Paper - HCT 3.2
(New)

Time : 3 Hours Maximum Marks : 80

Instructions to Candidates:

Answer any **Six** questions From part - A and **Five** questions from part - B

Part - A **(6×5=30)**

1. Given the model: $E(y_1)=\theta_1+2\theta_2$, $E(y_2)=2\theta_1+\theta_2$ and $E(y_3)=\theta_1-\theta_2$ Examine theestimability of $\theta_1+\theta_2$.
2. Define BLUE of a linear parametric function (lpf) Show that it is unique
3. Describe any one method of multiple comparison tests.
4. Define BIBD. Show that it is a variance balanced design
5. Outline yates' technique for a 2^3 Factorial experiment
6. Explain the principle of confounding in factorial experiments. Mention its types.
7. What is analysis of Covariance? When is it used?
8. What are split plot designs? Give a practical Situation where there designs are used.

Part - B **(5×10=50)**

9. Derive the BLUE of an estimable linear parametric function in a Gauss-Markov (G-M) model
10. a) Derive the least square estimators of the parameters in a RBD model.

    b) Obtain an estimator of a single missing Observation in a RBD. **(5+5=10)**

11. Write down the linear model for a mxm LSD. Obtain the normal equations. How will you test for differences among the treatments?

12. State and prove the parametric relations of BIBD.

13. a) Describe a test procedure for testing $H_0 : a^1\theta = 0$ where $a^1\theta$ is an estimable l.p.f. In a G-M model **(5+5=10)**

b) Derive a necessary and sufficient condition for the estimability of a lpf.

14. Explain comple Confounding in factorial experiments. Discuss the analysis of a completely confounded factorial experiment

15. Discuss the analysis of a split plot design with main treatments arranged in randomized blocks.

16. Describe one way random effect model. obtain the estimates of the variance components of this model.

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PGIIIS - N 1597 B - 14
M.Sc. IIIrd Semester (CBCS) Degree Examination
Statistics
(Demography)
Paper - SCT 3.1(a)
(New)

Time : 3 Hours Maximum Marks : 80

Instructions to Candidates:

*Answer any **Six** questions from part - A and **Five** questions from part - B*

*All questions carry **equal** marks*

Part - A **(6×5=30)**

1. Explain Whipple's index of identifying digit preference in age reporting
2. Explain the sources of demographic data
3. Define and explain crude birth rate
4. What are the reproduction measures? Explain
5. Define a life table State the assumptions for constructing a life table
6. With usual notations show that $\mu_x = \frac{1}{l^0_x}\left[1 + \frac{d}{dx} l^0_x\right]$
7. Define curative expectation of life (l_x). How is it related to the probability of survivals
8. Explain various methods of migration push and pull factors of migration

Part - B **(5×10=50)**

9. a) Explain Chandrasekaran and doming method to ascertain completeness of vital statistics registration

   b) Explain UN index of measuring tendentious bias **(5+5)**

10. Discuss different measures of fertility (10)

11. Discuss different types of mortality (10)

12. Derive Dandikar's modified Poisson distribution fertility model (10)

13. a) Define crude death rate and age specific death rate

b) Define infant mortality rate (IMR). Explain lexis diagram of infant mortality rate (5+5)

14. a) With usual notations prove that $_nv_x = \frac{n\,{}_nm_x}{1+(n-{}_na_x)\,{}_nm_x}$ When $_na_x$ is the average number of years lived in $(x, x+n)$ from those who did in it

b) With usual notations, show that $_nv_x = \frac{2n\,{}_nm_x}{2+n\,{}_nm_x}$ (5+5)

15. Explain Reed and Merrel method of constructing a life table. Show that this method is a particular case of Greville's method. (10)

16. a) Define migration. Explain push and pull factor of migration

b) Discuss the impact of migration on population size and structure (5+5)

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PGIIIS - N 1595 B - 14
M.A./M.Sc. IIIrd Semester (CBCS) Degree Examination
Statistics
(Stochastic Process)
Paper - HCT 3.1
(New)

Time : 3 Hours Maximum Marks : 80

Instructions to Candidates: Answer any Six questions from Part-A and Five questions from Part- B

Part - A **(6×5=30)**

1. Define Markov process, Stationary process and gaussian process

2. Define aperiodic State, reducible state and ergodic State

3. Discuss spectral decomposition method of obtaining higher step transition probabilities

4. Discuss briefly the compound poisson process

5. Show that the mean population give of birth and death process is $M(t) = i\,e^{(\lambda-\mu)t}$

6. Obtain a backward diffusion equation of a wiener process

7. Show that the renewal function M(t) Satisfies the equation $M(t) = F(t) + \int_0^t M(t-x)\,dF(x)$

8. Explain Branching process

Part - B **(5×10=50)**

9. State and prove Ergodic theorem of a Markov Chain

10. Show that if state j in persisted non - null then as $n \to \infty$

    i) $P_{jj}^{(nt)} \to \dfrac{t}{\mu_{jj}}$, When state j in Periodic with Period t

    ii) $P_{jj}^{(n)} \to \dfrac{1}{\mu_{jj}}$, When State j in aperiodic

iii) $p_{jj}^{(n)} \to 0, as\ n \to \infty$, When State j in perssistent null

11. Obtain P^n for two state Markov chain having t.p.m.

$$P = \begin{pmatrix} 1-a & a \\ b & 1-b \end{pmatrix}, 0 < a,b < 1$$

12. Define Poisson process and show that if $\{N(t), t \geq 0\}$ is a Poisson process then the auto correlation coefficient between N(t) and N(t+S) is $(t/t+S)^{1/2}$

13. Obtain the probability distribution function of Yule -Furry process

14. Obtain the first passage time distribution for wiener process

15. State and prove CLT for the renewal process $\{N(t), t \geq 0\}$

16. For a branching process $\{X_n, n \geq 0\}$ $if\ m = 1 and\ \sigma^2 < \infty$ then show that

$$\lim_{n\to\infty} P\{\frac{x_n}{n} > u / x_n = 0\} = \exp\left(-\frac{2\mu}{\sigma^2}\right), u \geq 0$$