UOI

059/21

Total Number of Questions : 32

Time : 3.00 Hours Max. Marks : 200

1. Define harmonic mean. (2 Marks)

2. What is regression ? (2 Marks)

3. State addition theorem on probability for two events. (2 Marks)

4. Define normal distribution. (2 Marks)

5. State sufficient set of conditions for consistency of an estimator. (2 Marks)

6. Define probabilities of type I and type II errors. (4 Marks)

7. Write any two properties of moment estimators. (4 Marks)

8. Define Karl-Pearson's coefficient of skewness. (4 Marks)

9. Define chi-square distribution with n degrees of freedom. (4 Marks)

10. Obtain the mean of Poisson distribution with parameter λ. (4 Marks)

11. If A and B are two events such that $P(A)=\frac{1}{3}, P(B)=\frac{1}{4}$ and $P(A \cap B)=\frac{1}{8}$. Find P(A/B) and $P(A/B^c)$. (5 Marks)

12. A continuous random variable X has the probability density function $f(x) = 3x^2$, $0 \leq x \leq 1$. Find the value of a such that $P(X \leq a) = P(X > a)$. (5 Marks)

13. Explain the best test for a simple hypothesis. (5 Marks)

14. Explain the chi-square test for the variance of a normal population. (5 Marks)

15. Explain method of moment estimation. (5 Marks)

16. State Gauss-Markov theorem. (5 Marks)

17. What are the basic assumptions used in analysis of variance ? (5 Marks)

18. Define the following : (7 Marks)
    (a) Test statistic
    (b) Critical region
    (c) Level of significance
    (d) p value.

P.T.O.

19. Find the size and power of the following test. Reject $H_0 : \lambda = 1$ in favour of $H_1 : \lambda = 2$ whenever $X_1 + X_2 \geq 2$. Assume that X_1 and X_2 are independent observations from a Poisson distribution with parameter λ. **(7 Marks)**

20. Write any four merits and any three demerits of standard deviation. **(7 Marks)**

21. Explain principle of least squares. **(7 Marks)**

22. Explain paired t test. **(7 Marks)**

23. Explain analysis of variance one way classification. **(10 Marks)**

24. State and prove Baye's theorem. **(10 Marks)**

25. A random sample of size n is taken from a normal population with mean zero and variance σ^2. Examine whether $t = \frac{1}{n}\sum_{i=1}^{n} X_i^2$ is a minimum variance bound unbiased estimator of σ^2. Hence find the variance of t. **(10 Marks)**

26. (1) Explain stratified sampling and what are its merits ?
    (2) Explain cluster sampling. **(10 Marks)**

27. For the rectangular distribution over the interval (α, β), where $\alpha < \beta$. Find the maximum likelihood estimators for α and β. **(10 Marks)**

28. Obtain $(1 - \alpha)100\%$ confidence interval for the difference of means of two independent normal populations $N(\mu_1, \sigma_1^2)$ and $N(\mu_2, \sigma_2^2)$, when σ_1^2 and σ_2^2 are known. **(10 Marks)**

29. Explain the t test for testing the equality of means of two normal populations. **(10 Marks)**

30. Explain Chi-square goodness of fit test. **(10 Marks)**

31. Explain the test concerning the mean of a normal population when population variance σ^2 is known. **(10 Marks)**

32. (a) How can the Shewhart control chart be prepared ?
    (b) How to interpret Shewhart control chart ? **(10 Marks)**
