Vivekanand College, Kolhapur (Autonomous)
Department of Statistics
Internal Examination Sept. - 2024

Notice

Date: 13/09/2024

All the students of **B.Sc. – I & II** (Major & Minor subject) are hereby informed that, the internal examination of **Semester- I & III** will be held as per following time table.
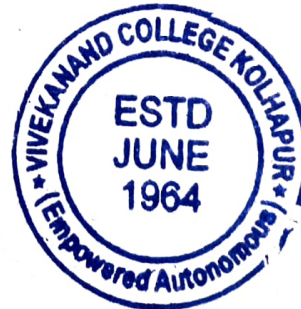
B. Sc. - I

Sr. No.	Date	Time	Title of the Paper
01	25/09/2024	12.40 pm to 01.30 pm	Descriptive Statistics I
	26/09/2024	12.40 pm to 01.30 pm	Elementary Probability Theory

Nature of Question Paper (Total Marks = 10)

Que. 1) 2 MCQ's each carrying 1 mark

Que. 2) Solve any 1 question out of 2 (1x4=4)

Que. 3) Solve any 2 questions out of 3 (2x2=4)

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Day & Date: Wednesday, 25/9/2024   Total marks -10
Time: 12.40 PM -1.30PM

Q.1 Choose the correct alternative.   (02)

1)Two ogive curves , less than type or greater than type, intersect at point --------

     a) (N/2,mean)   b) (N/2,median)   c) (N/2,mode)   d) (median, N/2)

2) Relation between AM ,GM and HM is.....

     a) $AM \leq GM \leq HM$ b) $HM \leq GM \leq AM$

     c) $AM \leq HM \leq GM$ d) $GM \leq AM \leq HM$

Q.2 Attempt anyone.   (04)

1) Define mean. State and prove any one property of mean.
2) Explain primary and secondary data.

Q.3 Attempt any two.   (2*2=4)

a) Define simple random sampling. State types of simple random sampling.
b) Define Nominal and ordinal scale with suitable example.
c) Define quartiles and Percentiles

Day & Date: Thursday, 26/9/2024   Total marks -10

Time: 12.40 noon -1.30PM

Q.1 Choose the correct alternative.   (02)

     1) The probability of event always lies between …………

         a) 0 and 1   b) -1 and 1   c) -1 and 0   d) none of these

     2) The event containing all points of a sample space is called ……

         a) exhaustive event   b) certain event

         c) simple event   d) complement of an event

Q.2 Attempt anyone.   (04)

     1) Give the axiomatic definition of probability. With usual notation prove that $P(A^c) = 1 - P(A)$

     2) Define i) Sample Space   ii) Mutually exclusive Events

Q.3 Attempt any two.   (04)

     1) Define power set. Write the power set of sample space $\Omega = \{a, b\}$.

     2) With usual notation prove that, $A \subseteq B$ then $P(A) \leq P(B)$

     3) Define odds in favour and against of an event.

B. Sc. - II

Sr. No.	Date	Subject	Time	Title of the Paper
01	27/09/2024	Major	2.30 pm to 3.20 pm	Probability Distributions -I
		Minor	3.20 pm to 4.10 pm	Predictive Modelling
	28/09/2024	Major	2.30 pm to 3.20 pm	Statistical Methods
		Minor	3.20 pm to 4.10 pm	Hypothesis Testing

Nature of Question Paper (Total Marks = 10)

Que. 1) 2 MCQ's each carrying 1 mark

Que. 2) Solve any 1 question out of 2 (1x4=4)

Que. 3) Solve any 2 questions out of 3 (2x2=4)

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Q1) Choose Correct Alternative   (1×2 = 2)

1. If $x_1, x_2 \ldots \ldots x_k$ follows Multinomial distribution with parameters $n, p_1, p_2 \ldots p_k$ then marginal distribution of x_1 is …….
        a) Poisson   b) Binomial   c) Hypergeometric   d) Uniform

2. If distribution of X is wailting time with parameter p then mean is ….
        a) $\dfrac{q}{p}$ b) $\dfrac{1}{q}$ c) $\dfrac{q}{p2}$ d) $\dfrac{1}{p}$

Q2) Solve any One   (1× 4 = 4)

   a) Define multinomial distribution. Obtain Moment generating function (m.g.f.) of multinomial distribution.

   b) Define Geometric distribution. State and prove lack of memory property of Geometric distribution.

Q3) Solve any Two   (2× 2 = 4)

1. Define power series distribution and show that Geometric distribution is particular case of power series distribution.
2. Define Negative binomial distribution. State its mean and variance.
3. Obtain pgf of Geometric distribution with parameter p hence find its mean.

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Q.1) Select the most correct Alternative.   (2)

   I) Secular trend in time series is of nature
     a) increasing   b) decreasing   c) stagnant   d) all the above

   II) The range in which multiple correlation coefficient lies is …………
     a) -1 to 1   b) 0 to 1   c) $-\infty$ to ∞ d) 0 to ∞

Q.2) Solve any 1 question out of 2   (4)

   a) Discuss the four components of time series.

   b) Explain the concept of multiple correlation in case of trivariate data. Also obtain the expression for multiple correlation coefficient $R_{1.23}$

Q.3) Solve any 2 questions out of 3   (4)

   I) Define the time series with example.

   II) Define AR(1) model

   III) Explain the partial correlation in case of a trivariate data.

Q1) Choose Correct Alternative   **(1×2 = 2)**

1. If price index number is 150 then the interpretation is …
   A) Price of each commodity increases by 50 Rs.
   B) Price of each commodity increases by 50%
   C) Average rise in prices by 50%
   D) Average rise in prices is by 50 Rs.

2. In time series, when change is by constant rate then …model is used.
   A) Additive   B) Multiplicative   C) Mixed   D) Exponential

Q2) Solve any One   **(1× 4 = 4)**

a) Define time series. State component of time series. Explain cyclical variation.

b) Define cost of living index number. What are the methods of construction of it? Explain any one method.

Q3) Solve any Two   **(2× 2 = 4)**

1. Explain the utility of time series.

2. Define Index number. State formulae's of Laspeyres, Paasches price and quantity index numbers.

3. Write note on Splicing.

Q.1) Select the most correct Alternative.   (2)

    I) The shape of the Normal Curve is _____

      a) Bell Shaped   b) Flat   c) Circular   d) Spiked

    II) Which of the fallowing is valid hypothesis.

      a) $\mu = 10$ b) $\bar{x} > 5$ c) $\bar{x} < 5$ d) $\bar{x} = 3$

Q.2) Solve any 1 question out of 2   (4)

    a) What is sampling distribution of statistic? Explain it with suitable example.

    b) State any four properties of Normal distribution.

Q 3) Solve any 2 question out of 3   (4)

    a) Explain difference between statistical inference and testing of hypothesis in short.

    b) Define: I) Statistic   II) Parameter

    c) Define: I) Null hypothesis   II) Alternative hypothesis

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B.Sc – III Internal Examination Sept. - 2024

Notice

Date: 13/09/2024

All the students of B.Sc. – III are hereby informed that, the Internal Examination of Semester – V will be held as per following time table.

Sr.No.	Date	Time	Paper No.
1	18/09/2024		Paper – IX : Probability Distributions
2	19/09/2024	12.00 pm to 01.00 pm	Paper – X : Statistical Inference-I
3	20/09/2024		Paper – XI : Sampling Theory
4	21/09/2024		Paper – XII : Operation Research

Nature of Question Paper (Total Marks = 15)

Que. 1) 5 MCQ's each carrying 1 mark

Que. 2) Solve any 2 questions out of 3 (5 X 2 = 10)

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Department of Statistics
B.Sc. III Sem V Internal Examination 2024-25

Paper IX: Probability Distributions

Total Marks 15   Time:12.00 pm to 1.00 pm   Date :18/09/2024

Q1) Choose Correct Alternative   (1×5 = 5)

1) Random variable X follows t-distribution with n d.f. If n=1 then distribution of X is......

    a) Normal   b) Exponential   c) Cauchy   d) Laplace

2) Mode of Parato distribution with parameters a=3 and b=2 is ......
    a) 6   b) 2   c) 8   d) 3

3) If a random variable $X \sim L(\mu, \lambda)$ then its 3rd central moments is ......
    a) 0   b)1   c) 2   d) 3

4) If x_1, x_2........x_k follows Multinomial distribution with parameters n,p1,p2....pk then marginal distribution of x_1 is ....

    a) Poisson   b) Binomial   c) Hypergeometric   d) Uniform

5)If X follows Lognormal distribution with parameter $\mu=5$ and $\sigma=2$ then mean and mode of X are.........
    a) (e^7, e^1) b) (e^1, e^7) c) (e^3, e^1) d) (9,1)

Q2) Attempt any Two   (2×5 = 10)

a) Define Lognormal distribution with parameters (μ, σ^2). Find its mean and variance.

b) Define Logistic distribution with parameters μ and σ. Also find its distribution function and first quartile.

c) Define power series distribution and show that Geometric distribution is a particular case of power series distribution.

################### End ###################

Q1) Choose Correct Alternative   (1×5 = 5)

5. If T_n is a consistent sequence of estimator of parameter θ then which of the following is true?

   b) T_n is consistent estimator of $\underline{\theta}^2$ b) T_n is unbiased estimator of θ^2

   c) T_n is consistent estimator of $\sqrt{\theta}$ d) T_n^2 is consistent estimator of θ^2

6. If $X_1, X_2 \ldots \ldots Xn$ is a random sample from a population $N(\mu, \sigma^2)$ then $\sum \frac{x_i}{n}$ is $\ldots \ldots$ for μ

   a) Unbiased   b) Sufficient   c) Consistent   d) All the above

7. The standard error of an unbiased estimator of μ based on a random sample of size 100 from $N(\mu, 100)$ is--------

   a) 5   b) 2   c) 1   d) 10

8. If T is unbiased estimator of θ, a and b are two integers then $\ldots \ldots$

   c) T^2 unbiased estimator of θ^2 b) aT+ b is unbiased estimator of θ

   c) aT+b is unbiased estimator of $a\theta + b$ d) T is unbiased estimator of $a\theta + b$

   d) Let X_1, X_2 be a random sample of size 2 from $N(\mu, \sigma^2)$. Define $T_1 = \frac{x_1+x_2}{2}$ &

   $T_2 = \frac{2x_1+x3_2}{5}$ then the relative efficiency of T_1 over T_2 is $\ldots \ldots$

   a) $\frac{25}{26}$ b) $\frac{26}{25}$ c) 1   d) $\frac{22}{25}$

Q2) Attempt any Two   (2×5 = 10)

4. Show that UMVUE is unique if it exists.

5. Define the following terms: Parameter space, Sample statistic, Point Estimation, Bias of an estimator & Relative efficiency.

6. Show that sample mean square is unbiased & consistent estimator of population variance.

Total Marks 15   Time:12.00 pm to 1.00 pm   Date :20/9/2024

Q1) Choose Correct Alternative $(1 \times 5 = 5)$

i) Which of the following is an odd member in principal steps in planning of a sample survey?
   a) Objective of survey   b) Definition of population
   c) Organization of field work   d) Observed estimate of population mean

ii) List of all the units of the population is called ....
   a) random sampling   b) bias
   c) sampling frame   d) probability sampling

iii) In SRSWOR variance of sample mean is.............
   a) $\frac{N-n}{N} * \frac{S^2}{n}$ b) $\frac{N-n}{N-1} * S^2$ c) $(1-f) * S^2$ d) all of these

iv) If we have a sample of size n from a population of N units, the finite population correction is.........
   a) $\frac{N-1}{N}$ b) $\frac{n-1}{N}$ c) $\frac{N-n}{n}$ d) $\frac{N-n}{N}$

v) Non-sampling errors are in.........
   a) sample survey   b) Census survey   c) both a) and b)   d) either a) or b)

Q.2 Attempt any two $(5*2=10)$

i) Define simple random sampling, SRSWR and SRSWOR. Also compare SRSWR & SRSWOR.

ii) Show that in sampling for proportion sample proportion is an unbiased estimator of population proportion.

iii) What is sampling? What are the advantages of sampling over census method

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B.Sc. III Sem V Internal Examination 2024-25
Paper XII: Operations Research

Total Marks 15   Time:12.00 pm to 1.00 pm   Date :21/09/2024

Q1) Choose Correct Alternative $(1 \times 5 = 5)$

1) A BFS of a LPP is said to be ---------------- if at least one of the basic variables is zero
   A) Degenerate   B) Non-degenerate   C) Infeasible   D) Unbounded

2) In the simplex table the vector Ar enters the basis if the ratio XBi/a_{ir} is....
   A) Minimum   b) Maximum   C) Not restricted   D) Positive and minimum

3) When the value of objective function can be ......such solutions are called unbounded solutions
   A) Increased indefinitely   B) Decreased indefinitely C) Both A) and B)   D) None of these

4) In canonical form of LPP......
   A) Objective function is of maximization type   B) All variables xi's are non-negative.
   C) All constraints are of $\leq$ type.   D) All of these

5) A basic solution which also satisfies the condition in which all basic variables are non - negative is called -
   A) Basic feasible solution   B) Feasible solution
   C) Optimal solution   D) None of the above

Q2) Attempt any Two $(2 \times 5 = 10)$

   a) Define the following terms
       i) Optimal Solution   ii) Slack Variable   iii) Feasible solution

   b) Explain simplex algorithm to solve LPP.

   c) Find optimal solution for the L.P.P.
   $Max\ Z = 2X_1 + 5X_2$ subject of the constraints
   $2X_1 + 3X_2 \leq 15;\quad X_1 \leq 5,\quad X_1, X_2 \geq 0$