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SHANTIPURAM, SECTOR-F, PHAPHAMAU, PRAYAGRAJ-211021

ASSIGNMENT QUESTION PAPER

सांख्यकी (परास्नातक) कार्यक्रम अधिन्यास सत्र 2024–25

Course Code:	*Course Title:*	*Maximum Marks : 30*
PGSTAT-101/MASTAT-101	*Measure and Probability Theory*	

Section- A

Long Answer Questions

Note: Attempt any three questions. Each question should be answered in 800 to 1000 Words.

Maximum Marks: 18

1. State and prove central limit theorem.
2. Discuss about the weak law of large numbers.
3. State and prove Cauchy Schwartz inequality.
4. Write down the axiomatic definition of probability. Let A, B and C be three events.

Section - B

Short Answer Questions

Maximum Marks: 12

Note: Write any four questions. Answer should be given in 200 to 300 Words.

1. State and prove Jensen inequality.
2. State and prove Kolmogorov inequality.
3. Discuss about the Zero one law.
4. Discuss about the random variable and its type.
5. Define probability space of a random experiment.

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Course Code:	*Course Title:*	*Maximum Marks : 30*
PGSTAT-102/MASTAT-102	*Statistical Inference*	

Section- A

Long Answer Questions

Note: Attempt any three questions. Each question should be answered in 800 to 1000 Words.

Maximum Marks: 18

1. State and prove Rao- Blackwell theorem.
2. State and prove Cramer- Roo inequality.
3. State and prove Neyman- Pearson lemma.
4. On the basis of random sample of size n from the Poisson distribution with parameter θ, obtain UMVUE of $e^{-5\theta.}$

Section - B

Short Answer Questions

Note: Answer any four questions. Answer should be given in 200 to 300 Words.

Maximum Marks: 12

1. Write short notes on (a) MP tests (b) UMP tests**.**
2. Discuss in short (a) BAN estimator (b) CAN estimator
3. Define exponential family of distributions.
4. Let X_1, X_2 - - X_n be a random sample from U [0, θ], $\theta \in (0,\infty)$. Let $X_{(n)}$ = Max (X_1, X_2 - - X_n) Show that $X_{(n)}$ is not BAN for θ.
5. Consider the family F = {p (n, θ) : $0<\theta<1$} of probability mass functions, where

   p (x_1, θ) = $\{(1-\theta)^x$, if x = 0,1,2..... ; 0 otherwise

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ASSIGNMENT QUESTION PAPER

सांख्यकी (परास्नातक) कार्यक्रम अधिन्यास सत्र 2024–25

Course Code:	***Course Title:***	***Maximum Marks : 30***
PGSTAT-103/MASTAT-103	***Survey Sampling***	

Section- A

Long Answer Questions

Note: Attempt any three questions. Each question should be answered in 800 to 1000 Words.

Maximum Marks: 18

1. Prove that $V(\bar{y}_{sy}) \leq V(\bar{y}_{st}) \leq V(\bar{y}_{srs})$
2. Discuss about the Midzuno and Narian system of sampling.
3. Discuss about the Desraj ordered estimates.
4. Write a note on Non Sampling and Sampling error.

Section - B

Short Answer Questions

Note: Answer any four questions. Answer should be given in 200 to 300 Words.

Maximum Marks: 12

1. Define Parameter and Statistic.
2. Define sampling frame and units.
3. Define finite population correction factor.
4. Discuss about the advantages and limitations of simple random sampling.
5. Discuss about the advantages and limitations of stratified sampling.

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ASSIGNMENT QUESTION PAPER

सांख्यकी (परास्नातक) कार्यक्रम अधिन्यास सत्र 2024–25

Course Code: ***PGSTAT-201/MASTAT-201***	***Course Title:*** ***Linear Models and Design of Experiments***	***Maximum Marks : 30***

Section- A

Long Answer Questions

Note: Attempt any three questions. Each question should be answered in 800 to 1000 Words.

Maximum Marks: 18

1. State and prove Gauss-Markov theorem.
2. Define BIBD with its all Parameters.
3. Discuss in detail about the Analysis of Covariance.
4. Discuss about the analysis of covariance and define ANCOVA table.

Section - B

Short Answer Questions

Note: Answer any four questions. Answer should be given in 200 to 300 Words.

Maximum Marks: 12

1. Write a brief note on BLUE
2. Write a note on linear estimation.
3. Discuss about the Turkey's Test.
4. Write a note on contrast and orthogonal contrast.
5. Write the advantages and disadvantages if confounding.

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ASSIGNMENT QUESTION PAPER

सांख्यकी (परास्नातक) कार्यक्रम अधिन्यास सत्र 2024–25

Course Code:	*Course Title:*	*Maximum Marks : 30*
PGSTAT-202/MASTAT-202	***Non parametrics***	

Section- A

Long Answer Questions

Note: Attempt any three questions. Each question should be answered in 800 to 1000 Words.

Maximum Marks: 18

1. Discuss about the order statistics.
2. Describe two Sample Kolnogorov Smirnov test.
3. Discuss about the Mann-Wliteney U-test.
4. What do you understand by order statistics? Discuss their role in non-paramatric theory.

Section - B

Short Answer Questions

Note: Answer any four questions. Answer should be given in 200 to 300 Words.

Maximum Marks: 12

1. Write short notes on two sample location tests.
2. Discuss in short about the Median test and Wilcoxan test.
3. Write short notes on (a) Run test (b) Sign test.
4. Discuss about the Pitman ARE.
5. Write a note on merits and demerits of non-parametric tests.

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ASSIGNMENT QUESTION PAPER

सांख्यकी (परास्नातक) कार्यक्रम अधिन्यास सत्र 2024–25

Course Code:	***Course Title:***	***Maximum Marks : 30***
PGSTAT-203/MASTAT-203	***Stochastic Process***	

Section- A

Long Answer Questions

Note: Attempt any three questions. Each question should be answered in 800 to 1000 Words.

Maximum Marks: 18

1. For a two state Markov chain, under suitable assumptions, derive the expression for the probability that the process occupies state 1 at time n given that the initial probability vector is $(P_O\ P_1)$.
2. State and prove the Chapman Kolmogorov equation for a Markov Chain. Giving some counter example, show that the equations are satisfied by non-Markovian processes also.
3. Stating the underlying assumptions, give the derivation of a Poisson process.
4. Describe the state space and and there one step and two step marunon probability matness for the homogenous markov chain $\{x_n\}$

Section - B

Short Answer Questions

Note: Answer any four questions. Answer should be given in 200 to 300 Words.

Maximum Marks: 12

1. Define (i) An Ergodic Markov Chain, (ii) Stationary Markov Chain.
2. Find the probability distribution of interarrival time for a Poisson process.
3. Let C_1 and C_2 be two communicative classes of a Markov chain and "S" be a state, which belongs to C_1 but not C_2. Prove that C_1 and C_2 are disjoint.
4. Prove that if a Poisson process has occurred once in time interval (0,a], then the point at which it occurs is distributed uniformly over interval (0,a].
5. Define gambler's ruin problem.

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ASSIGNMENT QUESTION PAPER

सांख्यकी (परास्नातक) कार्यक्रम अधिन्यास सत्र 2024–25

Course Code:	*Course Title:*	*Maximum Marks : 30*
PGSTAT-301/MASTAT-301	*Decision Theory and Bayesian Analysis*	

Section- A

Long Answer Questions

Note: Attempt any three questions. Each question should be answered in 800 to 1000 Words.

Maximum Marks: 18

1. State and Prove Minimax Theorem.
2. Discuss about the Optimal Decision Rules.
3. State and Prove complete class Theorem.
4. What is optional decision rule. Illustrate through an example.

Section - B

Short Answer Questions

Note: Answer any four questions. Answer should be given in 200 to 300 Words.

Maximum Marks: 12

1. Discuss about the Invariance and ordering.
2. What is the equalizer rule. Discuss about it.
3. Write a note on Extended Bayes Rule.
4. Write short notes on (a) Admissibility (b) Completeness
5. What is the criterion of optimal decision rule.

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ASSIGNMENT QUESTION PAPER

सांख्यकी (परास्नातक) कार्यक्रम अधिन्यास सत्र 2024–25

Course Code: ***PGSTAT-302/MASTAT-302***	***Course Title:*** ***Multivariate Analysis***	***Maximum Marks : 30***

Section- A

Long Answer Questions

Note: Attempt any three questions. Each question should be answered in 800 to 1000 Words.

Maximum Marks: 18

1. What is multivariate normal distribution? Estimate the moment generation function of MMD.
2. Discuss about the Wishart distribution. Also find its additive Property.
3. Discuss about the Maholanobis D^2 with its various applications.
4. Define multivariate normal distribution with its properties. Also, show that when x is normally distributed the components are mutually independent if the covariance matrix is diagonal.

Section - B

Short Answer Questions

Note: Answer any four questions. Answer should be given in 200 to 300 Words.

Maximum Marks: 12

1. Find the characteristic function of MMD.
2. Describe about the multiple and partial short.
3. Define Hoteling T^2 with its applications.
4. Write short notes on Discriminate Analysis.
5. Obtain MLE of mean vector for multivariate normal population.

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ASSIGNMENT QUESTION PAPER

सांख्यकी (परास्नातक) कार्यक्रम अधिन्यास सत्र 2024–25

Course Code:	*Course Title:*	*Maximum Marks : 30*
PGSTAT-303/MASTAT-303	*Econometrics*	

Section- A

Long Answer Questions

Note: Attempt any three questions. Each question should be answered in 800 to 1000 Words.

Maximum Marks: 18

1. Define linear regression model with assumptions.
2. Discuss about the SURE model and its estimation.
3. What is Dummy Variable. Discuss about the use of Dummy Variables.
4. Define econometrics. What is its limitation?

Section - B

Short Answer Questions

Note: Answer any four questions. Answer should be given in 200 to 300 Words.

Maximum Marks: 12

1. Discuss about the maximum likelihood method for estimation of the parameters.
2. What are the indirect least square estimators also define about two stage least square estimators.
3. Discuss about the Point and interval Predictors.
4. Write shout notes on R^2 an adjusted R^2
5. What is multi co-linearity?

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ASSIGNMENT QUESTION PAPER

सांख्यकी (परास्नातक) कार्यक्रम अधिन्यास सत्र 2024–25

Course Code:	*Course Title:*	*Maximum Marks : 30*
PGSTAT-401/MASTAT-401	***Demography***	

Section- A

Long Answer Questions

Note: Attempt any three questions. Each question should be answered in 800 to 1000 Words.

Maximum Marks: 18

1. Write a note on stable and Stationary population theory.
2. Discuss about the migration with its type and deferent methods of estimation.
3. Discuss about the steps of construction of abridge life table Also define abridge life table.
4. Discuss about the life time survival ratio method and census survival method.

Section - B

Short Answer Questions

Note: Answer any four questions. Answer should be given in 200 to 300 Words.

Maximum Marks: 12

1. Write shout notes on (a) NRR (b) GRR
2. Write shout notes on (a) ASFR (b) TFR
3. Write shout notes on (a) CEB (b) Brass PIF ratio
4. Write shout notes on (a) Mean Length of Generation (b) Expectation of life
5. In-migration & immigration.

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ASSIGNMENT QUESTION PAPER

सांख्यकी (परास्नातक) कार्यक्रम अधिन्यास सत्र 2024–25

Course Code: *PGSTAT-403A/ MASTAT-403A*	*Course Title:* *Survival Analysis and Reliability Theory*	*Maximum Marks : 30*

Section- A

Long Answer Questions

Note: Attempt any three questions. Each question should be answered in 800 to 1000 Words.

Maximum Marks: 18

1. Calculate the moment generating function of exponential distribution.
2. Write a short note on Desh Pande test.
3. Discuss about the life tables. Also construct the life table.
4. What do you mean by censoreal data? Also, differentiate it from truncated data (in detail).

Section - B

Short Answer Questions

Note: Answer any four questions. Answer should be given in 200 to 300 Words.

Maximum Marks: 12

1. Write short notes on Mentel Haenzel test & Log rank test.
2. Describe Weibull distribution with its first four moments.
3. What is Ageing Classes. Write its properties.
4. Write a note on Rank test for the regression coefficient.
5. Define survival function. Establish its relationship with hazard function.

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ASSIGNMENT QUESTION PAPER

सांख्यकी (परास्नातक) कार्यक्रम अधिन्यास सत्र 2024–25

Course Code:	*Course Title :*	*Maximum Marks : 30*
PGSTAT-404A/ MASTAT -404A	*Actuarial Statistics*	

Section - A

Long Answer Questions

Note: Attempt any three questions. Each question should be answered in 800 to 1000 Words.

Maximum Marks: 18

1. Discuss about the utility theory.
2. Discuss about the life table.
3. Discuss about the principles about the compound interest.
4. Write a detailed not on multiple life functions.

Section - B

Short Answer Questions

Maximum Marks: 12

Note: Attempt any four questions. Answer should be given in 200 to 300 Words.

1. Discuss in brief about force of mortality.
2. What is survival function?
3. Discuss endowment insurance.
4. Discuss about the force of interest and discounts.
5. Brief the roll of distribution theory on this.

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ASSIGNMENT QUESTION PAPER

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Course Code:	*Course Title :*	*Maximum Marks : 30*
PGSTAT-403B/ MASTAT -403B	***Operation Research***	

Section - A

Long Answer Questions

Note: Attempt any three questions. Each question should be answered in 800 to 1000 Words.

Maximum Marks: 18

1. Discuss about the Linear Programming Also Define the different steps for Graphical solution to LPP.
2. Discuss about the principle of simplex method. Also define non basic variable and artificial variables.
3. Discuss about the different methods for the computation of an initial basic feasible solution.
4. Write a detailed not on classification of models used in operations research.

Section - B

Short Answer Questions

Maximum Marks: 12

Note: Attempt any four questions. Answer should be given in 200 to 300 Words.

1. Discuss in brief about the Hungarian method.
2. Discuss about the basic assumption of two person sum- zero game.
3. Write a note on pay off matrix.
4. Describe the graphical method for or games.
5. What is a dual problem? How do we get a dual of given primal?

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ASSIGNMENT QUESTION PAPER

सांख्यकी (परास्नातक) कार्यक्रम अधिन्यास सत्र 2024–25

Course Code: *PGSTAT-404B/MASTAT-404B*	*Course Title:* *Mathematical and Real Analysis*	*Maximum Marks : 30*

Section- A

Long Answer Questions

Note: Attempt any three questions. Each question should be answered in 800 to 1000 Words.

Maximum Marks: 18

1. Discuss about the Riemann Stieltjes integrals.
2. Write a note on Convergence of the sequence.
3. State and prove Baire's theorem.
4. State & Prove Riemann stilettos integrals.

Section - B

Short Answer Questions

Note: Answer any four questions. Answer should be given in 200 to 300 Words.

Maximum Marks: 12

1. Write short notes on (a) MP tests (b) UMP tests
2. Discuss about the CRK bound.
3. Discuss in short (a) BAN estimator (b) CAN estimator
4. Discuss about the Bhattacharya bound.
5. Define about the Hahn & Jordan decomposition.