UTTAR PRADESH RAJARSHI TANDON OPEN UNIVERSITY

SHANTIPURAM, SECTOR-F, PHAPHAMAU, PRAYAGRAJ-211021

ASSIGNMENT QUESTION PAPER

Session: 2025-26 **Max. Marks: 30**

Program Name: M.Sc. (Statistics)

Course Code: *MScSTAT-101N / MASTAT -101N* **Course Name: Measure and Probability Theory**

Section A

S.N	**Short answer type question (approx. 200 -300 words)**	**Marks 2*6=12**
1	State and prove Jenson's inequality.	2
2	Using the convergence of the random variables to show that t distribution $\rightarrow N(0,1)$	2
3	Show that let $\{X_n\}$ be sequence of random variables such that $X_n \xrightarrow{2} X. Then\ E(X_n) \rightarrow E(X)\ and\ E(X_n^2) \rightarrow E(X^2)\ as\ n \rightarrow \infty$	2
4	If $X_n \xrightarrow{a.s} (X), Let\ \{a_n\}$ be sequence of real numbers such that $a_n \rightarrow a$ as $n \rightarrow \infty$, then show that $(a_n X_n) \xrightarrow{L} aX$	2
5	State and prove central limit theorem	2
6	Prove that any distribution function possesses the property $\frac{\lim X}{X \rightarrow \infty} \int_x^{\infty} \frac{1}{t} dF(t) = 0$	2

Section B

S.NO	**Short answer type question (approx. 500 -800 words)**	6*3=18 **Marks**
1.	Explain WLLN. How is it different from SLLN and CLT?	6
2.	State and prove the Lebesgue convergence theorem for measurable functions	6
3.	Find the characteristic function for the probability density function is $f(x) = \frac{1}{\sqrt{2\pi}} e^{\frac{-x^2}{2}}$	6

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ASSIGNMENT QUESTION PAPER

Session: 2025-26 **Max. Marks: 30**
Program Name: M.Sc. (Statistics)
Course Code: *MScSTAT-102N / MASTAT - 102N* **Course Name: Statistical Inference**

Section A

S.N	Short answer type question (approx. 200 -300 words)	Marks 6*2=12
1	What are simple and composite hypothesis? State and prove Neyman- Pearson lemma for testing simple hypothesis against simple hypothesis.	**2**
2	.Explain Type I and Type II Error in Statistical Hypothesis.	**2**
3	A bank wants to find out the average savings of its customers in Delhi and Kolkata. A sample of 250 accounts in Delhi shows an average savings of Rs. 22500 while a sample of 200 accounts in Kolkata shows an average savings of Rs. 21500. It is known that standard deviation of savings in Delhi is Rs. 150 and that in Kolkata is Rs. 200. Can we conclude at 1 per cent level of significance that banking pattern of customers in Delhi and Kolkata is the same?	**2**
4	State and prove Rao Blackwell theorem.	**2**
5	State and prove Lehman Schaffer theorem	**2**
6	Explain most powerful critical region.	**2**

Section B

S.NO	Short answer type question (approx. 500 -800 words)	6*3=12 Marks
1.	Let $X_1, X_2X_3 \ldots\ldots\ldots X_n$ be a random sample from U$(\theta, \theta+1)$ $s.t$ (1) $T_1 = \bar{X} - \frac{1}{2}$ (2) $T_2 = X_{(n)} - \frac{n}{n+1}$ $are\ both\ consistent\ for\ \theta$	6
2.	$Let\ X_1, X_2X_3 \ldots\ldots\ldots X_n$be a random sample of size n from the Poisson distribution P(θ), Obtain Cramer Rao lower bound for the variance of unbiased estimator of θ^2 .	6
3.	Explain Best linear unbiased estimator .	6

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ASSIGNMENT QUESTION PAPER

Session: 2025-26 **Max. Marks: 30**
Program Name: M.Sc. (Statistics)
Course Code: *MScSTAT-103N / MASTAT - 103N* **Course Name: Survey Sampling**

Section A

S.N	Short answer type question (approx. 200 -300 words)	Marks 6*2=12
1	Establish the result which justifies the statement stratification generally leads to greater precision that simple random sampling.	2
2	Define systematic and circular systematic sampling.	2
3	Prove that systematic sampling is more precise than SRS if the variation within the systematic sample is larger than the population variance as a whole.	2
4	A sample of 100 employees is to be drawn from a population of collages A and B. The population means and population mean squares of their monthly wages are given below Village 2 | Ni | $\bar{X}_i$ | $\bar{S}_i^2$ Collage A | 400 | 60 | 20 Collage B | 200 | 120 | 80 Draw the samples using Proportional and Neyman allocation techniques and compare. Obtain the sample mean and variances for the Proportional Allocation and SRSWOR for the given information. Then Find the percentage gain in precision of variances of sample mean under the Proportional Allocation over the that of SRSWOR	2
5	Prove that the probability of selection of a sample of n from the population by SRSWOR is 1/ N.	2
6	Discuss about the Desraj ordered estimates.	2

Section B

S.NO	Short answer type question (approx. 500 -800 words)	6*3=12 Marks
1.	Drive to the first Approximation, the expression for the bias and variance of the ratio estimators.	6
2.	Prove that the two stage sampling is more efficient than one stage sampling. If $\rho < 0$, where ρ is the intra class correlation coefficient between the elements of the first stage units (equal first stage units)	6
3.	Discuss the method of collapsed strata. Drive the condition for which this method is as efficient as stratified sampling.	6

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ASSIGNMENT QUESTION PAPER

Session: 2025-26 **Max. Marks: 30**

Program Name: M.Sc. (Statistics)

Course Code: *MScSTAT-201N /MASTAT-201N* **Course Name: Linear Model and design of Experiments**

Section A

S.N	Short answer type question (approx. 200 -300 words)	Marks 2*6=12
1	Explain basic principle of design of experiments.	2
2	Define Partial Confounding.	2
3	Discuss about the split plot design.	2
4	What is Random effects model?	2
5	Explain Yates method of statistical analysis of 2^3 factorial experiment?	2
6	Describe general linear regression model along with the assumptions usually made. Find out least square estimators for its parameters and examine their properties.	2

Section B

S.NO	Short answer type question (approx. 500 -800 words)	6*3=18 Marks
1.	A person wanted to purchase a lot of electric drills. He got quotations from five manufacturers. For the selection, he wanted to conduct an experiment to estimate the time taken by each making a hole in a metallic sheet. As the sheet might not be uniform all over in respect of thickness and hardness, he marked 20 places on the sheet and applied four drills from each concern in 4 randomly selected places to make holes. The time for making each hole was recorded and these formed the observations. The observations in seconds are shown below in brackets along with marks of the drills denoted by D1, D2, D3, D4 and D5. D1 (19) D3 (22) D4 (20) D1 (20)	6

	D5 (29) D2 (24) D5 (30) D3 (24) D2 (26) D4 (25) D1 (16) D2 (22) D5 (28) D3 (25) D5 (31) D4 (28) D4 (27) D1 (16) D2 (27) D3 (20) Conduct the experiment by adopting a completely randomized design	
2.	Carry out ANOVA for the following design: A ,5 B ,7 C ,7 D, 8 E ,9 B, 7 C, 9 D ,8 E ,8 A ,5 C, 6 D ,5 E, 9 A ,8 B, 9 D, 5 E, 6 A ,8 B, 5 C, 7 E ,8 A ,9 B, 5 C, 7 D ,6	6
3.	Explain factorial Experiments.	6

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ASSIGNMENT QUESTION PAPER

Session: 2025 -26 **Max. Marks: 30**

Program Name: M.Sc. (Statistics)

Course Code: *MScSTAT-202N/ MASTAT-202N* **Course Name: Non- Parametric**

Section A

S.N	Short answer type question (approx. 200 -300 words)	Marks 6*2=12
1	Explain disadvantages for a non parametric test	**2**
2	Explain the computation of median test for two independent samples with the help of steps and examples.	**2**
3	Explain median test with a focus on its assumptions.	**2**
4	Explain Run test with a focus on its assumptions.	**2**
5	Explain sign test.	**2**
6	Distinguish between parametric and non parametric tests.	**2**

Section B

S.NO	Short answer type question (approx. 500 -800 words)
1.	Compute one sample median test for the following data: 34, 32, 22, 34 ,43, 45 ,56, 54 ,56, 43, 22, 36, 43, 33.
2.	A new approach to prenatal care is proposed for pregnant women living in a rural community. The new program involves in-home visits during the course of pregnancy in addition to the usual or regularly scheduled visits. A pilot randomized trial with 15 pregnant women is designed to evaluate whether women who participate in the program deliver healthier babies than women receiving usual care. The outcome is the APGAR score measured 5 minutes after birth. Recall that APGAR scores range from 0 to 10 with scores of 7 or higher considered normal (healthy), 4-6 low and 0-3 critically low. The data are shown below.

usual Care	8	7	6	2	5	8	7	3
New Program	9	9	7	8	10	9	6	

3.	The following data shows the age at diagnosis of type II diabetes in young adults. Is the age at diagnosis different for males and females? Males: 19 22 16 29 24 Females: 20 11 17 12

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ASSIGNMENT QUESTION PAPER

Session: 2025 -26 **Max. Marks: 30**
Program Name: M.Sc. (Statistics)
Course Code: *MScSTAT-203 N /MASTAT-203N* **Course Name: Stochastic Process**

Section A

S.N	Short answer type question (approx. 200 -300 words)	Marks 6*2=12
1	What is stochastic process? What are the main elements distinguishing stochastic process?	**2**
2	Let C_1 and C_2be two communicative classes of a Markov chain and "S" be a state, which belongs to C_1 but notC_2? Prove that $C_1$and C_2 are disjoint?	**2**
3	Explain Gambler"s ruin problem. Give an example?	**2**
4	Distinguish between discrete and continuous state stochastic process with examples?	**2**
5	Define stationary probability distribution.	**2**
6	State and prove the Chapman Kolmogorov equation for a Markov Chain? Giving some counter example, and show that the equations are satisfied by non-Markovian processes.	**2**

Section B

S.NO	Short answer type question (approx. 500 -800 words)	6*3=12 Marks
1.	Find the probability distribution of inter arrival time for a Poisson process.	6
2.	Find out the probability generating function of a Simple Branching Process.	6
3.	State and prove fundamental theorem of probability of extinction in Branching Process.	6

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ASSIGNMENT QUESTION PAPER

Session: 2025-26 **Max. Marks: 30**

Program Name: M.Sc. (Statistics)

Course Code: *MScSTAT-301N /MASTAT-301N* **Course Name:** Decision Theory and Bayesian Analysis

Section A

S.N	Short answer type question (approx. 200 -300 words)	Marks 6*2=12
1	Write short notes on (a) Admissibility (b) Completeness	**2**
2	Discuss about the Optimal Decision Rules.	**2**
3	Explain equalizer rule.	**2**
4	Write a note on Extended Bayes Rule.	**2**
5	Explain the criterion of optimal decision rule.	**2**
6	Explain Bayesian robustness.	**2**

Section B

S.NO	Short answer type question (approx. 500 -800 words)	6*3=12 Marks
1.	State and Prove complete class Theorem.	6
2.	State and Prove Minimax Theorem.	6
3.	State is the basic difference between Bayes and Minimax Principles.	6

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ASSIGNMENT QUESTION PAPER

Session: 2025-26 **Max. Marks: 30**
Program Name: M.Sc. (Statistics)
Course Code: *MScSTAT-302N /MASTAT-302N* **Course Name:** Multivariate Analysis

Section A

S.N	Short answer type question (approx. 200 -300 words)	Marks 6*2=12
1	Find Moment generating function of Multivariate normal distribution.	**2**
2	Write short notes on Discriminate Analysis.	**2**
3	In case of Multivariate normal distribution find Maximum likelihood estimators of parameters.	**2**
4	Explain canonical correlation.	**2**
5	Explain Hoteling's T^2 Statistic.	**2**
6	Explain Factor analysis.	**2**

Section B

S.NO	Short answer type question (approx. 500 -800 words)	6*3=12 Marks
1.	Explain Wishart distribution. Also find its additive Property.	6
2.	Explain Maholanobis D2 statistics.	6
3.	Explain Multivariate linear regression model and estimate their parameters.	6

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ASSIGNMENT QUESTION PAPER

Session: 2025-26 **Max. Marks: 30**
Program Name: M.Sc. (Statistics)
Course Code: *MScSTAT-303N/ MASTAT-303N* **Course Name:** Econometrics

Section A

S.N	Short answer type question (approx. 200 -300 words)	Marks 6*2=12
1	Explain Linear regression model give basic Assumptions and estimate of parameters by least squares methods.	**2**
2	Explain Multicolliearity analysis.	**2**
3	Explain Models with dummy independent variables.	**2**
4	Explain Box-Jenkins models.	**2**
5	Explain Auto regressive AR(1) process.	**2**
6	Explain vector autoregressive moving average (VARMA) process.	**2**

Section B

S.NO	Short answer type question (approx. 500 -800 words)	6*3=12 Marks
1.	Explain pereiodogram and correlogram analysis.	6
2.	Explain auto covariance and auto correlation function.	6
3.	Explain vector autoregressive moving average (VARMA) process.	6

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ASSIGNMENT QUESTION PAPER

Session: 2025 -26 **Max. Marks: 30**

Program Name: M.Sc. (Statistics)

Course Code: *MScSTAT-401N / MASTAT -401N*

Course Name: Demography

Section A

S.N	Short answer type question (approx. 200 -300 words)	Marks 6*2=12
1	Explain Lotka's formulae of fundamental relationship for instable population.	2
2	Write shout notes on (a) Mean Length of Generation (b) Expectation of life .	2
3	Explain gross reproduction rate (GRR).	2
4	Explain standardized death rate (STDR).	2
5	Explain basic concept of stable and stationary population	2
6	Define IMR (Infant mortality rate) and CEB (Children ever Born	2

Section B

S.NO	Short answer type question (approx. 500 -800 words)	6*3=12 Marks
1.	Discuss about the migration. Also discuss internal migration from duration of residence statistics.	6
2.	Prove that NRR< GRR. Give the reason why NRR is less than GRR.	6
3.	Discuss about the steps of construction of abridge life table Also define abridge life table.	6

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ASSIGNMENT QUESTION PAPER

Session: 2025-26 **Max. Marks: 30**

Program Name: M.Sc. (Statistics)

Course Code: *MScSTAT- 403NA /MASTAT -403NA*

Course Name: Survival Analysis and Reliability Theory

Section A

S. N	Short answer type question (approx. 200 -300 words)	Marks 6*2=12
1	Explain survival function. Establish its relationship with hazard function.	**2**
2	Explain reliability. Also differentiate it from quality.	**2**
3	Explain Ageing Classes. Write its properties.	**2**
4	Describe Weibull distribution with its first four moments.	**2**
5	Explain coherent system.	**2**
6	Define reliability. Also, differentiate it from quality, clearly	**2**

Section B

S.NO	Short answer type question (approx. 500 -800 words)	6*3=12 Marks
1.	Write a short note on Desh Pande test.	6
2.	Explain Mentel Haenzel test & Log rank test.	6
3.	State and prove Loss of memory property of exponential distribution.	6

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ASSIGNMENT QUESTION PAPER

Session: 2025-26 **Max. Marks: 30**

Program Name: M.Sc. (Statistics)

Course Code: *MScSTAT- 404NA / MASTAT -404NA* **Course Name:** Actuarial Statistics

Section A

S. N	Short answer type question (approx. 200 -300 words)	Marks 6*2=12
1	Discuss in brief about force of mortality.	2
2	What is survival function?	2
3	Discuss endowment insurance.	2
4	Discuss about the force of interest and discounts	2
5	Brief the roll of distribution theory on this	2
6	Discuss about the utility theory	2

Section B

S.NO	Short answer type question (approx. 500 -800 words)	6*3=12 Marks
1.	Discuss about the life table.	6
2.	Discuss about the principles about the compound interest	6
3.	Write a detailed not on multiple life functions	6

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ASSIGNMENT QUESTION PAPER

Session: 2025-26 **Max. Marks: 30**

Program Name: M.Sc. (Statistics)

Course Code: *MScSTAT- 403NB / MASTAT - 403NB* **Course Name:** Operation Research

Section A

S. N	Short answer type question (approx. 200 -300 words)	Marks 6*2=12
1	Discuss about the Linear Programming Also Define the different steps for Graphical solution to LPP	2
2	Write down the steps involved in solving Assignment problem using Hungarian Method.	2
3	Write the steps involved in solving LPP Using Graphical method? And also write the applications of Operations Research	2
4	Classify Queuing models	2
5	Explain PERT method.	2
6	Differentiate between individual and group replacement.	2

Section B

S.NO	Short answer type question (approx. 500 -800 words)	6*3=12 Marks
1.	Super market has a single cashier During the peak hours; customers arrive at a rate of 20 customers per hour. The average number of customers that can be served by the cashier is 24 per	6

hour. Calculate :

(i) The probability that the cashier is idle.

(ii) The average number of customers in the queuing system.

(iii) The average number of customers in the queue

2. Draw network diagram from following 4 activities artificial variables. 6

Job	A	B	C	D	E	F	G	H	I	J	K
Predecessor Jobs	-	A	B	C	B	E	D,F	F	H	G,I	J

3. Determine the basic feasible solution to the following transportation problem by using the following : (a) North-West Corner Rule (b) Vogel's approximation method 6

Distribution Centers					
Source	D_1	D_2	D_3	D_4	Supply
S_1	2	3	11	7	6
S_2	1	0	6	1	1
S_3	5	8	15	9	10
Requirements	7	5	3	2	

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ASSIGNMENT QUESTION PAPER

Session: 2025-26 **Max. Marks: 30**

Program Name: M.Sc. (Statistics)

Course Code: *MScSTAT- 404NB/ MASTAT - 404NB* **Course Name: Mathematical and real analysis**

Section A

S. N	Short answer type question (approx. 200 -300 words)	Marks 6*2=12
1	State the Completeness Property of real numbers.	2
2	State the Monotone Subsequence Theorem	2
3	Discuss about the Riemann Stieltjes integrals.	2
4	State Dirichlet's conditions for a function to be expanded as a Fourier series.	2
5	Define about the Hahn & Jordan decomposition.	2
6	Explain Reusz- Fischar theorem.	2

Section B

S.NO	Short answer type question (approx. 500 -800 words)	6*3=12 Marks
1.	State and prove D'Alemberts Ratio test for series	6
2.	Explain Fourier and Laplace transformation.	6
3.	State and prove Baire's theorem	6

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ASSIGNMENT PAPER

Session: 2025-26	**Max. Marks: 30**
Program Name: M.Sc.- Biochemistry	
Course Code: PGBR-01	**Course Name: Basics in research**

SECTION -A		**2*6=12 marks**
Q. No.	**Short answer type question (approx. 200 -300 words)**	**Marks**
1	Write down the meaning and objective of research.	**2**
2	Discuss the need for reviewing literature in brief. What are the types of literature review?	**2**
3	What do you understand by google scholar, science direct?	**2**
4	What do you understand by google Scopus, web of science?	**2**
5	write short notes on the following- a) Journal abstracts b) SciFinder	2
6	Write short notes on the following- a) Citation index b) Peer review and revision.	2
SECTION -B		**6*3=18 marks**
	Long answer type question (approx. 500 -800 words)	**Marks**
7	Discuss in detail about the intellectual property and intellectual property rights (IPR).	**6**
8	write short notes on the following- a) Citation index b) Peer review and revision.	**6**
9	What are the various kinds of report writing in academics and research. Explain in detail.	**6**

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ASSIGNMENT PAPER

Session: 2025-26	**Max. Marks: 30**
Program Name: M.Sc.- Biochemistry	
Course Code: PGRT-03	**Course Name: Basic research tools**

SECTION -A		**2*6=12 marks**
Q. No.	**Short answer type question (approx. 200 -300 words)**	**Marks**
1	Write down the types and methods of data collection.	**2**
2	What are the different types of sample design?	**2**
3	What do you understand by data presentation?	**2**
4	Briefly describe errors in hypothesis testing.	**2**
5	Discuss the application of ICT in research.	2
6	Discuss the application of MS office in research.	2
SECTION -B		**6*3=18 marks**
	Long answer type question (approx. 500 -800 words)	**Marks**
7	Discuss sample designing detail. What are the characteristics of a good sample design?	**6**
8	What is research hypothesis and formulation of hypothesis. Discuss the concept of hypothesis testing.	**6**
9	What do you understand by Data classification and tabulation?	**6**

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ASSIGNMENT QUESTION PAPER (2025-20256)

M.Sc. (Statistics/Computer Science/Mathematics/ Bio chemistry/ Environmental Science) III Semester

Subject: Statistics/Computer Science/ Mathematics/ Bio chemistry/ Environmental Science
Subject Code: M.Sc. (CS)/ M.Sc. (Statistics)/M.Sc. (Mathematics)/M.Sc.(Environmental Science)
Subject Title: Entrepreneurship development
Course Code: PGED-02

Maximum Marks: 30

Section- A

Note: Long Answer Questions. Answer should be given in 800 to 1000 words each. Answer all questions. All questions are compulsory.(Six marks each)

Maximum Marks: 18

1. Explain various type of entrepreneurship.
2. What are the needs and Objectives of Entrepreneurship Development Programs. Explain eight stages of Entrepreneurship Development Cycle.
3. Explain any four all India Financial Institutions who aid toentrepreneur.

Section- B

Note: Short Answer Questions. Answer should be given in 200 to 300 words each. Answer all questions. All questions are compulsory. (Two marks each)

Maximum Marks: 12

1. What is entrepreneurship?What are the main characteristics of an entrepreneur to do entrepreneurship?
2. Differentiate between Entrepreneur, Intrapreneur &Manager.
3. What are the problems faced by women entrepreneurs in doingbusiness?
4. Explain the characteristics of projects with various types of project?
5. Highlight the need of technology for entrepreneurs.
6. What is the various assistance of financial Institutions toentrepreneurs?