Test Booklet No. _____

This booklet consists of 100 questions and __ printed pages.

RGUCET/2025/36

Series A

RGUCET 2025
Common Entrance Test, 2025
MASTER OF SCIENCE IN STATISTICS

Full Marks: 100 **Time: 2 Hours**

Roll No. | | | | | | | | |

Day and Date of Examination: _____

Signature of Invigilator(s) _____

Signature of Candidate _____

General Instructions:

PLEASE READ ALL THE INSTRUCTIONS CAREFULLY BEFORE MAKING ANY ENTRY.

1. DO NOT OPEN THIS TEST BOOKLET UNTIL YOU ARE TOLD TO DO SO.
2. Candidate must write his/her Roll Number on the space provided.
3. This Test Booklet contains 100 Multiple Choice Questions (MCQs) from the concerned subject. Each question carries 1 mark. There shall be negative marking of 0.25 against each wrong attempt.
4. Please check the Test Booklet to verify that the total pages and total number of questions contained in the test booklet are the same as those printed on the top of the first page. Also check whether the questions are in sequential order or not.
5. Candidates are not permitted to enter into the examination hall after the commencement of the entrance test or leave the examination hall before completion of Examination.
6. Making any identification mark in the OMR Answer Sheet or writing Roll Number anywhere other than the specified places will lead to disqualification of the candidate.
7. Candidates shall maintain silence inside and outside the examination hall. If candidates are found violating the instructions mentioned herein or announced in the examination hall, they will be summarily disqualified from the entrance test.
8. In case of any dispute, the decision of the Entrance Test Committee shall be final and binding.
9. The OMR Answer Sheet consists of two copies, the Original copy and the Student's copy

<table>
<tr><td>1</td><td colspan="4">In the given sentence, identify the segment which contains the grammatical error.
‘All the ladies of the colony assemble in temple and prays together on Sunday evening.’</td><td>and prays together</td></tr>
<tr><td></td><td>a) on Sunday evenings</td><td>b) and prays together</td><td>c) assemble in temple</td><td>d) all the ladies of the colony</td><td>b)</td></tr>
<tr><td>2</td><td colspan="4">Select the correct indirect form of the given sentence.
The gardener said to the children, “Please do not pluck any flowers.”</td><td>The gardener requested the children not to pluck any flowers.</td></tr>
<tr><td></td><td>a) The gardener told to the children to kindly not pluck any flowers.</td><td>b) The gardener requested the children not to pluck any flowers.</td><td>c) The gardener ordered the children to not pluck any flowers.</td><td>d) The gardener requested to the children please do non pluck any flowers.</td><td>b)</td></tr>
<tr><td>3</td><td colspan="4">A. Sentences that use the subject-verb-object order are passive voice sentences.
B. Transitive verbs are always followed by a direct object.

Based on the above statements A and B, choose the correct answer from the options given below:</td><td>Statement B is true but not A</td></tr>
<tr><td></td><td>a) Statement A is true but not B</td><td>b) Statement B is true but not A</td><td>c) Both statements A and B are true</td><td>d) Both statements A and B are false</td><td>b)</td></tr>
<tr><td>4</td><td colspan="4">Match the following pairs of synonyms.

<table><tr><td>A. Irresolute</td><td>i. Miserly</td></tr><tr><td>B. Frugal</td><td>ii. Undecided</td></tr><tr><td>C. Motive</td><td>iii. Mercy</td></tr><tr><td>D. Pity</td><td>iv. Intention</td></tr></table></td><td>A-ii, B-i, C-iv, D-iii</td></tr>
<tr><td></td><td>a) A-i, B-ii, C-iii, D-iv</td><td>b) A-iv, B-iii, C-ii, D-i</td><td>c) A-ii, B-i, C-iv, D-iii</td><td>d)A-iii, B-ii, C-i, D-iv</td><td>c)</td></tr>
<tr><td>5</td><td colspan="4">Select the most appropriate antonym of the underlined word.

The <u>incidental</u> meeting with the investors at Mr. Sinha’s party helped him expend his business.</td><td>Planned</td></tr>
<tr><td></td><td>a) Fortunate</td><td>b) Important</td><td>c) Planned</td><td>d) Arbitrary</td><td>c)</td></tr>
<tr><td>6</td><td colspan="4">Which article of the Indian Constitution gives the President the power of pardoning?</td><td>Article 72</td></tr>
<tr><td></td><td>a) Article 73</td><td>b) Article 72</td><td>c) Article 75</td><td>d) Article 74</td><td>b)</td></tr>
</table>

7	Which of the statement(s) is/are true? A. The human heart has five chambers. B. The Statue of Liberty was a gift from France to the USA. C. Lightning never strikes the same place twice. D. Venus is the closest planet to the Sun.				Only B is true
	a) Only A is true	b) Only B is true	c) A and B are true	d) C and D are true	b)
8	The Flamingo festival is celebrated in the state of:				Andhra Pradesh
	a) Rajasthan	b) Assam	c) Manipur	d) Andhra Pradesh	d)
9	Match the capital cities with their country. A. Berlin — i. Canada B. Moscow — ii. Germany C. Canberra — iii. Russia D. Ottawa — iv. Australia				A-ii, B-iii, C-iv, D-i
	a) A-i, B-ii, C-iv, D-iii	b) A-ii, B-iii, C-iv, D-i	c) A-ii, B-iii, C-i, D-iv	d) A-iii, B-ii, C-iv, D-i	b)
10	Which planet is known as the "Red Planet"?				Mars
	a) Venus	b) Earth	c) Mars	d) Jupiter	c)
11	Which organization has recently delivered the Medium Range-Microwave Obscurant Chaff Rocket (MR-MOCR) to the Indian Navy?				DRDO
	a) ISRO	b) DRDO	c) HAL	d) CSIR	
12	Which of these statements are correct? I. Lt. General KaiwalyaTrivikramParnaik, PVSM, UYSM, YSM (Retired) is the present governor of Arunachal Pradesh. II. Shri Lakshman Prasad Acharya is the present governor of Manipur. III. Shri La. Ganesan is the present governor Nagaland. IV. Shri C H Vijayashankar is the present governor of Meghalaya.				I, III and IV.
	a) I, II, III and IV	b) I, II, and IV.	c) I, III and IV.	d) II,III and IV	c)
13	Given below are two statements: choose the most appropriate answer from the options Assertion (A): COVID-19 is caused by a virus. Antibiotics do not work against viruses. Reason (R): The bacteria of COVID-19 is very infective.				**A** is true but **R** is false.
	a) Both the A and R	b) Both the A	c) A is true but	d) A is false but	c)

	are true and R is the correct explanation of A.	and R are true but R is NOT the correct explanation of A.	R is false.	R is true.	
14	Match List I with List II: **List I** / **List II** A. India Men's Cricket Team — I. Brazil B. Australia Women's Cricket Team — II. Won the ICC Men's Champions Trophy 2025 C. Women's World Cup 2027 — III. Football D. Durand Cup, recently seen in news, is associated with which sports? — IV. Won the ICC Women's T20 World Cup 2024 1.				A-II, B-IV, C-I, D-III
	a) A-IV, B-III, C-I, D-II	b) A-II, B-III, C-IV, D-I	c) A-II, B-IV, C-I, D-III	d) A-III, B-IV, C-I, D-II	c)
15	Which of the following institute recently launched the 'Electric Tiller'?				CSIR-Central Mechanical Engineering Research.
	a) CSIR-Central Leather Research Institute.	b) CSIR-Central Mechanical Engineering Research.	c) CSIR-Central Institute of Mining and Fuel Research.	d) CSIR-Advanced Materials and Processes Research	b)
16	Find the answer choice that can replace the question mark in the letter series. 1. J L N P R T ?				V
	a) S	b) U	c) V	d) W	c)
17	Which letter will come in the blank square? H M C J N F L O				I
	a) R	b) Q	c) K	d) I	d)
18	Given below are two statements: choose the most appropriate answer from the options **Assertion (A):** If a conclusion logically follows from the given premises, then the argument is considered valid. **Reason (R):** An argument is valid only if all its premises are true.				**A** is true but **R** is false.

	a) Both the A and R are true and R is the correct explanation of A.	b) Both the A and R are true but R is NOT the correct explanation of A.	c) A is true but R is false.	d) A is false but R is true.	c)
19	How many triangles are there in the given figure? 				19
	a) 15	b) 17	c) 18	d) 19	d)
20	Jone walks a certain distance, say X meters, from his home towards the west. Then he turns left and walks 23 meters. After that, he turns left and walks 36 meters. Then he turns left again to walk 23 meters. He finally turns left and walks 18 meters to reach his home. Find the value of X.				18 meters
	a) 20 meters	b) 18 meters	c) 22 meters	d) 41 meters	b)

21	**Let Ax = b be a non-homogeneous system of linear equations. The augmented matrix [A : b] is given by:** $\begin{bmatrix} 1 & -2 & 1 & : & 1 \\ -1 & 2 & -3 & : & 0 \\ 0 & 3 & 0 & : & -1 \end{bmatrix}$				The system has no solution.
	a) Rank of A is 3.	b) The system has no solution.	c) The system has a unique solution.	d) The system has an infinite number of solutions.	b
22	The eigen values of the matrix: $A = \begin{bmatrix} 2 & 1 & 0 \\ 9 & 2 & 1 \\ 0 & 0 & 2 \end{bmatrix}$				2, 5, −1
	a) −2, 5, −1	b) 2, 5, −1	c) 2, 2, 5	d) 1, 2, 5	b
23	Match List I with List II: **List I: Matrix** / **List II: Characteristics Root** A. Hermitian matrix — i. Unit modules B. Skew-Hermitian matrix — ii. Diagonal elements of matrix C. Unitary matrix — iii. Real D. Unitary matrix — iv. Either zero or pure imaginary				A-III, B-IV, C-I, D-II
	a) A-IV, B-III, C-I,	b) A-IV, B-III,	a) A-III, B-IV,	d) A-III, B-IV,	d

	D-II	C-II, D-I	C-II, D-I	C-I, D-II	
24	If $A = \begin{bmatrix} 4 & x+2 \\ 2x-3 & x+1 \end{bmatrix}$ is symmetric, then what is x equal to?				5
	a) 2	b) 3	c) -1	d) 5	d
25	For an orthogonal matrix Q, the valid equality is				$Q^T = Q^{-1}$
	a) $Q^T = Q^{-1}$	b) $Q = Q^{-1}$	c) $Q^T = Q$	d) $\det(Q) = 0$	a
26	Which of the following statements is/are correct if A and B are two symmetric matrices of order n then 1. A+B is also a symmetric matrix. 2. AB is a symmetric matrix				A. Only 1.
	a) Only 1	b) Only 2	c) Neither 1 nor 2	d) Both 1 and 2	a
27	Given below are two statements: choose the most appropriate answer from the options **Assertion (A):** If A is any matrix given by $A = \begin{bmatrix} 5 & 0 & 3 \\ -1 & 0 & 2 \\ 1 & 0 & 1 \end{bmatrix}$. Then $\lvert A \rvert = 0$, since all elements in column II are zero. **Reason (R):** Laplace expansion permits evaluation of a determinant along any row and column.				Both the Assertion and Reason are correct, Reason is the correct explanation for Assertion.
	a) Both the Assertion and Reason are correct, Reason is the correct explanation for Assertion.	b) Both the Assertion and Reasons are correct, Reason is not correct explanation for Assertion.	c) Assertion is the correct but Reason is incorrect.	d) Both Assertion and reasons are correct.	a
28	What is the degree of the differential equation $\frac{d^2y}{dx^2} + a \sin x = 0$				1
	a) 0	b) 1	c) 2	d) 3	b
29	**The function $f(x) = \frac{(x-3)^5}{(x+1)^4}$ has:**				x = −1 is a point of maxima and x = 7/9 is a point of minima.

	a) x = −1 is a point of maxima and x = 7/9 is a point of minima.	b) x = 7/9 is a point of maxima and x = −1 is a point of minima.	c) x = −1 and x = 3 are points of maxima and x = 7/9 is a point of minima.	d) Neither a point of maxima nor a point of minima.	a
30	**A function $f(x)$defined on *R* by:** $$f(x) = \begin{cases} x & if\ x\ is\ rational \\ -1 & if\ x\ is\ irrational \end{cases}$$ **Which of the following statements is true?**				Continuous at x = 0.
	a) Discontinuous at every real number.	b) Discontinuous at x = 0.	c) Continuous at x = 0.	d) Continuous at all non-zero real numbers.	c
31	Given below are two statements: choose the most appropriate answer from the options Assertion (A): The differential equation x^2=y^2+xy dx/dy is an ordinary differential equation. Reason (R):An ordinary differential equation involves derivatives of the dependent variable with respect to only one dependent variable.				Both the Assertion and Reason are correct, Reason is the correct explanation for Assertion.
	a) Both the Assertion and Reason are correct, Reason is the correct explanation for Assertion.	b) Both the Assertion and Reasons are correct, Reason is not correct explanation for Assertion.	c) Assertion is the correct but Reason is incorrect.	d) Both Assertion and reasons are correct.	a
32	Match the List-I with List-II **List I** / **List II** A. Integrating factor of $xdy - (y + 2x^2)dx = 0$ — I. $\frac{1}{x}$ B. Integrating factor of $(2x^2 - 3y)dx = xdy$ — II. x C. Integrating factor of $(2y + 3x^2)dx + xdy = 0$ — III. x^2				A-I, B-IV, C-III, D-II

	D. Integrating factor of $2xdy + (3x^3 + 2y)dx = 0$	IV. x^3			
	a) A-I, B-III, C-IV, D-II	b) A-I, B-IV, C-III, D-II	c) A-II, B-I, C-III, D-IV	d) A-III, B-IV, C-II, D-I	b)
33	Find the general solution of the differential equation $\frac{dy}{dx} = \frac{x+2}{x}$				$y = x + \ln x^2 + C$
	a) $y = x^2 + ln\, x^2 + C$	b) $y = x^2 + \ln x + C$	c) $y = x + \ln x + C$	d) $y = x + \ln x^2 + C$	d)
34	What is the degree of the differential equation $y = x\left(\frac{dy}{dx}\right)^2 + \frac{dy}{dx}$?				3
	a) 1	b) 2	c) 3	d) 4	c)
35	Arithmetic mean is a measure of:				central value
	a) central value	b) dispersion	c) correlation	d) skewness	a)
36	In how many ways 8 girls and 8 boys can sit around a circular table so that no two boys sit together?				7!8!
	a) $(7!)^2$	b) $(8!)^2$	c) 7!8!	d) 15!	c)
37	Given below are two statements: choose the most appropriate answer from the options **Assertion (A):** In order to find the dispersion of values of x from mean $\bar{x}$, we take absolute measure of dispersion. **Reason (R):** Sum of the deviations from mean $\bar{x}$ is zero.				Both the Assertion and Reason are correct; Reason is the correct explanation for Assertion.
	a) Both the A and R are true and R is the correct explanation of A.	b) Both the A and R are truebutR is NOT the correct explanation of A.	c) A is true but R is false.	d) A is false but R is true.	a)
38	Match List I with List II: **List I** / **List II** A. Bayes' Theorem — I. $P(E^c) = 1 - P(E)$ B. Conditional Probability — II. $P(E_1 \cup E_2) = P(E_1) + P(E_2)$ C. Theorem of complementary events — III. $P(E_2\|E_1) = \frac{P(E_1 \cap E_2)}{P(E_1)}$				A-IV, B-III, C-I, D-II

	D. Theorem of addition	IV. $P(H_i\|E) = \frac{P(H_i \cap E)}{P(E)}$			
	a) A-I, B-IV, C-III, D-II	b) A-III, B-IV, C-II, D-I	c) A-III, B-IV, C-I, D-II	d) A-IV, B-III, C-I, D-II	d)
39	For a negatively skewed distribution, the correct relation between mean, median and mode is:				Mean <median <mode
	a) Mean=median =mode	b) Median <mean <mode	c) Mean <median <mode	d) Mode < mean <median	c)
40	Two events A & B with probability 0.5 and 0.7 respectively, have joint probability of 0.4. The probability that neither A or B happen is				0.2
	a) 0.2	b) 0.4	c) 0.6	d) 0.8	a)
41	Given below are two statements: choose the most appropriate answer from the options **Assertion (A):** Median is the middle most item in the set of numbers. **Reason (R):** Mode is not unduly affected by extreme values.				Both the **A** and **R** are true but **R** is NOT the correct explanation of **A**.
	a) Both the A and R are true and R is the correct explanation of A.	b) Both the A and R are true but R is NOT the correct explanation of A.	c) A is true but R is false.	d) A is false but R is true.	b)
42	If a Bivariate Normal distribution with parameter $(\mu_X, \mu_Y, \sigma_X^2, \sigma_Y^2, \rho)$ is such that $\sigma_X = \sigma_Y$, $\rho = 0$, the distribution is known as:				circular normal
	a)uniform normal	b) rectangular normal	c)elliptical normal	d)circular normal	d)
43	Let X and Y be the heights of fathers and their sons from bivariate variables. A. Ratio variables B. Discrete variables C. Quantitative variables D. Pseudo variables Choose the correct answer from the options given below.				A and C.
	a) A, B and C.	b) A, B and D.	c) A and C.	d) B and D.	c)

<table>
<tr><td>44</td><td colspan="4">Given below are two statements: choose the most appropriate answer from the options

Assertion (A): The value of the correlation coefficient is in the range of -1 to +1.
Reason (R): Correlation between two variables doesn't help in predicting the value of a variable even if we know the value of another variable.</td><td>Both the A and R are true but R is NOT the correct explanation of A.</td></tr>
<tr><td></td><td>a) Both the A and R are true and R is the correct explanation of A.</td><td>b) Both the A and R are true but R is NOT the correct explanation of A.</td><td>c) A is true but R is false.</td><td>d) A is false but R is true.</td><td>b)</td></tr>
<tr><td>45</td><td colspan="4">Let $Y = \beta_o + X\beta_1 + \varepsilon$ be a simple linear regression model.

Match List I with List II:

<table><tr><th>List I:</th><th>List II:</th></tr><tr><td>A. Estimator of $\hat{\beta}_o$ is</td><td>I. $N(\beta_o + X\beta_1,\ \sigma^2 I_n)$</td></tr><tr><td>B. Estimator of $\hat{\beta}_1$ is</td><td>II. $r\frac{s_y}{s_x}$</td></tr><tr><td>C. ε follows</td><td>III. $\bar{y} + \hat{\beta}_1\bar{x}$</td></tr><tr><td>D. Y follows</td><td>IV. $N(0, \sigma^2 I_n)$</td></tr></table>
Choose the correct answer from the options given below:</td><td>A-III, B-II, C-IV, D-I</td></tr>
<tr><td></td><td>a) A-III, B-II, C-IV, D-I</td><td>b) A-IV, B-III, C-II, D-I</td><td>c) A-III, B-IV, C-II, D-I</td><td>d) A-III, B-IV, C-I, D-II</td><td>a)</td></tr>
<tr><td>46</td><td colspan="4">For a bivariate data set on (x, y), if the means, standard deviations and correlation coefficient are:
$\bar{x} = 1.0, \bar{y} = 2.0, s_x = 3.0, s_y = 9.0, r = 0.8$
Then the regression line of y on x is:</td><td>-1.4+2.4x</td></tr>
<tr><td></td><td>a) 2.4-1.4x</td><td>b) 1.4-2.4x</td><td>c) -1.4+2.4x</td><td>d) 2.4-1.4x</td><td>c)</td></tr>
<tr><td>47</td><td colspan="4">Which of the following statements are true for the moment generating function?

A. $M_X(t) = E(e^X)$.
B. $M_{cX}(t) = M_X(ct)$, c being a constant.
C. $M_{X_1+X_2+\cdots+X_n}(t) = M_{X_1}(t)M_{X_2}(t) \ldots M_{X_n}(t)$
D. $\frac{d^n M_X(0)}{dt^n} = E(X^n); n \geq 1$

Choose the correct answer from the options given below.</td><td>B, C and D</td></tr>
<tr><td></td><td>a) A, B, C and D</td><td>b) A, B and C</td><td>c) A, C and D</td><td>d) B, C and D</td><td>d)</td></tr>
</table>

<table>
<tr><td>48</td><td colspan="4">Which theorem states that the larger the sample size, the closer the sample mean will be to the mean of the population?</td><td>Law of large number</td></tr>
<tr><td></td><td>a) Law of large number</td><td>b) Law of averages</td><td>c) Markov's theorem</td><td>d) Central limit theorem</td><td>a)</td></tr>
<tr><td>49</td><td colspan="4">A fair coin is flipped 100 times. What is the expected number of heads?</td><td>50</td></tr>
<tr><td></td><td>a) 10</td><td>b) 25</td><td>c) 50</td><td>d) 75</td><td>c)</td></tr>
<tr><td>50</td><td colspan="4">Match List I with List II:

<table><tr><th>List I:</th><th>List II:</th></tr><tr><td>A. Law of Large Numbers (LLN)</td><td>I. distribution of the sample average becomes approximately normal, regardless of the population's distribution, as the sample size grows</td></tr><tr><td>B. Central Limit Theorem (CLT)</td><td>II. to allow inference using the normal distribution.</td></tr><tr><td>C. Purpose of LLN</td><td>III. sample average will get closer to the true average of a large sample</td></tr><tr><td>D. Purpose of CLT</td><td>IV. to guarantee accuracy of sample estimates.</td></tr></table>
Choose the correct answer from the options given below:</td><td>A-III, B-I, C-IV, D-II</td></tr>
<tr><td></td><td>a) A-III, B-I, C-II, D-IV</td><td>a) A-III, B-I, C-IV, D-II</td><td>c) A-I, B-III, C-IV, D-II</td><td>d) A-I, B-III, C-II, D-IV</td><td>b)</td></tr>
<tr><td>51</td><td colspan="4">Given below are two statements: choose the most appropriate answer from the options
Assertion (A):
As the sample size increases, the sample mean converges in probability to the population mean.

Reason (R):
The variance of the sample mean decreases with increasing sample size.</td><td>Both the A and R are true and R is the correct explanation of A.</td></tr>
<tr><td></td><td>a) Both the A and R are true and R is the correct explanation of A.</td><td>b) Both the A and R are true but R is NOT the correct explanation of A.</td><td>c) A is true but R is false.</td><td>d) A is false but R is true.</td><td>a)</td></tr>
</table>

52	Which of the following statements about the sampling distribution of the sample mean is incorrect?				The standard deviation of the sampling distribution is σ.
	a) The sampling distribution is generated by repeatedly taking samples of size n and computing the sample means.	b) The standard deviation of the sampling distribution is σ.	c) The sampling distribution is approximately normal whenever the sample size is sufficiently large (n ≥ 30).	d) The mean of the sampling distribution is μ.	b)
53	In research project is set up so that everybody in the population of interest has an equal chance of being included in the sample, the research involves:				probability sampling
	a) quota sampling	b) judgement sampling	c) probability sampling	d) convenience sampling	c)
54	Survey of population is called:				Census
	a) Parametric	b) Sample	c) Statistic	d) Census	d)
55	Given below are two statements: One is labelled as **Assertion (A)** and the other is labelled as **Reason (R)**: **Assertion (A):** Sampling is preferred over a complete census in most research studies. **Reason (R):** Sampling reduces cost and time, and often provides sufficiently accurate results. In light of the above statements, choose the most appropriate answer from the options given below:				Both the **A** and **R** are true and **R** is the correct explanation of **A**.
	a) Both the A and R are true and R is the correct explanation of A.	b) Both the A and R are true but R is NOT the correct explanation of A.	c) A is true but R is false.	d) A is false but R is true.	a)
56	Consider a randomized block design for a 2^2 factorial in r replication. The degree of freedom for the error term is				$4(r-1)$

	a)$(r-1)$	b)$(r-3)$	c)$4(r-1)$	d) $3(r-1)$	c)
57	**What is the purpose of a one-way ANOVA?**				To compare the means of two or more independent groups.
	a) To compare the means of two independent groups	b) To compare the means of two or more independent groups.	c) To compare the means of two or more dependent groups.	d) To determine the correlation between two variables.	b)
58	Some properties of Design of Experiments are given below: A. Randomization is used in experimental design to eliminate the effects of uncontrolled variables. B. A factorial design studies the effect of only one factor at a time. C. Replication in experiments helps to estimate experimental error. **D.** Blocking is used to control known sources of variability.				A, C and D.
	a) A, B, C and D	b) A, C and D.	c) A, B and D.	d) C and D.	b)
59	Given below are two statements: choose the most appropriate answer from the options **Assertion (A):** ANOVA is used to determine whether there are statistically significant differences between the means of three or more groups. **Reason (R):** ANOVA compares the variances within groups to the variance between groups using the F-distribution.				Both the **A** and **R** are true and **R** is the correct explanation of **A**.
	a) Both the A and R are true and R is the correct explanation of A.	b) Both the A and R are true but R is NOT the correct explanation of A.	c) A is true but R is false.	d) A is false but R is true.	a)

<table>
<tr><td>60</td><td>Match List I with List II:
<table><tr><th>List I (Concepts):</th><th>List II (Descriptions):</th></tr><tr><td>A. Randomization</td><td>I. Repetition of trials to estimate experimental error.</td></tr><tr><td>B. Replication</td><td>II. Dividing experimental units into homogeneous groups.</td></tr><tr><td>C. Blocking</td><td>III. Assigning treatments to experimental units purely by chance.</td></tr><tr><td>D. Factorial Design</td><td>IV. Studying the effect of two or more factors simultaneously.</td></tr></table>Choose the correct answer from the options given below:</td><td>A-III, B-I, C-II, D-IV</td></tr>
<tr><td></td><td>a) A-I, B-III, C-II, D-IV</td><td>b) A-IV, B-I, C-II, D-III</td><td>c) A-I, B-III, C-IV, D-II</td><td>d) A-III, B-I, C-II, D-IV</td><td>d)</td></tr>
<tr><td>61</td><td colspan="3">The sum of the first 15 natural numbers is:</td><td>120</td></tr>
<tr><td></td><td>a) 105</td><td>b) 110</td><td>c) 115</td><td>d) 120</td><td>d)</td></tr>
<tr><td>62</td><td colspan="3">The sum of the first n terms of a geometric progression (G.P.) is 80. If $a = 5$ and $r = 2$, find n.</td><td>4</td></tr>
<tr><td></td><td>a) 3</td><td>b) 4</td><td>c) 5</td><td>d) 6</td><td>b)</td></tr>
<tr><td>63</td><td colspan="3">Which of the following is NOT a geometric progression (G.P.)?</td><td>5, 10, 15, 25</td></tr>
<tr><td></td><td>a) 2, 4, 8, 16</td><td>b) 1, 3, 9, 27</td><td>c) 5, 10, 15, 25</td><td>d) 1/2, 1/4, 1/8, 1/16</td><td>c)</td></tr>
<tr><td>64</td><td colspan="3">What is the sum of the infinite geometric series 3 + 1.5 + 0.75 + 0.375 + ... ?</td><td>6</td></tr>
<tr><td></td><td>a) 5</td><td>b) 6</td><td>c) 7</td><td>d) 8</td><td>b)</td></tr>
<tr><td>65</td><td colspan="3">The slope of the tangent to the curve y = x² at x = 3 is:</td><td>6</td></tr>
<tr><td></td><td>a) 3</td><td>b) 4</td><td>c) 6</td><td>d) 9</td><td>c)</td></tr>
<tr><td>66</td><td colspan="3">$\frac{d}{dx}(x^2 \cdot sin(x))$ is:</td><td>x² cos(x) + 2x sin(x)</td></tr>
<tr><td></td><td>a) x² cos(x) + 2x sin(x)</td><td>b) x² cos(x) + 2x sin(x)</td><td>c) x² sin(x) + 2x cos(x)</td><td>d) 2x sin(x)</td><td>b)</td></tr>
<tr><td>67</td><td colspan="3">If $f''(a) > 0$ at $f'(a) = 0$, then $x = a$ is:</td><td>Point of local minimum</td></tr>
<tr><td></td><td>a) Point of inflection</td><td>b)Point of local minimum</td><td>c)Point of local maximum</td><td>d)Saddle point</td><td>b)</td></tr>
<tr><td>68</td><td colspan="3">The slope of the normal to the curve $y = f(x)$ at $x = a$ is:</td><td>$-1 / f'(a)$</td></tr>
<tr><td></td><td>a) $f'(a)$</td><td>b)– $f'(a)$</td><td>c) $-1 / f'(a)$</td><td>d) $1 / f'(a)$</td><td>c)</td></tr>
<tr><td>69</td><td colspan="3">Which of the following is the necessary condition for increasing</td><td>$f'(x) > 0$</td></tr>
</table>

	function?				
	a) $f'(x) < 0$	b) $f'(x) > 0$	c) $f'(x) = 0$	d) $f''(x) < 0$	b)
70	If the radius of a sphere is increasing at the rate of 3 cm/sec, what is the rate of change of its volume when r = 2 cm?				48π cm³/sec
	a) 16π cm³/sec	b) 24π cm³/sec	c) 48π cm³/sec	d) 32π cm³/sec	c)
71	Match the correct pairs from the following table. A. First derivative (f′(x)) — I. Slope of tangent B. Second derivative (f″(x)) — II. Concavity & points of inflection C. Slope of normal at x = a — III. –1 / f′(a) D. Critical point — IV. f′(x) = 0				A-i, B-ii, C-iii, D-iv
	a) A-i, B-ii, C-iii, D-iv	b) A-ii, B-iii, C-iv, D-i	c) A-iv, B-iii, C-ii, D-i	d) A-iii, B-ii, C-ii, D-i	a)
72	Which of the following represents the formula of integration by parts?				$\int u\,dv = uv - \int v\,du$
	a) $\int u\,dv = uv - \int v\,du$	b) $\int u\,dv = vu + \int v\,du$	c) $\int u\,dv = vu - \int u\,dv$	d) $\int u\,dv = uv - \int v\,du$	d)
73	$\int (1 / \sqrt{(1 - x^2)})\,dx$ equals:				$\sin^{-1}(x) + C$
	a) $\ln\lvert x\rvert + C$	b)$\sin^{-1}(x) + C$	c)$\tan^{-1}(x) + C$	d)$\cos^{-1}(x) + C$	b)
74	The area under the curve y = x between x = 0 and x = 2 is:				2
	a) 1	b) 2	c) 3	d) 4	b)
75	For finding the area in polar coordinates, which formula is used?				Answer
	a) $\int r^2\,d\theta$	b) $1/2\int_{\theta_1}^{\theta_2} r^2\,d\theta$	c) $\int r\,d\theta$	d) $2\pi \int r\,dr$	b) $1/2\int_{\theta_1}^{\theta_2} r^2\,d\theta$
76	Which of the following statements is TRUE about random variables? A. A discrete random variable takes infinitely many integer values. B. A continuous random variable can take only countable values. C. Random variables cannot have probabilities. D. A random variable maps outcomes of a random experiment to real numbers.				A & D are true
	a) Only A is true	b) A& C are true	c) A & D are true	d) B & C are true	c)
77	Match the item of column A with appropriate items of column B 1. Binomial Distribution — A. Measure of spread of values 2. Expected Value — B. Discrete Random Variable				1-B, 2-D, 3-C, 4-A

	3. Normal Distribution 4. Variance		C. Continuous Random Variable D. Average of possible values		
	a) 1-C, 2-B, 3-D, 4-A	b) 1-B, 2A, 3-D, 4-C	c) 1-B, 2-D, 3-C, 4-A	d) 1-A, 2-B, 3-C, 4-D	c)
78	If X is a discrete random variable with E(X) = μ, then $E(\frac{X+c}{d})$ is:				$\frac{\mu + c}{d}$
	a) $\mu + c$	b) $\mu - c$	c) $\frac{\mu+c}{d}$	d) $\frac{\mu}{d}$	c)
79	The joint pmf of two random variables, X and Y is $f(x,y)=kxy;$ $x,y=0, 1, 2, 3$. The value of k is				1/36
	a) 1/9	b) 1/16	c) 1/12	d) 1/36	d)
80	If X ~ N(μ, σ²), the transformation Y = aX + b is also:				Normal
	a) Normal	b) log- Normal	c) inverse Normal	d) Exponential	a)
81	The cumulative distribution function (CDF) F(x) of a random variable X is:				Non-decreasing and right continuous
	a) Always increasing	b) Always decreasing	c) Non-decreasing and right continuous	d) Non-increasing and left continuous	c)
82	Let X and Y are two independent Poisson variates. Then the conditional distribution of X given X+Y is				Binomial
	a) Binomial	b) Poisson	c) Negative binomial	d) Geometric	a)
83	For a standard normal random variable Z, the probability P(Z > 0) is:				0.5
	a) 0	b) 0.5	c) 1	d) 0.6826	b)
84	Suppose X_1 and X_2 are independent exponential variates each having mean θ. Then the conditional distribution of X_2 given $X_1+X_2=t$ is				Uniform on $(0, t)$
	a) Exponential with mean $t/2$	b) Exponential with mean $t\ \theta/2$	c) Uniform on $(0, t)$	d) Uniform on $(0, t\ \theta)$	c)
85	Let X be a random variable with $P(X = x) = k(x + 1);\ x = 0, 1, 2$ & 3. The value of k is				1/10
	a) 10	b) 1/10	c) 1/6	d) ¼	b)
86	Which of the statement(s) is/are true? A. If X and Y are jointly normal but not independent, their sum is not necessarily normally distributed. B. The variance of the sum of two dependent random variables is always equal to the sum of their variances. C. For a continuous random variable, the probability at any specific point is always zero. D. The moment generating function (MGF) of a random				only C and D are true

	variable, if it exists, uniquely determines its distribution.				
	a) only A is true	b) only B and D are true	c) only B, C and D are true	d) only C and D are true	d)
87	Arrange the following scales of measurements from the simplest to the most evolved. A. Ordinal B. Nominal C. Ratio D. Interval				B, A, D, C
	a) B, A, D, C	b) C, D, B, A	c) B, C, A, D	d) A, B, C, D	a)
88	The production of lignite in India from 1975 to 1985 in Mn. Tones was, 3.03, 4.02, 3.58, 3.3, 2.9, 5.11, 6.31, 6.93, 7.3, 7.8, 8.03. It is expected that the median production of lignite in India is 5Mn. Tones/yr. to test H_0:$M=5$, the value of T^- in Wilcoxon signed rank test is:				26
	a) 28	b) 26	c) 25	d) 27	b)
89	To proceed with the Modified Distribution method algorithm for solving an transportation problem, the number of dummy allocations need to be added are:				n-1
	a) n-1	b) n	c) 2n-1	d) n-2	a)
90	The Rao-Cramer lower bound for an unbiased estimator of σ^2 in a $N(\mu, \sigma^2)$ population when μ is known, is:				$\frac{2\sigma^4}{n}$
	a) $\frac{\sigma^4}{n}$	b) $\frac{\sigma^4}{2n}$	c) $\frac{2\sigma^4}{n}$	d) $\frac{2\sigma^4}{n-1}$	b)
91	If λ is the likelihood ratio criterion, the asymptotic distribution of $-2log_e\lambda$ is:				Chi-square
	a) Beta of 1st kind	b) Normal	c) Beta of 2nd kind	d) Chi-square	d)
92	If $E[X\|Y] = E[X]$, what can be said about X and Y?				X and Y are independent
	a) X and Y are dependent	b) X and Y are independent	c) X and Y are jointly uniform	d) X and Y are dependent	b)
93	The Cramér-Rao Lower Bound provides:				The lower limit of variance of an unbiased estimator
	a) The upper limit of variance of an	b) The lower limit of variance of an	c) The exact variance of an estimator	d) The expected value of an	b)

	estimator	unbiased estimator		estimator	
94	If an estimator is unbiased and achieves the Cramér-Rao lower bound, it is said to be:				Efficient
	a) Consistent	b) Robust	c) sufficient	d) Efficient	d)
95	Which of the statement(s) is/are true/false? A. For an exponential distribution, the MLE of λ is consistent and asymptotically efficient. B. Sample mean is always an efficient estimator of the population mean regardless of the underlying distribution. C. If the sample size increases, the bias of an estimator may still remain constant, but variance will usually decrease. D. The Cramér-Rao lower bound applies to both biased and unbiased estimators.				only A and C are true
	a) only A and C are true	b) only B and D are true	c) only A, B and C are true	d) All the statements are true	a)
96	The power of a test is defined as:				P(rejecting H_0 when H_0 is false)
	a) P(failing to reject H_0 when H_0 is false)	b) P(rejecting H_0 when H_0 is false)	c) P(rejecting H_0 when H_0 is true)	d) P(not rejecting H_0 when H_0 is true)	b)
97	If T_1 be the most efficient estimator and T_2 is any other estimator of the same parameter, then the correlation between T_1 and $T_2 - T_1$ is:				0
	a) 0	b) 1	c) $\sqrt{efficiency\ of\ T_2}$	d) 0.5	a)
98	A p-value is best described as:				Probability of obtaining a result as extreme as the observed under H_0
	a) Probability of H_0 being true	b) Probability of H_1 being true	c) Probability of obtaining a result as extreme as the observed under H_0	d) Probability of Type I error	c)
99	In hypothesis testing, which of the following pairs is correct? A. Type I error - False Positive; Type II error - False Negative B. Type I error - False Negative; Type II error - False Positive C. Type I error - Power of the test; Type II error - Confidence level D. Type I error - Confidence level; Type II error - Power of the				only A is true

	test				
	a) only A is true	b) only B is true	c) only A and C are true	d) only D is true	a)
100	A more robust non-parametric alternative to the independent samples t test is the:				Wilcoxon rank-sum test.
	a) Matched pairs t test.	b) Kruskal-Wallis test	c) Wilcoxon rank-sum test.	d) Welch's t test.	c)