

Test Booklet No. _____

This booklet consists of 150 questions and pages.

RGUPET/2025/1004/112

RGUPET 2025
Common Entrance Test, 2025
DOCTOR OF PHILOSOPHY IN STATISTICS

Full Marks: 150

Time: 3 Hours

Roll No.

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Day and Date of Examination: _____

Signature of Invigilator(s) _____

Signature of Candidate _____

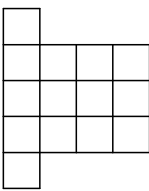
General Instructions:

PLEASE READ ALL THE INSTRUCTIONS CAREFULLY BEFORE MAKING ANY ENTRY.

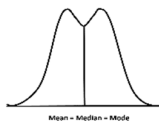
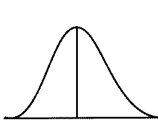
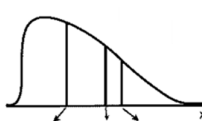
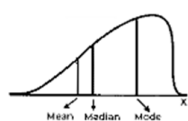
1. DO NOT OPEN THIS TEST BOOKLET UNTIL YOU ARE TOLD TO DO SO.
2. Candidate must write his/her Roll Number on the space provided.
3. This Test Booklet contains 150 Multiple Choice Questions (MCQs) from the concerned subject. Each question carries 1 mark.
4. Please check the Test Booklet to verify that 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.

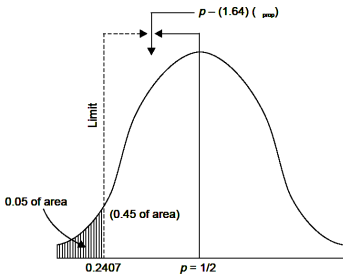
1	The “Mission Sudarshan Chakra”, recently launched by the Prime Minister of India, primarily relates to				development of a multilayered air and missile defence system
	a) a national renewable energy mission	b) a national digital currency mission	c) development of a multilayered air and missile defence system	d) a national mission to modernise Indian Railways	(c)
2	“Pushpak”- a national mission being implemented by the Indian Institute of Technology, Bombay is related to the development of				Drone technology
	a) Helicopters	b) Dairy technology	c) Drone technology	d) Artificial intelligence	(c)
3	North East India’s first underwater tunnel project, announced in 2024, is proposed to connect				Numaligarh and Gohpur
	a) Dibrugarh and Dhemaji	b) Jorhat and Majuli	c) Numaligarh and Gohpur	d) Guwahati and North Guwahati	(c)
4	Which of the following statements are correct? A. Canada hosted the 51 st G7 summit in 2025. B. Four players were honoured with the Khel Ratna Award 2025. C. Sweden was ranked first in Global Innovation Index 2024. D. Operation Sindoor was Launched by India to attack terrorist bases in Pakistan on 7 th May 2025.				(a)
	a) A, B and D	b) A,B and C	c) Only A	d) All of the above	A, B and D
5	Which of the followings are correct? A. Lip Butan has been appointed as the new CEO of Intel in March 2025 B. Shri C P Radhakrishnan has been appointed as the Vice President of India C. India’s rank in the Human Development Index 2025 released by UNDP is 99 D. India has become the 2 nd largest road network in the World.				(d)
	a) A and B only	b) A, B and C only	c) A, C and D only	d) A, B, D only	A, B, D only
6	Which of the following sentences is false? A. Palk Strait joins India and Sri Lanka B. The Radcliffe Line is between India and Bangladesh C. The MacMohan Line separates India and China D. The Durand Line is between Iran and Afghanistan.				
	a) A, B	b) B, C	c) C, D	d) B, D	(d)
7	Assertion (A): Eclipses do not occur on all full moon and new moon days. Reason (R): The moon revolves round the earth in an elliptical orbit.				A and R are true but R doesnot explain A

	a) A and R are true and R correctly explains A.	b) A and R are true but R does not explain A.	c) A is true R is false	d) R is true but A is false	(b)
8	Right to equality is a-				Fundamental right
	a) fundamental right	b) social right	c) cultural right	d) legal right	(a)
9	The author of the book "Midnight's Children" is-				Salman Rushdie
	a) Shakespeare	b) Leo Tolostoy	c) Salman Rushdie	d) R K Narayan	(c)
10	Match the organizations with their headquarters:				
	A. UNESCO	1. New York			
	B. WHO	2. Paris			
	C. UNICEF	3. Geneva			
	D. IMF	4. Washington D.C.			
	a) A-3, B-2, C-4, D-1	b) A-2, B-3, C-1, D-4	c) A-2, B-4, C-3, D-1	d) A-1, B-3, C-2, D-4	(b)
11	He said, "Happy new year!" The correct indirect speech of the above is-				He wished me a happy new year.
	a) He said the new year was happy.	b) He wished me a happy new year.	c) He said to me that happy new year.	d) I was wished a happy new year.	(b)
12	Identify the correct sentence(s) from the following. A. One of my friends is a doctor. B. I don't know nothing about her. C. It is a two-hour journey. D. We will be definitely there at the yesterday's programme.				
	a) A, B	b) B, C	c) A, C	d) C, D	(c)
13	"She drank the _____ milk that was there in the flask." The appropriate quantifier to fill in the blank is-				little
	a) all	b) little	c) sour	d) few	(b)
14	"a/ great /and/ reality/their/ theory/in/there/ disparity/is" The correct reordered meaningful sentence with the above jumbled words/phrases is- P. There is a great theory and their reality in disparity. Q. There is a great disparity in their theory and reality. R. Their great disparity is in a theory and reality there. S. Their great theory is a reality and in disparity there.				There is a great disparity in their theory and reality.
	a) P	b) Q	c) R	d) S	(b)
15	The correct match of synonyms and antonyms is:				A-ii, B-iii, C-i, D-iv
	A. Futile	i. Help			
	B. Generic	ii. Effective			
	C. Hinder	iii. Individual			
	D. Inception	iv. Termination			

	a) A-i, B-ii, C-iii, D-iv	b) A-iii, B-ii, C-iv, D-iii	c) A-iv, B-iii, C-i, D-ii	d) A-ii, B-iii, C-i, D-iv	(d)
1 6	The total number of squares in the following figure is: 				22
	a) 24	b) 20	c) 22	d) 18	(c)
1 7	Fill in the blank in the following pattern. ELFY GLHX ILJW ----- MLNU				KLLV
	a) KLLV	b) KLMX	c) JLLV	d) JLMX	a)
1 8	Raghav introduces Vineet as the only son of the only brother of his father's wife. How Raghav and Vineet are related?				cousin
	a) brother	b) cousin	c) uncle	d) son-in-law	(b)
1 9	Which two numbers should be interchanged to make the given equation mathematically correct? $3 \times 6 + 72 \div 8 - 24 = 12$				6, 8
	a) 6, 8	b) 6, 24	c) 3, 8	d) None	(a)
2 0	If BANKER is coded as CAOKFR, then how would LAWYER be coded?				MAXYFR
	a) LBWZES	b) LBWYFR	c) MAXYFR	d) MAXZES	c)
2 1	Same error occurs at the same size in every measurement, and such errors can only be eliminated either by thinking through the sources of problems and removing them. This type of error is termed as:				
	a) Random errors	b) Systematic errors	c) Cascading errors	d) Perpetual errors	b
2 2	Hypothesis-driven research begins with a hypothesis. A hypothesis is a statement about the world that can be true or false, and whose truth is being tested.				
	a) A valid hypothesis is based on 'that exists'	b) A hypothesis is a positive conclusion	c) A hypothesis can never be tested	d) A valid hypothesis must be falsifiable	d
2 3	Which of the following statements that could be considered as valid scientific hypotheses? A. Eating two ounces of olive oil a day decreases the odds of contracting heart disease. B. What is the best fertilizer to use to get large and tasty tomatoes? C. Macs are better than PCs. D. Briar's Aspirin cures headaches faster than RCS Aspirin.				Answer
	a) A, B	b) A, B, C	c) A, D	d) B, C	c
2 4	Relate the 'function or relationship' (A) and 'comment' (B) and select the appropriate answer A: Find how the speed of sound in air at fixed pressure depends upon air temperature.				Answer

	B: The control variable is temperature, and the response variable is sound speed.				
	a) Functional relationship is correct and the comment is true for the relationship	b) Functional relationship is incorrect but the comment is true for the relationship	c) Functional relationship is correct but the comment is false for the relationship	d) Neither the functional relationship is correct nor the comment is true	a
2	Relate 'sampling design' and its 'method'				Answer
5	Sampling Design		Method		
	A. Deliberate		i. Sample collected as information received and survey progresses		
	B. Simple random		ii. sample drawn from a heterogeneous group		
	C. Stratified		iii purposive selection of particular units		
	D. Sequential		iv. very item in the population has an equal chance of inclusion		
	a) A-iii, B-iv, C-ii, D-i	b) A-ii, B-iv, C-iii, D-i	c) A-i, B-iii, C-ii, D-iv	d) A-iii, B-ii, C-iv, D-i	a
2	Number of observations in a normal distribution is 1000. How many observations will be there between $\mu+1\sigma$ and $\mu-1\sigma$				Answer
6	a) 500	b) 680	c) 720	d) 950	b
2	Which of the following are reasons for citing a paper?				Answer
7	A. use its ideas, definitions, terms in a Research B. provides upcoming facts regarding undergoing Research Question. C. to adopt part/full methodology it adopted for a certain task. D. to refer to data also used in Current Research.				
	a) A, B, C	b) B, C, D	c) A, C, D	d) A, B, D	
	c				
2	Scholars who wish to meet publication expectations mostly resort to a variety of techniques to increase their output and crank up their citation ranking, which are not considered ethical. Identify these techniques:				Answer
8	A. Gift authorship B. Extensive experiments C. Salami Slicing D. Extensive referencing				
	a)A, B, C	b) A, B, D	c) B, C, D	d) A, C, D	
	d				
2	Match the references (APA 7 style):				Answer
9					
	A. Journal Article	i. Edwards, A. A., Steacy, L. M., Siegelman, N., Rigobon, V. M., Kearns, D. M., Rueckl, J. G., & Compton, D. L. (2022). Unpacking the unique relationship between set for variability and word reading development: Examining word- and child-level predictors of performance. <i>Journal of Educational Psychology</i> , 114(6), 1242–1256. https://doi.org/10.1037/edu0000696			
	B. Authored Book	ii. Levenson, H., Jinich, S., Vaz, A., & Rousmaniere, T. (2025). <i>Deliberate practice in emotionally focused couple therapy</i> . American Psychological Association. https://doi.org/10.1037/0000436-000			

	C. Webpage	iii. Zeleke, W. A., Hughes, T. L., & Drozda, N. (2020). Home-school collaboration to promote mind-body health. In C. Maykel & M. A. Bray (Eds.), <i>Promoting mind-body health in schools: Interventions for mental health professionals</i> (pp. 11–26). American Psychological Association. https://doi.org/10.1037/0000157-002																																											
	D. Edited Book Chapter	iv. Taras, Z. (2024, May 30). <i>Situational irony can be funny, tragic or even terrifying</i> . howstuffworks. https://entertainment.howstuffworks.com/arts/literature/situational-irony.htm																																											
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30	Which one of the following refers to positive skewness?																																												
	a) 	b) 	c) 	d) 	c																																								
31	How much is the degree of freedom for the following data table?				Answer																																								
	<table><tr><th>S. No.</th><th>X_i</th><th>Hypothesised mean $m_{H_0} = 578 \text{ kg.}$</th><th>$D_i = (X_i - \mu_{H_0})$</th><th>$D_i^2$</th></tr><tr><td>5</td><td>572</td><td>578</td><td>-6</td><td>36</td></tr><tr><td>6</td><td>578</td><td>578</td><td>0</td><td>0</td></tr><tr><td>7</td><td>570</td><td>578</td><td>-8</td><td>64</td></tr><tr><td>8</td><td>572</td><td>578</td><td>-6</td><td>36</td></tr><tr><td>9</td><td>596</td><td>578</td><td>18</td><td>324</td></tr><tr><td>10</td><td>544</td><td>578</td><td>-34</td><td>1156</td></tr><tr><td>$n = 10$</td><td></td><td></td><td>$\sum D_i = -60$</td><td>$\sum D_i^2 = 1816$</td></tr></table>				S. No.	X_i	Hypothesised mean $m_{H_0} = 578 \text{ kg.}$	$D_i = (X_i - \mu_{H_0})$	D_i^2	5	572	578	-6	36	6	578	578	0	0	7	570	578	-8	64	8	572	578	-6	36	9	596	578	18	324	10	544	578	-34	1156	$n = 10$			$\sum D_i = -60$	$\sum D_i^2 = 1816$	
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32	Find out the Null hypothesis for the given table				Answer																																								
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33	What will be sum of the deviations of observations from the regression line?				Answer																																								
	a) $-\infty$	b) 0	c) $+\infty$	d) undefined	b																																								
34	Derive from the following diagram				Answer																																								

	 Assertion: In this normal distribution 5 percent of the sample are rejected. Justification: It shows a two tailed hypothesis test model at 90 percent confidence level														
	a) Assertion is true and justification explains the Assertion	b) Assertion is false but justification explains the Assertion	c) Assertion is true and justification is true but does not explain the Assertion	d) Assertion is true and justification for the Assertion is incorrect	d										
3 5	Match into pairs for the Statistical method with appropriate details mentioned: <table border="1" data-bbox="266 728 1169 938"><thead><tr><th>Statistical method</th><th>Details</th></tr></thead><tbody><tr><td>A. Correlation</td><td>i. Order 2, 3, 4,</td></tr><tr><td>B. Polynomial regression</td><td>ii. More than two population on same characteristics</td></tr><tr><td>C. ANOVA</td><td>iii. Test of homogeneity</td></tr><tr><td>D. Chi square</td><td>iv. Requires only two variables</td></tr></tbody></table>				Statistical method	Details	A. Correlation	i. Order 2, 3, 4,	B. Polynomial regression	ii. More than two population on same characteristics	C. ANOVA	iii. Test of homogeneity	D. Chi square	iv. Requires only two variables	Answer
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3 6	Match the following and give the correct answer: <table data-bbox="266 1043 924 1173"><tbody><tr><td>A. Nature of Interaction holding atom</td><td>i Kinetics</td></tr><tr><td>B. Rate of Chemical Reaction</td><td>ii Bond</td></tr><tr><td>C. Increase the rate of reaction</td><td>iii Lipid</td></tr><tr><td>D. hydrocarbon chain insoluble in water</td><td>iv catalyst</td></tr></tbody></table>				A. Nature of Interaction holding atom	i Kinetics	B. Rate of Chemical Reaction	ii Bond	C. Increase the rate of reaction	iii Lipid	D. hydrocarbon chain insoluble in water	iv catalyst	Answer		
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3 7	In a simple harmonic motion, the velocity of a particle is maximum at:				Answer										
	a) Mean position	b) Extreme position	c) Halfway between mean and extreme	d) At all positions	(a)										
3 8	In a double-slit experiment, if the distance between slits is doubled, what happens to the fringe spacing on the screen?				Answer										
	a) Fringe spacing halves	a) Fringe spacing doubles	c)Fringe spacing remains the same	d)Fringe spacing quadruples	(a)										
3 9	A block slides down a frictionless inclined plane. Which of the following statements is true?				Answer										
	a) Mechanical energy is not conserved	b) Potential energy decreases, kinetic energy increases	c) Kinetic energy decreases	d)Acceleration is zero	(b)										

40	Which of the following is true for a photon in a vacuum?				Answer
	a) It has mass but no energy	b) It has energy but no rest mass	c) It has rest mass and energy	d) It can be accelerated by a force	(b)
41	Which of the following is diamagnetic?				Answer
	a) CO ₂	b) O ₂	c) NO	d) O ₂ ⁻	(a)
42	Match the following ligands with their denticity:				Answer
	A. NH ₃		i. Quadridentate		
	B. EDTA		ii. Monodentate		
	C. Oxalate		iii. Hexadentate		
	D. Porphyrin		iv. Bidentate		
	a) A-ii, B-iii, C-iv, D-i	b) A-ii, B-iii, C-i, D-iv	c) A-iv, B-iii, C-ii, D-i.	d) A-ii, B-i, C-iv, D-iii	(a)
43	In which of the following compounds is the metal-metal bonding present ?				Answer
	a) NaCl	b) ZnO	c) Al ₂ O ₃	d) Cr ₂ Cl ₆	(d)
44	A solution contains 0.1 mol of a non-volatile solute in 1 L of water at 298 K. Calculate the osmotic pressure:				Answer
	a) 2.44 atm	b) 1.33 atm	c) 0.22 atm	d) 0.11 atm	(a)
45	According to Henry's law, the solubility of a gas in a liquid is:				Answer
	a) Independent of pressure.	b) Directly proportional to pressure.	c) Inversely proportional to pressure.	d) Exponential with pressure.	(b)
46	Relate the statements: A: Assertion—SSDs are faster than HDDs. B: Justification—Because SSDs use flash memory instead of spinning disks.				Answer
	a) Both A and B are true, and B is the correct explanation of A	b) Both A and B are true, but B is NOT the correct explanation of A	c) A is true, but B is false	d) A is false, but B is true	(a)
47	Match the pairs:				Answer
	A. Machine Learning		i Enables machines to understand and process human language		
	B. Natural Language Processing (NLP)		ii Uses data to learn and improve predictions automatically		
	C. Computer Vision		iii Analyzes and interprets visual data like images and videos		
	D. Expert Systems		iv Mimics human decision-making using rules and knowledge base		

	a) A – iv, B – i, C – iii, D – ii.	b) A – iv, B – iii, C – i, D – ii.	c) A – ii, B – i, C – iii, D – iv.	d) A – iii, B – i, C – iv, D – ii.	(c)
4 8	Which programming language is widely used for AI and ML development?				Answer
	a) Python	b) JavaScript	c) C#	d) HTML	(a)
4 9	Which of the following statement is true:				Answer
	a) A byte is made up of 16 bits.	b) ROM is volatile memory that loses data when power is switched off.	c) A compiler translates high-level code into machine code line by line.	d) A firewall is used to protect a computer network from unauthorized access.	(d)
5 0	What is a network of networks called?				Answer
	a) Intranet	b) Internet	c) WAN	d) LAN	(b)
5 1	Let X be a random variable with $P(X = x) = k(x + 1)$; $x = 0, 1, 2$ & 3 . The value of k is				Answer
	a) 1/10	b) $\frac{1}{4}$	c) 9	d) 1/6	a) 1/10
5 2	Let $X \sim \text{Uniform}(-a, a)$, determine 'a' such that $P(X < 2) = 1/4$				Answer
	a) 2	b) 4	c) 8	d) 6	c) 8
5 3	The average marks of 100 students at a certain examination is 66 and the variance is 64. Assuming that the marks are normally distributed, the number of students getting marks between 50 and 82, is approximately				Answer
	a) 68	b) 95	c) 90	d) 99	b) 95
5 4	Answer the following Assertion–Reason: Assertion (A): Entropy of an isolated system always increases. Reason (R): It is a direct consequence of the second law of thermodynamics.				Answer
	a) Both A and R are true, and R explains A	b) Both A and R are true, but R does not explain A	c) A true, R false	d) A false, R true	(a)
5 5	Match the types of a random variable X with the specific nature of its cumulative distribution functions.				(A-II), (B-I), (C-III)
	Type of R.V.		Nature of cdf		
	A. Discrete		I. Absolutely continuous		
	B. Continuous		II. Increases by jump only		
	C. Partially discrete, partially continuous		III. Increases by jump and continuously also		
	a) (A-I), (B-II), (C-III)	b) (A-II), (B-I), (C-III)	c) (A-II), (B-III), (C-I)	d) (A-III), (B-I), (C-II)	b)
5 6	A continuous random variable X has the distribution function				Answer

	$F(x) = \begin{cases} 0, & x < 0 \\ kx, & 0 < x < 1 \\ 1, & x > 1 \end{cases}$ The value of k is				
	a) 2	b) $\frac{1}{2}$	c) 1	d) $\frac{1}{4}$	c) 1
5 7	Which of the following is/are not true? (i) All estimators are statistics (ii) All statistics are estimators (iii) The terms estimators and estimates are synonyms (iv) An estimate is the true value of an estimator				Answer
	a) (ii) only	b) (i), (ii) & (iii) only	c) (ii) & (iii) only	d) (i), (iii) & (iv) only	c) (ii) & (iii) only
5 8	Let X and Y have joint pdf $f(x, y) = 2, 0 < x < y < 1$. Let $a = E(Y X=1/2)$ and $b = V(Y X=1/2)$. Then (a, b) is				Answer
	a) (1/4, 7/12)	b) (3/4, 1/48)	c) (3/4, 7/12)	d) (1/4, 1/48)	b) (3/4, 1/48)
5 9	Consider the following statements. A. T_n is a consistent estimator of ϑ. B. $E(T_n) \rightarrow \theta$ and $V(T_n) \rightarrow 0$ as $n \rightarrow \infty$ The correct statement is				Answer
	a) B implies A but A does not imply B	b) A implies B but B does not imply A	c) None of A and B implies the other	d) A and B implies each other	a) B implies A but A does not imply B
6 0	The relation between expected value of R and S.D. σ with usual constant factor is:				Answer
	a) $E(R) = D_1 \sigma$	b) $E(R) = D_2 \sigma$	c) $E(R) = d_2 \sigma$	d) $E(R) = d_1 \sigma$	c) $E(R) = d_2 \sigma$
6 1	R-charts are preferable over σ charts because:				Answer
	a) R and SD fluctuate together in case of small samples	b) R-charts are economical	c) R is easily calculatable	d) all of the above	d) all of the above
6 2	The causes of infant deaths can be generally being separated in two broad groups' i.e. Endogenous deaths and				Answer

	a) Premature deaths.	b) Mature deaths	c) Neonatal deaths	d) Exogenous deaths.	d) Exogenous deaths.
63	Match the following suitable pairs				Answer
	A. x-bar chart	I. Percentage defective			
	B. p chart	II. variability test			
	C. u-chart	III. Variable control chart			
	D. R chart	IV. Number of defects per sample			
	a) A-II, B-I, C-IV, D-III	b) A-I, B-II, C-IV, D-III	c) A-III, B-II, C-I, D-IV	d) A-III, B-I, C-IV, D-II	d) A-III, B-I, C-IV, D-II
64	The graph of the proportion defectives in the lot against average sample number is:				Answer
	a) ASN curve	b) Power curve	c) OC Curve	d) All of the above	a) ASN curve
65	Computation of standardized death rate is based upon the following assumptions. (i). The age wise distribution of two population is same. (ii). One population is taken as standard population.				Answer
	a) option (i) is true	b) options (i) and (ii) are true	c) option (ii) is true	d) both options are false	b) options (i) and (ii) are true
66	The probability of rejecting a lot having $\bar{p}$ as the process average defective is known as				Answer
	a) Consumer's risk	b) Producer's risk	c) Type I error	d) Type II error	b) Producer's risk
67	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 test				Answer
	a) only A is true	b) only B is true	c) only A and C are true	d) only D is true	a) only A is true
68	A more robust non-parametric alternative to the independent samples t test is the:				Answer

	a) matched pairs t test.	b) Kruskal-Wallis test	c) Wilcoxon rank-sum test.	d) Welch's t test.	c) Wilcoxon rank-sum test.
6 9	A p-value is best described as:				Answer
	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) Probability of obtaining a result as extreme as the observed under H_0
7 0	The likelihood ratio test statistic is generally given by:				Answer
	a) $f(X; \theta_0) / f(X; \theta_1)$	b) $f(X; \theta_1) / f(X; \theta_0)$	c) $(\sup \text{ under } H_1 \text{ of } L(\theta)) / (\sup \text{ under } H_0 \text{ of } L(\theta))$	d) $(\sup \text{ under } H_0 \text{ of } L(\theta)) / (\sup \text{ under } H_1 \text{ of } L(\theta))$	d) $(\sup \text{ under } H_0 \text{ of } L(\theta)) / (\sup \text{ under } H_1 \text{ of } L(\theta))$
7 1	If $E[X Y] = E[X]$, what can be said about X and Y?				Answer
	a) X and Y are dependent	b) X and Y are independent	c) X and Y are jointly uniform	d) None of these	b) X and Y are independent
7 2	If λ is the likelihood ratio criterion, the asymptotic distribution of $-2\log_e \lambda$ is				Answer
	a) Beta of 2 nd kind	b) Chi-square	c) Beta of 1 st kind	d) Normal	b) Chi-square
7 3	The Rao-Cramer lower bound for an unbiased estimator of σ^2 in a $N(\mu, \sigma^2)$ population when μ is known, is				Answer
	a) $\frac{\sigma^4}{n}$	b) $\frac{2\sigma^4}{n}$	c) $\frac{\sigma^4}{2n}$	d) $\frac{2\sigma^4}{3n}$	b) $\frac{2\sigma^4}{n}$
7 4	To proceed with the Modified Distribution method algorithm for solving an transportation problem, the number of dummy allocations need to be added are				Answer
	a) n-1	b) n	c) 2n-1	d) n-2	a) n-1

7 5	Choose the correct statements. A. The type I error is caused by rejection of H_0 when it is true B. The type II error is caused by acceptance of H_0 when H_1 is true C. The principle of Neyman-Pearson gives equal weights to both these errors				Answer								
	a) A and B are true	b) B and C are true	c) A and C are true	d) All the three	a) A and B are true								
7 6	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				Answer								
	a) 28	b) 26	c) 25	d) 27	b) 26								
7 7	Which of the statement(s) is/are true/false? 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 variable, if it exists, uniquely determines its distribution.				Answer								
	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) only C and D are true								
7 8	Match the item of column A with appropriate items of column B <table><tr><td>1. $E[aX + b]$</td><td>A. $\exp(\lambda(e^t - 1))$</td></tr><tr><td>2. Poisson Distribution (λ)</td><td>B. $a^2Var(X)$</td></tr><tr><td>3. Exponential Distribution (λ)</td><td>C. $aE[X] + b$</td></tr><tr><td>4. $Var(aX + b)$</td><td>D. $\lambda / (\lambda - t), for t < \lambda$</td></tr></table>				1. $E[aX + b]$	A. $\exp(\lambda(e^t - 1))$	2. Poisson Distribution (λ)	B. $a^2Var(X)$	3. Exponential Distribution (λ)	C. $aE[X] + b$	4. $Var(aX + b)$	D. $\lambda / (\lambda - t), for t < \lambda$	Answer
1. $E[aX + b]$	A. $\exp(\lambda(e^t - 1))$												
2. Poisson Distribution (λ)	B. $a^2Var(X)$												
3. Exponential Distribution (λ)	C. $aE[X] + b$												
4. $Var(aX + b)$	D. $\lambda / (\lambda - t), for t < \lambda$												
	a) 1-C, 2-B, 3-D, 4-A	b) 1-D, 2-C, 3-B, 4-A	c) 1-B, 2-C, 3-A, 4-D	d) 1-C, 2-A, 3-D, 4-A	d) 1-C, 2-A, 3-D, 4-A								
7 9	For a standard normal random variable Z, the probability $P(Z > 0)$ is:				Answer								
	a) 0	b) 0.5	c) 1	d) 0.6826	b) 0.5								
8 0	What is the formula to calculate Bayesian probability?				Answer								

	a) $P(B A) = (P(A B) * P(B)) / P(A)$	b) $P(A B) = (P(B) * P(A)) / P(B A)$	c) $P(A B) = (P(B A) * P(A)) / P(B)$	d) $P(B A) = (P(A) * P(B)) / P(A B)$	e) $P(A B) = (P(B A) * P(A)) / P(B)$
8 1	Let X and Y be two independent Poisson variates. Then the conditional distribution of X given X+Y is				Answer
	a) Geometric	b) Poisson	c) Negative binomial	d) Binomial	d) Binomial
8 2	Which statement correctly describes a time-homogeneous Markov chain? i. The probability of future states depends on the entire history of past states. ii. The transition probabilities between states remain constant over time. iii. It is a stochastic process where all states are recurrent. iv. Its transition matrix rows do not necessarily sum to one.				Answer
	a) option (i) is true	b) option (ii) is true	c) options (i) & (iv) are true	d) options (ii) & (iii) are true	b) option (ii) is true
8 3	Consider a discrete-time Markov chain with two states, A and B, and the following transition matrix P: $P = \begin{pmatrix} 0.8 & 0.2 \\ 0.3 & 0.7 \end{pmatrix}$ If the chain starts in state A, what is the probability of being in state A after 2 steps?				Answer
	a) 0.64	b) 0.70	c) 0.76	d) 0.80	c) 0.76
8 4	Consider a discrete-time Markov chain describing daily weather, with states 'Sunny' (S) and 'Rainy' (R). The transition matrix P is given by: $P = \begin{pmatrix} 0.6 & 0.4 \\ 0.2 & 0.8 \end{pmatrix}$ what is the stationary distribution ($\pi = (\pi_S, \pi_R)$)?				Answer
	a) (0.5, 0.5)	b) (0.33, 0.67)	c) (0.4, 0.6)	d) (0.25, 0.75)	b) (0.33, 0.67)
8 5	Let $X_1, X_2, \dots, X_n$ are coming from a Binomial distribution with parameters (n, p) and p has the prior distribution as $Beta(\alpha, \beta)$, the posterior of p is:				Answer
	a) $Beta(\alpha + \bar{x}, \beta + n - \bar{x})$	b) $Beta(\alpha + n, \beta + n)$	c) $N(\mu, \sigma^2)$	d) $Gamma(\alpha + x, \beta + n - x)$	a) $Beta(\alpha + \bar{x}, \beta + n - \bar{x})$
8 6	Which of the following statement(s) is(are) true/false A. The Bayes factor is the ratio of marginal likelihoods of two competing models.				Answer

	B. Posterior predictive checks are used to evaluate model fit with new or replicated data.				
	C. If the Bayes factor is less than 1, it always means the null hypothesis is correct.				
	a) only statements A & B are true	b) only statements B & C are true	c) statement A is true but B & C are false	d) statements A, B & C are true	a) only statements A & B are true
87	Gibbs sampling is a special case of:				Answer
	a) Importance sampling	b) Metropolis–Hastings	c) Markov chain Monte Carlo (MCMC)	d) Bootstrap	c) Markov chain Monte Carlo (MCMC)
88	Match the following suitable pairs				Answer
	A. Squared-error loss		i. Posterior mode		
	B. Absolute-error loss		ii. Posterior mean		
	C. 0–1 loss		iii. Posterior median		
	D. MAP estimator		iv. Maximum a posteriori		
	a) A-ii, B-i, C-iii, D-iv	b) A-ii, B-iii, C-i, D-iv	c) A-i, B-ii, C-iii, D-iv	d) A-iii, B-ii, C-iv, D-i	b) A-ii, B-iii, C-i, D-iv
89	The hazard function $h(t)$ can be written as:				Answer
	a) $\frac{1-F(t)}{f(t)}$	b) $\frac{f(t)}{1-F(t)}$	c) $\frac{dF(t)}{dt}$	d) $F(t) - f(t)$	b) $\frac{f(t)}{1-F(t)}$
90	The exponential distribution is <i>memoryless</i> . This means:				Answer
	a) $f(t + s) = f(t)f(s)$	b) $E[T T > t] = t + E[T]$	c) $P(T > t + s T > t) = P(T > s)$	d) Hazard function decreases over time	c) $P(T > t + s) = P(T > s)$
91	A right-censored observation occurs when:				Answer
	a) Failure is observed exactly	b) Data are missing completely	c) The measurement is left-truncated	d) The lifetime is known to exceed a certain time but not the exact failure time	d) The lifetime is known to exceed a certain time but not the exact

					failure time
9 2	The Kaplan–Meier estimator provides a nonparametric estimate of:				
	a) Hazard function	b) Survival function	c) Mean residual life	d) Shape parameter of Weibul	b) Survival function
9 3	Match the following suitable pairs				Answer
	A. Kaplan–Meier estimator	i. Hazard = baseline $\times$ exp(covariates)			
	B. Nelson–Aalen estimator	ii. Nonparametric survival function estimate			
	C. Right-censoring	iii. Cumulative hazard estimator			
	D. Proportional hazards model	iv. Failure time known only to exceed a bound			
	a) A-ii, B-iii, C-iv, D-i	b) A-i, B-ii, C-iii, D-iv	c) A-iii, B-ii, C-iv- D-i	d) A-iv, B-iii, C-i, D-ii	a) A-ii, B-iii, C-iv, D-i
9 4	Which of the following statement(s) is(are) true/false				Answer
	A. The exponential distribution is the only continuous lifetime distribution with the memoryless property.				
	B. A Weibull distribution with shape parameter $k = 1$ reduces to an exponential distribution.				
	C. In a Weibull distribution with $k > 1$, the hazard rate decreases with time.				
	a) only statements A & C are true	b) only statements B & C are true	c) only statements A & B are true	d) All statements are true	c) only statements A & B are true
9 5	Which of the following statement(s) is(are) true/false				Answer
	A. Adding redundant components typically decreases system reliability				
	B. For a parallel system, reliability equals the minimum of individual component reliabilities				
	C. The Barlow–Proschan measure assesses component importance to system reliability				
	a) only statements A & C are true	b) only statements A & B are true	c) only statements A & B are false	d) All statements are false	c) only statements A & B are false

96	Match the following suitable pairs				Answer
	A. Series system	i. Works if at least k components work			
	B. Parallel system	ii. Improves overall system reliability			
	C. k-out-of-n system	iii. Product of component reliabilities			
	D. Redundancy	iv. $1 - \prod(1 - Ri)$			
	a) A-iii, B-iv, C-ii, D-i	b) A-ii, B-iii, C-iv, D-i	c) A-iii, B-ii, C-iv, D-i	d) A-iii, B-iv, C-i, D-ii	d) A-iii, B-iv, C-i, D-ii
97	In the standard form of an LPP, all decision variables are:				Answer
	a) Non-negative	b) Positive	c) Integer valued	d) Free of sign restrictions	a) Non-negative
98	The branch-and-bound technique is used to solve:				Answer
	a) Standard LPPs	b) Integer programming problems	c) Ttransportation problems	d) Queuing models	b) Integer program ming problems
99	The shortest-path algorithm commonly used in networks is:				Answer
	a) Ford–Fulkerson	b) Dijkstra’s algorithm	c) Kruskal’s algorithm	d) Hungarian algorithm	b) Dijkstra’s algorithm
100	In an $M/M/1$ queue, the utilization factor ρ is:				Answer
	a) $\lambda + \mu$	b) $\mu - \lambda$	c) μ/λ	d) λ/μ	d) λ/μ
101	The matrix $\begin{bmatrix} 2 & 0 & 0 \\ 0 & 5 & 0 \\ 0 & 0 & 0 \end{bmatrix}$ is				symmetri x matrix
	a) identity matrix	b) symmetrix matrix	c) skew symmetrix matrix	d) null matrix	b)
102	Match List I with List II:				A-III, B-IV, C-I, D-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		
	Choose the correct answer from the options given below:				
	a) A-IV, B-III, C-I, D-II	b) A-IV, B-III, C-II, D-I	a) A-III, B-IV, C-II, D-I	d) A-III, B-IV, C-I, D-II	d)

1 0 3	Given below are two statements: One is labelled as Assertion A and the other is labelled as Reason R: Assertion (A): If A is any matrix given by $A = \begin{bmatrix} 5 & 0 & 3 \\ -1 & 0 & 2 \\ 1 & 0 & 1 \end{bmatrix}$. Then $ A = 0$, since all elements in column II are zero. Justification (B): Laplace expansion permits evaluation of a determinant along any row and column. In light of the above statements, choose the most appropriate answer from the options given below:				Both statements are true, and (B) is the correct explanation of (A).										
	a) Both statements are true, and (B) is the correct explanation of (A).	b) Both statements are true, but (B) is not the correct explanation of (A).	c) Statement (A) is true, but Statement (B) is false.	d) Statement (B) is true, but, Statement (A) is false.	a)										
1 0 4	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)										
1 0 5	'A' and 'B' are two matrices such that the order of 'A' is 3×4 . If AB and BA both are defined, then the order of 'B' is				4×3										
	a) 3×3	b) 3×4	c) 4×3	d) 4×4	c)										
1 0 6	If $r = 1$, the angle between the two regression lines is :				0°										
	a) 90°	b) 0°	c) 45°	d) 60°	b)										
1 0 7	There are four assumptions associated with a linear regression model. Match List I and List II. <table><tr><td>List I</td><td>List II</td></tr><tr><td>A. Linearity</td><td>i. The variance of residual is the same for any value of X.</td></tr><tr><td>B. Homoscedasticity</td><td>ii. Observations are independent of each other.</td></tr><tr><td>C. Independence</td><td>iii. The relationship between X and the mean of Y is linear.</td></tr><tr><td>D. Normality</td><td>iv. For any fixed value of X, Y is normally distributed</td></tr></table> Choose the correct answer.				List I	List II	A. Linearity	i. The variance of residual is the same for any value of X.	B. Homoscedasticity	ii. Observations are independent of each other.	C. Independence	iii. The relationship between X and the mean of Y is linear.	D. Normality	iv. For any fixed value of X, Y is normally distributed	A-iii, B-i, C-ii, D-iv
List I	List II														
A. Linearity	i. The variance of residual is the same for any value of X.														
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D. Normality	iv. For any fixed value of X, Y is normally distributed														
	a) A-iii, B-i, C-ii, D-iv	b) A-ii, B-i, C-iv, D-iii	c) A-ii, B-iv, C-i, D-iii	d) A-ii, B-i, C-iii, D-iv	a)										
1 0 8	Consider the Assertion (A) and Justification (B) given below: Assertion A: The value of the correlation coefficient is in the range of -1 to +1. Justification B: Correlation between two variables doesn't help in predicting the value of a variable even if we know the value of another variable. Choose the correct answer from the code given below:				Both statements are true, but (B) is not the										

					correct explanation of (A).
	a) Both statements are true, and (B) is the correct explanation of (A).	b) Both statements are true, but (B) is not the correct explanation of (A).	c) Statement (A) is true, but Statement (B) is false.	d) Statement (B) is true, but, Statement (A) is false.	b)
109	A paired data set has $n=5$, $\sum x = 15$, $\sum y = 27$, $\sum xy = 100$ and $\sum x^2=55$. The value of the regression coefficient of y on x is				1.9
	a) 19	b) 1.9	c) -1	d) 0.5	b)
110	With a total sample size of 30, the statistics-F to test the regression equation with 3 independent variables has d.f.:				(3, 26)
	a) (1, 29)	b) (1, 26)	c) (3, 29)	d) (3, 26)	d)
111	The formula for the Akaike Information Criterion (AIC) is				$AIC = 2k - 2\ln(L)$
	a) $AIC = 2k - 2\ln(L)$	b) $AIC = -2\ln(L) + k\ln(n)$	c) $AIC = k - \ln(L)$	d) $AIC = -\ln(L) + k\ln(n)$	a)
112	Suppose $\hat{\beta}$ is the OLS estimator of the coefficient of β in a multiple linear regression model, and the variance of the error term, denoted as σ^2 , is a known constant. According to the Gaussian-Markov Theorem, which of these conclusions can be true? 1. $\hat{\beta}$ is the BLUE. 2. $\hat{\beta}$ is unbiased, but not always the best estimator. 3. $\hat{\beta}$ is affected by change in σ^2 . 4. The Gaussian-Markov Theorem guarantees that $\hat{\beta}$ is always equal to β .				1 only.
	a) 1 only.	c) 1 and 2.	c) 3 and 4.	d) 2 only	a)
113	The formula for information from an experiment was propounded by:				R. A. Fisher
	a) C. R. Rao	b) Charles Spearman	c) Karl Pearson	d) R. A. Fisher	d)
114	Randomization is a process in which the treatments are allocated to the experimental units:				with equal probability
	a) at the will of the investigation	b) in sequence	c) with equal probability	d) with unequal probability	c)

1 1 5	There are four assumptions associated with the design of experiments. Match List I and List II.					A-ii, B-iii, C-iv, D-i
List I		List II				
A. CRD		i. an experiment involving two or more factors at various levels.				
B. RBD		ii. the experimental units are randomly assigned to the different treatments.				
C. LSD		iii. a restricted randomized design, in which experimental units are first organized into homogeneous blocks and then the treatments are assigned at random to these units within these blocks.				
D. Factorial experiment		iv. a method of placing treatments so that they appear in a balanced fashion within a square block or field, as well as treatments appearing once in each row and column.				
Choose the correct answer.						
a) A-ii, B-i, C-iii, D-iv		b) A-ii, B-i, C-iv, D-iii		c) A-ii, B-iii, C-iv, D-i	d) A-ii, B-iii, C-i, D-iv	c)
1 1 6	Below are two statements-one Assertion (A) and the other Justification (J). Find the correct answer using code. A: Assertion: In experimental research, we can not eliminate extraneous factors that influence the outcome. B: Justification: In survey research, a vast amount of rich and diverse data can be collected.					Both A and B are true but B is not the correct explanation of A.
a) Both A and B are true and B is the correct explanation of A.		b) Both A and B are true but B is not the correct explanation of A.		c) A is true, but B is false.	d) A is false, but B is true.	b)
1 1 7	Find the values of A, B, and C from the given ANOVA table.					A=15, B=3, C=5
Source of Variati on		Sum of Squares	Degree of Freedom	Mean Sum of Squares	F	
Treatment		30	2	A	C	
Error		45	15	B		
Total		75	17			
a) A=15, B=3, C=5		b) A=2, B=22.5, C=11.25		c) A=4.41, B=3, C=5	d) A=15, B=5, C=3	a)
1 1 8	Which of the following is not a contrast among the three treatments?					$T_1 + 2T_2 - T_3$

	a) $T_1 + 2T_2 - T_3$	b) $T_1 - T_3$	c) $T_1 - 2T_2 + T_3$	d) $-T_1 + 2T_2 - T_3$	a)												
1 1 9	Match the List I and List II <table><tr><td>List I</td><td>List II</td></tr><tr><td>A. Design of experiments</td><td>i. A subject receiving treatment in an experiment.</td></tr><tr><td>B. Experimental unit</td><td>ii. a branch of Statistics</td></tr><tr><td>C. Treatment</td><td>iii. The allocation of treatments to experimental units with equal probability.</td></tr><tr><td>D. Randomization</td><td>iv. A substance or a factor attached to an experimental unit.</td></tr></table> Chose the correct option.				List I	List II	A. Design of experiments	i. A subject receiving treatment in an experiment.	B. Experimental unit	ii. a branch of Statistics	C. Treatment	iii. The allocation of treatments to experimental units with equal probability.	D. Randomization	iv. A substance or a factor attached to an experimental unit.	A-ii, B-i, C-iv, D-iii		
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D. Randomization	iv. A substance or a factor attached to an experimental unit.																
	a) A-ii, B-i, C-iv, D-iii	b) A-ii, B-iii, C-i, D-iv	c) A-iii, B-ii, C-iv, D-iii	d) A-ii, B-i, C-iv, D-iii	d)												
1 2 0	For the ANOVA table <table><tr><td>Source of variations</td><td>Sum of squares</td><td>Degree of freedoms</td></tr><tr><td>Between treatments</td><td>45</td><td>3</td></tr><tr><td>Error</td><td>32</td><td>16</td></tr><tr><td>Total</td><td>99</td><td>19</td></tr></table> The F-statistic is:				Source of variations	Sum of squares	Degree of freedoms	Between treatments	45	3	Error	32	16	Total	99	19	7.5
Source of variations	Sum of squares	Degree of freedoms															
Between treatments	45	3															
Error	32	16															
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	a) 7.2	b) 7.3	c) 7.4	d) 7.5	d)												
1 2 1	The layout, <table><tr><td>A</td><td>C</td><td>B</td></tr><tr><td>B</td><td>A</td><td>C</td></tr><tr><td>C</td><td>B</td><td>A</td></tr></table> stands for:				A	C	B	B	A	C	C	B	A	Latin square design			
A	C	B															
B	A	C															
C	B	A															
	a) cross-over design	b) RBD	c) Latin square design	d) CRD	c)												
1 2 2	$E(U'U) = \begin{bmatrix} 2 & 0 & 0 \\ 0 & 3 & 0 \\ 0 & 0 & 4 \end{bmatrix}$. The given variance covariance matrix shows the problem of				Heteroscedasticity												
	a) Auto-correlation	b) Non auto-correlation	c) Heteroscedasticity	d) Homoscedasticity	c)												
1 2 3	Match the List I and List II <table><tr><td>List I</td><td>List II</td></tr><tr><td>A. White test</td><td>i. Stationary test</td></tr><tr><td>B. Farrar-Glauber test</td><td>ii. Heteroscedasticity test</td></tr><tr><td>C. Dickey-Fuller Test</td><td>iii. Autocorrelation test</td></tr><tr><td>D. Durbin-Watson test</td><td>iv. Multicollinearity test</td></tr></table> Choose the correct answer.				List I	List II	A. White test	i. Stationary test	B. Farrar-Glauber test	ii. Heteroscedasticity test	C. Dickey-Fuller Test	iii. Autocorrelation test	D. Durbin-Watson test	iv. Multicollinearity test	A-ii, B-iv, C-i, D-iii		
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	a) A-ii, B-iv, C-i, D-iii	b) A-iv, B-ii, C-i, D-iii	c) A-ii, B-iv, C-iii, D-i	d) A-i, B-iv, C-ii, D-iii	a)										
1 2 4	Consider the following statements: A: Assertion: Multicollinearity is a statistical phenomenon that occurs when two or more independent variables in a regression model are highly correlated with each other. B: Justification: Multicollinearity occurs when two or more independent variables in a data frame have a high correlation with one another in a regression model. Choose the correct answer from the given code:				Both A and B are true and B is the correct explanation of A.										
	a) Both A and B are true and B is the correct explanation of A.	b) Both A and B are true but B is not the correct explanation of A.	c) A is true, but B is false.	d) A is false, but B is true.	a)										
1 2 5	$Y_t = \alpha + \beta_0 X_t + \beta_1 X_{t-1} + \varepsilon_t$ is an example of				Distributed lag model										
	a) Distributed lag model	b) Auto regressive model	c) Regression model	d) Moving average model	a)										
1 2 6	In the case of perfect multicollinearity, the value of the determinant of $X'X$ is equal to				0										
	a) <1	b) 0	c) 1	d) >1	b)										
1 2 7	The _____ distribution is a multivariate generalization of the chi-square distribution.				Hotelling's T^2										
	a) Multivariate Normal	b) Hotelling's T^2	c) Wishart distribution	d) Univariate Normal	b)										
1 2 8	Choose the correct match from the codes: <table><tr><td>A. $t = \frac{\bar{\mu} - \mu}{s/\sqrt{n}}$</td><td>i. Follows Chi-square distribution with p df.</td></tr><tr><td>B. $(t)^2 = \left(\frac{\hat{\beta}_1 - \beta_1}{\hat{\sigma}/\sqrt{n}}\right)^2$ (in case of simple linear regression model)</td><td>ii. follows t-distribution with $(n-1)$ df.</td></tr><tr><td>C. $n(\bar{x} - \mu)' \Sigma^{-1} (\bar{x} - \mu)$</td><td>iii. follows F-distribution with $(1, n-2)$ df.</td></tr><tr><td>D. $n(\bar{x} - \mu)' S^{-1} (\bar{x} - \mu)$</td><td>i. $\frac{(n-1)p}{n-p} F_{p, n-p}$</td></tr></table>				A. $t = \frac{\bar{\mu} - \mu}{s/\sqrt{n}}$	i. Follows Chi-square distribution with p df.	B. $(t)^2 = \left(\frac{\hat{\beta}_1 - \beta_1}{\hat{\sigma}/\sqrt{n}}\right)^2$ (in case of simple linear regression model)	ii. follows t-distribution with $(n-1)$ df.	C. $n(\bar{x} - \mu)' \Sigma^{-1} (\bar{x} - \mu)$	iii. follows F-distribution with $(1, n-2)$ df.	D. $n(\bar{x} - \mu)' S^{-1} (\bar{x} - \mu)$	i. $\frac{(n-1)p}{n-p} F_{p, n-p}$	a)		
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	a) A-ii, B-iii, C-I, D-iv	b) A-ii, B-iii, C-iv, D-i	c) A-ii, B-i, C-iv, D-iii	d) A-ii, B-iii, C-I, D-iv	A-ii, B-iii, C-I, D-iv										
1 2 9	Choose the correct match from the codes: <table><tr><td>List I</td><td>List II</td></tr><tr><td>A. Characteristic function of multivariate normal distribution</td><td>i. $N(\bar{x} - \mu)' S^{-1} (\bar{x} - \mu)$</td></tr><tr><td>B. Hotelling's T^2-statistic</td><td>ii. $(\bar{x}_1 - \bar{x}_2)' S^{-1} (\bar{x}_1 - \bar{x}_2)$</td></tr><tr><td>C. Mahalanobis' D^2-statistic</td><td>iii. $\frac{ A }{ A+B }$</td></tr><tr><td>D. Walk's λ-critetion</td><td>iv. $e^{it' \mu - \frac{1}{2} t' \Sigma t}$</td></tr></table>				List I	List II	A. Characteristic function of multivariate normal distribution	i. $N(\bar{x} - \mu)' S^{-1} (\bar{x} - \mu)$	B. Hotelling's T^2 -statistic	ii. $(\bar{x}_1 - \bar{x}_2)' S^{-1} (\bar{x}_1 - \bar{x}_2)$	C. Mahalanobis' D^2 -statistic	iii. $\frac{ A }{ A+B }$	D. Walk's λ -critetion	iv. $e^{it' \mu - \frac{1}{2} t' \Sigma t}$	A-iv, B-i, C-ii, D-iii
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	a) A-iii, B-ii, C-i, D-iv	b) A-iv, B-i, C-ii, D-iii	c) A-iii, B-ii, C-iv, D-i	d) A-iv, B-ii, C-i, D-iii	b)
1 3 0	Consider the following statements: A: Assertion: A use of multivariate statistics in social science research has increased due to the availability of statistical software. B: Justification: Multivariate statistics are easier to comprehend as compared to the bivariate statistics. Choose the correct answer from the given code:				Statement (A) is true, but Statement (B) is false.
	a) Both statements are true, and (B) is the correct explanation of (A).	b) Both statements are true, but (B) is not the correct explanation of (A).	c) Statement (A) is true, but Statement (B) is false.	d) Statement (B) is true, but, Statement (A) is false.	c)
1 3 1	Consider the following statements: A: Assertion: Multivariate studies demand larger samples than univariate studies. B: Justification: Multivariate studies do not analyse the data sets involving several responses. Choose the correct answer from the given code:				Statement (A) is true, but Statement (B) is false.
	a) Both statements are true, and (B) is the correct explanation of (A).	b) Both statements are true, but (B) is not the correct explanation of (A).	c) Statement (A) is true, but Statement (B) is false.	d) Statement (B) is true, but, Statement (A) is false.	c)
1 3 2	If p ₁ and p ₂ are the first and the second principal component vectors respectively, what statements are correct about them				p ₁ is orthogonal to p ₂
	a) p ₁ is orthogonal to p ₂	b) p ₁ is parallel to p ₂	c) variance along p ₂ is bigger than variance along p ₁	d) variance along p ₁ is the same to the variance along p ₂	A)
1 3 3	If the element c _{1,2} of the covariance matrix C is 114, what is the value of c _{2,1} and what is the meaning?				114, covariance
	a) 114, variance	b) 1/114, variance	c) 1/114, covariance	d) 114, covariance	d)
1 3 4	This process is performed after extraction to obtain a more interpretable factor solution.				factor rotation
	a) factor Normalization	b) factor rotation	c) factor optimization	d) factor interpretation	b)
1 3 5	Consider the following statements: A: Assertion: If the value of $\beta_2 = \frac{\mu_4}{\sigma_4}$, of a distribution gives the value more than 3, its curve is platykurtic. B: Justification: In a moderately asymmetrical distribution, the standard deviation is 1.25 times of mean deviation. Choose the correct answer from the given code:				Statement (B) is true, but, Statement (A) is false.

	a) Both statements are true, and (B) is the correct explanation of (A).	b) Both statements are true, but (B) is not the correct explanation of (A).	c) Statement (A) is true, but Statement (B) is false.	d) Statement (B) is true, but, Statement (A) is false.	d)																
1 3 6	Consider the following statements: A: Assertion: In negative skewness as the marks/scores increases the frequency decreases. B: Justification: In negative skewness the test is too easy for the takers. Choose the correct answer from the given code:				Statement (B) is true, but, Statement (A) is false.																
	a) Both statements are true, and (B) is the correct explanation of (A).	b) Both statements are true, but (B) is not the correct explanation of (A).	c) Statement (A) is true, but Statement (B) is false.	d) Statement (B) is true, but, Statement (A) is false.	d)																
1 3 7	A discrete random variable X has the following probability distribution. <table><tr><td>X</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td><td>7</td></tr><tr><td>P(X)</td><td>K</td><td>2K</td><td>2K</td><td>3K</td><td>K²</td><td>2K²</td><td>7K²+K</td></tr></table> What is the value of K?				X	1	2	3	4	5	6	7	P(X)	K	2K	2K	3K	K ²	2K ²	7K ² +K	1/10
X	1	2	3	4	5	6	7														
P(X)	K	2K	2K	3K	K ²	2K ²	7K ² +K														
	a) 1/10	b) 1/20	c) 1/30	d) 1/40	a)																
1 3 8	Subway trains on a certain line run every half hour between mid-night and six in the morning. What is the probability that a man entering the station at a random time during this period will have to wait at least twenty minutes?				1/3																
	a) 1/2	b) 1/3	c) 1/4	d) 1/5	b)																
1 3 9	Exponential distribution comprises which of the following characteristics? 1) It is discrete distribution. 2) It is a family of distribution. 3) It is a skewed to the left. 4) The x value ranges from zero to infinity. Which one of the following options is most appropriate.				3 & 4																
	a) 1, 2, 3 & 4	b) 2, 3 & 4	c) 3 & 4	d) 2 & 4	c)																
1 4 0	For a set of n independent and identically distributed random variables, what is the role of the k -th order statistic, $X_{(k)}$?				It is the k -th smallest observation in the sample.																
	a) It is the k -th smallest observation in the sample.	b) It is the k -th largest observation in the sample.	c) It is the mean of the k smallest observations.	d) It is a random variable that represents the probability of the k -th event occurring.	a)																
1 4 1	A sample consists of:				any fraction																

					of the population n										
	a) all units of the population	b) 50 per cent units of the population	c) 5 per cent units of the population	d) any fraction of the population	d)										
1 4 2	Probability of drawing a unit at each selection remains same in:				srswr										
	a) srswor	b) srswr	c) both srswor and srswr	d) stratified sampling	b)										
1 4 3	Match List I and List II <table><tr><th>List I</th><th>List II</th></tr><tr><td>A. Stratified sampling</td><td>I. The units/members are chosen to represent various arears of characteristics so defined</td></tr><tr><td>B. Cluster sampling</td><td>II. Every unit had an independent and equal chance of being picked up</td></tr><tr><td>C. Systematic sampling</td><td>III. The units are groups and are chosen intact</td></tr><tr><td>D. Dimensional sampling</td><td>IV. The members are selected using the interval obtained by N/n; the N= Agrregate, n=desired sub aggregate.</td></tr></table> Choose the correct answer from the options given below:				List I	List II	A. Stratified sampling	I. The units/members are chosen to represent various arears of characteristics so defined	B. Cluster sampling	II. Every unit had an independent and equal chance of being picked up	C. Systematic sampling	III. The units are groups and are chosen intact	D. Dimensional sampling	IV. The members are selected using the interval obtained by N/n ; the N = Agrregate, n =desired sub aggregate.	A-II, B-III, C-IV, D-I
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1 4 5	Consider the following statements: A: Assertion: No test provides a perfect picture of a student's abilities and skills. B: Justification: A test is only one small sample of a student's performance Choose the correct answer from the given code:				Both statemen ts are true, and (B) is the correct explanati on of (A).										

	a) Both statements are true, and (B) is the correct explanation of (A).	b) Both statements are true, but (B) is not the correct explanation of (A).	c) Statement (A) is true, but Statement (B) is false.	d) Statement (B) is true, but, Statement (A) is false.	a)
1 4 6	Consider the following statements: A: Assertion: Sampling methods is an economical method. B: Justification: Under sampling, analysis of data is confined only to a fraction of the population. Choose the correct answer from the given code:				Both statements are true, and (B) is the correct explanation of (A).
	a) Both statements are true, and (B) is the correct explanation of (A).	b) Both statements are true, but (B) is not the correct explanation of (A).	c) Statement (A) is true, but Statement (B) is false.	d) Statement (B) is true, but, Statement (A) is false.	a)
1 4 7	The number of possible samples of size 2 out of 4 population units without replacement is				6
	a) 2	b) 4	c) 6	d) 12	c)
1 4 8	A sample of 16 items from an infinite population having S.D.=4, yielding total scores as 160. The standard error of sampling distribution of mean is:				1
	a) 1	b) 10	c) 20	d) 40	a)
1 4 9	Supposing that, in cluster sampling s_w^2 represents the variance within the clusters and s_b^2 between clusters. What is the relation between s_w^2 and s_b^2 ?				$s_w^2 \leq s_b^2$
	a) $s_w^2 = s_b^2$	b) $s_w^2 \geq s_b^2$	c) $s_w^2 \leq s_b^2$	d) $s_w^2 < s_b^2$	c)
1 5 0	Having sample observations $x_1, x_2, \dots, x_n$, find the formula that does not defined the formula for the sample variance.				$\frac{1}{n} \left\{ \sum x_i^2 - \frac{(\sum x_i)^2}{n} \right\}$
	a) $s^2 = \frac{1}{n-1} \sum (x_i - \bar{x})^2$	b) $s^2 = \frac{1}{n-1} \left\{ \sum x_i^2 - \frac{(\sum x_i)^2}{n} \right\}$	c) $s^2 = \frac{1}{n-1} \left\{ \sum x_i^2 - n\bar{x}^2 \right\}$	d) $s^2 = \frac{1}{n} \left\{ \sum x_i^2 - \frac{(\sum x_i)^2}{n} \right\}$	d)