Set No. 1

18P/221/23

Total No. of Printed Pages : 54

Question Booklet No ....

(To be filled up by the candidate by **blue/black ball-point pen**)

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

Roll No. *(Write the digits in words)*...

Serial No. of OMR Answer Sheet ....

Centre Code No. | | | | |

Day and Date . ...

....
(Signature of Invigilator)

INSTRUCTIONS TO CANDIDATES

(Use only *blue/black ball-point pen* in the space above and on both sides of the **Answer Sheet**)

1. Within 30 minutes of the issue of the Question Booklet, check the Question Booklet to ensure that it contains all the pages in correct sequence and that no page/question is missing. In case of faulty Question Booklet bring it to the notice of the Superintendent/Invigilators immediately to obtain a fresh Question Booklet.

2. Do not bring any loose paper, written or blank, inside the Examination Hall *except the Admit Card.*

3. *A separate OMR Answer Sheet is given. It should not be folded or mutilated. A second OMR Answer Sheet shall not be provided. Only the OMR Answer Sheet will be evaluated.*

4. Write all entries by blue/black pen in the space provided above.

5. *On the front page of the OMR Answer Sheet, write by pen your Roll Number in the space provided at the top, and by darkening the circles at the bottom. Also, write the Question Booklet Number, Centre Code Number and the Set Number wherever applicable in appropriate places.*

6. *No overwriting is allowed in the entries of Roll No., Question Booklet No. and Set No. (if any) on OMR Answer sheet and Roll No. and OMR Answer sheet no. on the Question Booklet.*

7. *Any change in the aforesaid entries is to be verified by the invigilator, otherwise it will be taken as unfair means.*

8. *Each question in this Booklet is followed by four alternative answers. For each question, you are to record the correct option on the Answer Sheet by darkening the appropriate circle in the corresponding row of the Answer Sheet, by pen as mentioned in the guidelines given on the first page of the OMR Answer Sheet.*

9. For each question, darken only one circle on the OMR Answer Sheet. If you darken more than one circle or darken a circle partially, the answer will be treated as incorrect.

10. *Note that the answer once filled in ink cannot be changed. If you do not wish to attempt a question, leave all the circles in the corresponding row blank (such question will be awarded zero mark).*

11. For rough work, use the inner back page of the title cover and the blank page at the end of this Booklet.

12. On completion of the Test, the candidate must handover the OMR Answer Sheet to the Invigilator in the examination room/hall. However, candidates are allowed to take away Test Booklet and copy of OMR Answer Sheet with them.

13. Candidates are not permitted to leave the Examination Hall until the end of the Test.

14. If a candidate attempts to use any form of unfair means, he/she shall be liable to such punishment as the University may determine and impose on him/her.

(218)

18P/221/23 (1)

No. of Questions : 120
प्रश्नों की संख्या : 120

Time : 2 Hours]   [Full Marks : 360

समय : 2घण्टे]   [पूर्णांक : 360

Note : (1) Attempt as many questions as you can. Each question carries 3 (Three) marks. *One mark will be deducted for each incorrect answer.* **Zero mark will be awarded for each unattempted question.**

अधिकाधिक प्रश्नों को हल करने का प्रयत्न करें । प्रत्येक प्रश्न 3 (तीन) अंक का है । *प्रत्येक गलत उत्तर के लिए एक अंक काटा जायेगा ।* प्रत्येक अनुत्तरित प्रश्न का प्राप्तांक **शून्य होगा ।**

(2) If more than one alternative answers seem to be approximate to the correct answer, choose the closest one.

यदि एकाधिक वैकल्पिक उत्तर सही उत्तर के निकट प्रतीत हो, तो निकटतम सही उत्तर दें ।

1. From the frequency distribution with open end class interval at the end , we can calculate :

    (i) mean   (ii) median and (iii) mode.

Choose your answer from the following codes :

(1) (i) and (ii)   (2) (i) and (iii)

(3) (ii) and (iii)   (4) All the three

अन्त में खुला वर्ग अन्तराल वाले आवृत्ति-बंटन से हम

    (i) माध्य   (ii) माध्यिका   एवं   (iii) बहुलक

की गणना कर सकते हैं । निम्नलिखित कूटों में से अपने उत्तर चुनिए

(1) (i) और (ii)   (2) (i) और (iii)

(3) (ii) और (iii)   (4) सभी तीनों

(1)   (Turn Over)

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2. The average age of 10 people in a house is 40 years. When the age of a guest is included, the average age is increased by one year. The age of guest is

   (1) 45 years   (2) 51 years   (3) 55 years   (4) 61 years

   एक घर में 10 लोगों की औसत उम्र 40 साल है । जब एक अतिथि की उम्र शामिल की जाती है तो औसत आयु एक वर्ष बढ जाती है । अतिथि की आयु है

   (1) 45 वर्ष   (2) 51 वर्ष   (3) 55 वर्ष   (4) 61 वर्ष

3. Which of the following is least for any data ?

   (1) Q_2 (2) P_{50} (3) D_4 (4) P_{75}

   निम्न में से कौन किसी भी आकड़े के लिए न्यूनतम होगा ?

   (1) Q_2 (2) P_{50} (3) D_4 (4) P_{75}

4. For 10 data sets, each consisting of 17 observations, which of the following is true ?

   (i) The combined arithmetic mean shall be the arithmetic mean of the individual arithmetic means.

   (ii) The logarithm of the combined geometric mean shall be the arithmetic mean of the logarithm of individual geometric means.

   (iii) The combined harmonic mean shall be the harmonic mean of the individual harmonic means.

   Choose your answer from the following codes :

   (1) Only (i) and (ii) are true.

   (2) Only (ii) and (iii) are true.

   (3) Only (i) and (iii) are true.

   (4) All are true.

     (Continued)

10 आँकड़ों के समुच्चयों, प्रत्येक 17 प्रेक्षण रखनेवाले, के लिए निम्नलिखित में से कौन सत्य है ?

(i) वैयक्तिक अंकगणितीय माध्यों का अंकगणितीय माध्य, संयुक्त अंकगणितीय माध्य होगा ।

(ii) वैयक्तिक गुणोत्तर माध्यों के लघुगणकों का अंकगणितीय माध्य, संयुक्त गुणोत्तर माध्य का लघुगणक होगा ।

(iii) वैयक्तिक हरात्मक माध्यों का हरात्मक माध्य, संयुक्त हरात्मक माध्य होगा ।

निम्नलिखित कूटों में से अपने उत्तर चुनिए :

(1) केवल (i) और (ii) सत्य हैं ।

(2) केवल (ii) और (iii) सत्य हैं ।

(3) केवल (i) और (iii) सत्य हैं ।

(4) सभी सत्य हैं ।

5. The statistic defined as the distance between 70th and 30th sample percentiles gives us the information concerning

(1) Central tendency   (2) Dispersion

(3) Skewness   (4) Kurtosis

70 वें और 30 वें प्रतिदर्श शतमकों के मध्य दूरी की भांति परिभाषित प्रतिदर्शज हमें

(1) केन्द्रीय प्रवृत्ति   (2) प्रसरण

(3) विषमता   (4) ककुदता

से सम्बंधित सूचना देता है ।

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6. A reading test with maximum score 50 yields a bell-shaped symmetrical distribution with scores ranging from 5 to 48 on a large sample of class III students. If the same test is administered to class V students, the frequency distribution is expected to be ?

   (1) Positively skewed.

   (2) Negatively skewed.

   (3) Symmetrical and bell-shaped.

   (4) Symmetrical and bathtub shape.

कक्षा III के छात्रों के वृहद् प्रतिदर्श पर, अधिकतम 50 प्रासांकोंवाली एक वाचन परीक्षा, प्रामांक 5 से 48 तक की सीमा के साथ एक घंट्याकार सममित बंटन देता है । यदि यही परीक्षा कक्षा V के छात्रों को दी जाती है तो बारंबारता बंटन

   (1) धनात्मक विषम

   (2) ऋणात्मक विषम

   (3) सममित और घंट्याकार

   (4) सममित और बायटब के आकार का

होना संभावित है ।

7. If x and y are uncorrelated variables then this implies

   (i) The absence of any linear relationship between them.

   (ii) The absence of any functional relationship between them.

   (iii) These are independent variables.

   Which of the above is/are correct ?

   (1) (i) only   (2) Both (i) and (ii)

   (3) Both (i) and (iii) only   (4) All

(4) (Continued)

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x और y असहसम्बन्धित चर हैं, तो इसका यह अर्थ हुआ कि

(i) उनके बीच कोई रैखिक सम्बन्ध नहीं है ।

(ii) उनके बीच कोई फलनीय सम्बन्ध नहीं है ।

(iii) वो स्वतन्त्र चर है ।

उपरोक्त में से कौन हैं ?

(1) केवल (i)   (2) (i) और (ii) दोनों

(3) (i) और (iii) दोनों   (4) सभी

8. In order to fit a polynomial of degree 2, how many summations are to be computed over 5 observations under least square principle ?

(1) 10   (2) 4   (3) 7   (4) 16

द्विघातीय बहुपद को समंजित करने के लिये न्यूनतम वर्ग सिद्धान्त के अन्तर्गत 5 प्रेक्षणों के कितने योगफल अभिकलित होते हैं ?

(1) 10   (2) 4   (3) 7   (4) 16

9. A data set containing paired values are shown by points in (X, Y) plane, then the corresponding diagram is known as

(1) Point diagram   (2) Correlogram

(3) Dendogram   (4) Scatter diagram

युग्मित मानों वाले किसी आँकडों के समुच्चय को (X, Y) तल पर बिन्दुओं द्वारा दर्शाया गया है, तो सम्बन्धित आरेख

(1) बिन्दु आरेख   (2) कोरिलोग्राम

(3) डेन्डोग्राम   (4) प्रकीर्ण आरेख

की भाँति जाना जाता है ।

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10. If the regression line of Y on X is $Y + 0.8X = 25$ and the standard deviations of X and Y are respectively 3 and 8, then the value of the correlation coefficient r is

(1) −0.3   (2) −0.4   (3) 0.3   (4) 0.4

यदि X पर Y की समाश्रयण रेखा $Y + 0.8X = 25$ है और X और Y के मानक विचलन क्रमशः 3 एवं 8 हैं तो सहसंबंध गुणांक r का मान है

(1) −0.3   (2) −0.4   (3) 0.3   (4) 0.4

11. Suppose r is the correlation coefficient between two variables X and Y where standard deviations of X and Y are equal. If θ is the angle between the regression lines then :

(1) $\tan\theta = \dfrac{1+r^2}{2r}$ (2) $\sec\theta = \dfrac{1+r^2}{2r}$ (3) $\cos\theta = \dfrac{2r}{1+r^2}$ (4) $\sin\theta = \dfrac{1+r^2}{1-r^2}$

मान लीजिए दो चरों X और Y के बीच सहसंबंध गुणांक r है जिसमें X और Y के मानक विचलन एक समान हैं । यदि समाश्रयण रेखाओं के बीच का कोण θ है, तो

(1) $\tan\theta = \dfrac{1+r^2}{2r}$ (2) $\sec\theta = \dfrac{1+r^2}{2r}$ (3) $\cos\theta = \dfrac{2r}{1+r^2}$ (4) $\sin\theta = \dfrac{1+r^2}{1-r^2}$

12. For three attributes A, B and C, given that, $(A) = (B) = (C) = \dfrac{N}{2}$ and $(ABC) = (\alpha\beta\gamma)$ the relation between (ABC), (AB), (AC), (BC) and N is

(1) $(ABC) = (AB) + (AC) + (BC) - N$

(2) $(ABC) = (AB) + (AC) + (BC) - \dfrac{N}{2}$

(3) $2(ABC) = (AB) + (AC) + (BC) - N$

(4) $2(ABC) = (AB) + (AC) + (BC) - \dfrac{N}{2}$

(6)   (Continued)

किन्हीं तीन गुणधर्मों A, B और C के लिए, यदि दिया गया हो कि, $(A) = (B) = (C) = \dfrac{N}{2}$ और

$(ABC) = (\alpha\beta\gamma)$, तब (ABC), (AB), (AC), (BC) और N के बीच सम्बन्ध होगा

(1) $(ABC) = (AB) + (AC) + (BC) - N$

(2) $(ABC) = (AB) + (AC) + (BC) - \dfrac{N}{2}$

(3) $2(ABC) = (AB) + (AC) + (BC) - N$

(4) $2(ABC) = (AB) + (AC) + (BC) - \dfrac{N}{2}$

13. In a series of houses actually invaded by small-pox 70% of the inhabitant is attacked and 85% have been vaccinated, what is the lowest percentage of the vaccinated that must have been attacked ?

(1) 62.3%   (2) 64.7%   (3) 68.3%   (4) 71.0%

चेचक के प्रकोप से ग्रसित किसी बस्ती में 70% निवासी चेचक से ग्रसित है एवं 85% का टीकाकरण हुआ है, टीकाकरण के उपरान्त भी ग्रसित लोगों का निम्नतम प्रतिशत होगा

(1) 62.3%   (2) 64.7%   (3) 68.3%   (4) 71.0%

14. The joint probability density function of (X, Y) is $f(x, y) = \exp\{-(x + y)\}$, for $0 < x < \infty$ and $0 < y < \infty$.

Assertion (A): $P(X < Y \mid X < 2Y) = P(X < Y)$.

Reason (R): X and Y are independently exponentially distributed which possesses 'lack of memory property'.

Select your answer from the following codes :

(1) Both (A) and (R) is true and (R) is correct explanation of (A).

(2) Both (A) and (R) is true but (R) is not correct explanation of (A).

(3) (A) is true but (R) is false.

(4) (A) is false but (R) is true.

(7)   (Turn Over)

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(X, Y) का संयुक्त प्रायिकता घनत्व फलन $f(x, y) = \exp\{-(x + y)\}$, $0 < x < \infty$, $0 < y < \infty$ के लिए, है।

अभिकथन (A) : $P(X < Y \mid X < 2Y) = P(X < Y)$.

कारण (R) : X और Y स्वतंत्रतः चरघातांकी बंटित हैं जो 'स्मृति विहीनता गुण' को रखता है।

निम्नलिखित कूटों में से अपने उत्तर चुनिए :

(1) (A) और (R) दोनों सत्य हैं और (A) का सही स्पष्टीकरण (R) है।

(2) (A) और (R) दोनों सत्य हैं और (A) का सही स्पष्टीकरण (R) नहीं है।

(3) (A) सत्य हैं परन्तु (R) असत्य है।

(4) (A) असत्य है परन्तु (R) सत्य है।

15. The joint probability mass function of random variables X and Y is

$$f(x, y) = \frac{\lambda^x e^{-\lambda} p^y (1-p)^{x-y}}{y!(x-y)!}, \quad y = 0, 1, \ldots, x; x = 0, 1, \ldots, \ldots$$

The marginal distribution of

(1) X and Y both are Poisson.

(2) X and Y both are binomial.

(3) X is binomial and that of Y is Poisson.

(4) X is Poisson and that of Y is binomial.

यादृच्छिक चरों X और Y का संयुक्त प्रायिकता मात्रा फलन

$$f(x, y) = \frac{\lambda^x e^{-\lambda} p^y (1-p)^{x-y}}{y!(x-y)!}, \quad y = 0, 1, \ldots, x; x = 0, 1, \ldots, \ldots$$

है।

(1) X और Y दोनों के उपान्त बंटन प्वायसाँ है।

(2) X और Y दोनों के उपान्त बंटन द्विपद हैं।

(3) X का उपान्त बंटन द्विपद और वहीं Y का प्वायसाँ है।

(4) X का उपान्त बंटन प्वायसाँ और वहीं Y का द्विपद है।

(Continued)

16. The joint probability density function of (X, Y) is

$$f_{X,Y}(x, y) = 2; \quad 0 < x < 1, \ 0 < y < x$$
$$= 0; \quad \text{elsewhere.}$$

The conditional probability density function

(1) $f_{X|Y}(x \mid y) = 1/(1-y)$ for $0 < x < 1$ and zero elsewhere.

(2) $f_{X|Y}(x \mid y) = 1/x$ for $y < x < 1$ and zero elsewhere.

(3) $f_{Y|X}(y \mid x) = 1/x$ for $0 < y < x$ and zero elsewhere.

(4) $f_{Y|X}(y \mid x) = 1/(1-y)$ for $0 < y < 1$ and zero elsewhere.

(X, Y) का संयुक्त प्रायिकता घनत्व फलन

$$f_{X,Y}(x, y) = 2; \quad 0 < x < 1, \ 0 < y < x$$
$$= 0; \quad \text{अन्यत्र ।}$$

प्रतिबन्धित प्रायिकता घनत्व फलन

(1) $f_{X|Y}(x \mid y) = 1/(1-y)$, $0 < x < 1$ के लिए और शून्य अन्यत्र ।

(2) $f_{X|Y}(x \mid y) = 1/x$, $y < x < 1$ के लिए और शून्य अन्यत्र ।

(3) $f_{Y|X}(y \mid x) = 1/x$, $0 < y < x$ के लिए और शून्य अन्यत्र ।

(4) $f_{Y|X}(y \mid x) = 1/(1-y)$, $0 < y < 1$ के लिए और शून्य अन्यत्र ।

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17. The joint probability density function of (X, Y) is

$$f_{X,Y}(x,y) = (1+xy)/4; \quad |x|<1, \ |y|<1$$
$$= 0; \quad \text{elsewhere.}$$

Assertion (A): X^2 and Y^2 are not independent.

Reason (R): X and Y are not independent.

Select your answer from the following codes :

(1) Both (A) and (R) is true and (R) is correct explanation of (A).

(2) Both (A) and (R) is true but (R) is not correct explanation of (A).

(3) (A) is true but (R) is false.

(4) (A) is false but (R) is true

(X, Y) का संयुक्त प्रायिकता घनत्व फलन

$$f_{X,Y}(x,y) = (1+xy)/4; \quad |x|<1, \ |y|<1$$
$$= 0; \quad \text{अन्यत्र}$$

अभिकथन (A): X^2 और Y^2 स्वतंत्र नहीं हैं ।

कारण (R): X और Y स्वतंत्र नहीं हैं ।

निम्नलिखित कूटों में से अपने उत्तर चुनिए :

(1) (A) और (R) दोनों सत्य हैं और (A) का सही स्पष्टीकरण (R) है ।

(2) (A) और (R) दोनों सत्य हैं और (A) का सही स्पष्टीकरण (R) नहीं हैं ।

(3) (A) सत्य है परन्तु (R) असत्य है ।

(4) (A) असत्य है परन्तु (R) सत्य है ।

(Continued)

18. X is a non-negative random variable.

Assertion (A) : $E(X) \geq 1/E(1/X)$

Reason (R) : $1/X$ is convex function of X.

Select your answer from the following codes :

(1) Both (A) and (R) is true and (R) is correct explanation of (A).

(2) Both (A) and (R) is true but (R) is not correct explanation of (A).

(3) (A) is true but (R) is false.

(4) (A) is false but (R) is true

X ऋणेतर यादृच्छिक चर है

अभिकथन (A) : $E(X) \geq 1/E(1/X)$

कारण (R) : $1/X$, X का नतोदर फलन है ।

निम्नलिखित कूटों में से अपने उत्तर चुनिए :

(1) (A) और (R) दोनों सत्य हैं और (A) का सही स्पष्टीकरण (R) है ।

(2) (A) और (R) दोनों सत्य हैं और (A) का सही स्पष्टीकरण (R) नहीं है ।

(3) (A) सत्य है परन्तु (R) असत्य है ।

(4) (A) असत्य है परन्तु (R) सत्य है ।

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19. F is the cummulative distribution and f, which is symmetric about zero, the corresponding probability density function of a continuous random variab X. Which of the following statements are true for all choices of $a > 0$?

(i) $F(-a) + F(a) = 1$

(ii) $P(|X| > a) = 2F(-a)$

(iii) $P(|X| \leq a) = 2F(a) - 1$

Choose your answer from the following codes :

(1) Only (i) and (ii)

(2) Only (ii) and (iii)

(3) Only (i) and (iii)

(4) All the three

F संचयी बंटन फलन और f, जो की शून्य के परित: सममित है, किसी सतत यादृच्छिक चर X च तद्नुरूप प्रायिकता घनत्व फलन है । $a > 0$ के सभी चयनों के लिए निम्नलिखित कथनों में से कौ सही है ?

(i) $F(-a) + F(a) = 1$

(ii) $P(|X| > a) = 2F(-a)$

(iii) $P(|X| \leq a) = 2F(a) - 1$

निम्नलिखित कूटों में से अपने उत्तर चुनिए :

(1) केवल (i) और (ii)

(2) केवल (ii) और (iii)

(3) केवल (i) और (iii)

(4) सभी तीनों

(Continuec

20. If X and Y are two Poisson variates such that $X \sim P(1)$ and $Y \sim P(2)$, the probability, $P(X + Y < 3)$ is

   (1) $8.5\,e^{-3}$　　(2) $4\,e^{-3}$　　(3) e^{-3}　　(4) $3\,e^{-3}$

   यदि X और Y दो ऐसे प्वासाँ चर है, $X \sim P(1)$ एवं $Y \sim P(2)$, तो प्रायिकता $P(X + Y < 3)$ होगी

   (1) $8.5\,e^{-3}$　　(2) $4\,e^{-3}$　　(3) e^{-3}　　(4) $3\,e^{-3}$

21. In hypergeometric distribution $HG(N, K, n)$, if $N \to \infty$, $\dfrac{K}{N} \to p$, it reduces to the following distribution :

   (1) Gamma　　　　　　(2) Geometric

   (3) Binomial　　　　　(4) Normal

   हाइपर ज्यामितीय बंटन $HG(N, K, n)$ में, यदि $N \to \infty$, $\dfrac{K}{N} \to p$, तो यह निम्नलिखित बंटन में बदलता है

   (1) गामा　　　　　　(2) ज्यामितीय

   (3) द्विपद　　　　　　(4) प्रसामान्य

22. For normal distribution, the quartile deviation, the mean deviation and standard deviation are approximately

   प्रसामान्य बंटन के लिये चतुर्थक विचलन, माध्य विचलन और मानक विचलन लगभग होंगे

   (1) $1:2:3$　　(2) $\dfrac{1}{2}:3:5$　　(3) $10:12:15$　　(4) $1:1:1$

23. For exponential distribution with parameter $\theta > 0$, variance = mean if

   घातांकी बंटन $\theta > 0$ प्राचल के लिये प्रसरण = माध्य होगा यदि

   (1) $\theta > 1$　　(2) $\theta = 1$　　(3) $0 < \theta < 1$　　(4) $\theta = \dfrac{1}{2}$

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24. Mean deviation about the mean for normal distribution is approximately

प्रासामान्य बंटन के लिये माध्य से माध्य विचलन का लगभग मान होगा

(1) σ (2) $\frac{4}{5}\sigma$ (3) $\mu + \sigma$ (4) $\mu - \sigma$

25. The moment generating function of a random variable X is $(1+3e^t)^2/16$, then X is a

   (1) Bernoulli variable   (2) Binomial variable

   (3) Poisson variable   (4) Geometric variable

किसी यादृच्छिक चर X का आघूर्ण जनक फलन $(1+3e^t)^2/16$ है, तो X एक

   (1) बर्नोली चर है   (2) द्विपद चर है

   (3) प्वायसाँ चर है   (4) ज्यामितीय चर है

26. If X and Y are independent standard normal variable, the distribution of square of their ratio would be

   (1) Normal   (2) Chi square

   (3) t (4) F

यदि X और Y स्वतन्त्र मानक प्रासामान्य चर हैं तो उनके अनुपात के वर्ग का बंटन होगा

   (1) प्रासामान्य   (2) काई वर्ग

   (3) t (4) F

27. The probability generating function of geometric distribution *is*

ज्यामिति बंटन के लिए प्रायिकता जनक फलन है

(1) $\frac{p}{1-q^t}$ (2) $\frac{q}{1-p^t}$ (3) $\frac{pq}{1-q^t}$ (4) $\frac{pq}{1-p^t}$

28. If $\phi(t)$ is characteristic function, which of the following is incorrect ?

(1) $|\phi(t)| \le 1$

(2) $\phi(t)$ is continuous everywhere on real line

(3) $\phi(t)$ is real iff X is monotone increasing function of t

(4) $\phi(0) = 1$

यदि $\phi(t)$ अभिलक्षण फलन है, तो निम्नलिखित में से कौन असत्य है ?

(1) $|\phi(t)| \le 1$

(2) $\phi(t)$ वास्तविक रेखा पर सर्वत्र सतत है

(3) $\phi(t)$ वास्तविक है तब और केवल तभी जब X एकलय बढ़ता हुआ फलन है

(4) $\phi(0) = 1$

29. A symmetric die is thrown 600 times, then the lower bound for the probability of getting sixes between 80 and 120 is

एक सममित पाँसे को 600 बार उछाला गया है, तो 80 से 120 छक्के आने की प्रायिकता का निम्न परिबंध है

(1) 19/24   (2) 17/24   (3) 15/24   (4) 13/24

(Turn Over)

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30. Which of the following is/are true ?

        S : Poisson distribution is limiting case of binomial distribution

        P : Poisson distribution is limiting case of negative binomial distribution

Choose your answer from the following codes :

(1) Both S and P are true

(2) S is true but P is false

(3) S is false but P is true

(4) Both S and P are false

निम्नलिखित में से कौन सत्य है/हैं ?

        S : प्वायसाँ बंटन, द्विपद बंटन का सीमांत अवस्था है

        P : प्वायसाँ बंटन, ऋणात्मक बंटन का सीमांत अवस्था है

अपने उत्तर निम्नलिखित कूटों में से चुनिए

(1) S तथा P दोनों सत्य है

(2) S सत्य है परन्तु P असत्य है

(3) S असत्य है परन्तु P सत्य है

(4) S तथा P दोनों असत्य हैं

31. In tossing of an unbiased coin four times, define E_1 : Getting at least two heads and E_2 : Getting at least two tails. The events E_1 and E_2 are

(1) equally likely.

(2) independent.

(3) mutually exclusive.

(4) both equally likely and independent.

एक अनभिनत सिक्के के चार उछालों में, E_1 : कम से कम दो शीर्षों का पाना और E_2 : कम से कम दो पुच्छों का पाना परिभाषित कीजिए । घटनाएं E_1 और E_2

(1) समसम्भाव्य हैं ।

(2) स्वतंत्र हैं ।

(3) परस्पर अपवर्जी हैं ।

(4) समसम्भाव्य और परस्पर अपवर्जी दोनों हैं ।

         (Continued)

32. An unbiased coin is tossed until a head is obtained or the total number of tosses is 7. The total number of possible mutually exclusive outcomes would be

(1) 7   (2) 8

(3) Less than 7   (4) More than 8

एक अनभिनत सिक्का तब तक उछाला जाता है जब तक कि एक शीर्ष या कुल उछालों की संख्या 7 न हो जाय । कुल संभव परस्पर अपवर्जी परिणामों की संख्या होगी

(1) 7   (2) 8

(3) 7 से कम   (4) 8 से अधिक

33. In a university 60% students are male. 50% of the male students and 30% of the female students are smokers. If a student is seen smoking, the probability that it is a male student is

(1) Less than 0.5   (2) Between 0.5 and 0.6

(3) Between 0.6 and 0.7   (4) More than 0.7

किसी विश्वविद्यालय में 60% छात्र पुरुष हैं । पुरुषछात्रों के 50% और महिलाछात्राओं की 30% धुम्रपानकर्ता हैं । यदि कोई छात्र धुम्रपान करते हुए देखा गया है तो यह कोई पुरुषछात्र है, की प्रायिकता

(1) 0.5 से कम है   (2) 0.5 और 0.6 के मध्य है

(3) 0.6 और 0.7 के मध्य है   (4) 0.7 से अधिक है

34. An urn contains 'a' white and 'b' black balls. A ball is drawn at random and kept aside without noticing its colour. Then a ball is drawn at random from the remaining balls. The probability of this ball being white is

एक कलश 'a' सफेद और 'b' काली गेंदे रखता है । यादृच्छिक रूप एक गेंद निकली जाती और बिना इसका रंग देखे, किनारे रख दी जाती है । तब बची हुयी गेंदों में से एक गेंद यादृच्छिक रूप से निकली जाती है । इस गेंद के सफेद होने की प्रायिकता है

(1) $(a-1)/(a+b)$ (2) $a/(a+b)$

(3) $(a-1)/(a+b-1)$ (4) $a/(a+b-1)$

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35. Under usual notations,

$$(A \cap B \cap \bar{C}) \cup (C \cap B \cap \bar{A}) \cup (A \cap C \cap \bar{B})$$

denotes happening of

(1) At least two of A, B and C

(2) At most two of A, B and C

(3) Exactly two of A, B and C

(4) None of the above.

प्रचलित संकेताक्षरों के अंतर्गत,

$$(A \cap B \cap \bar{C}) \cup (C \cap B \cap \bar{A}) \cup (A \cap C \cap \bar{B})$$

(1) A, B और C में से कम से कम दो

(2) A, B और C में से अधिकतम दो

(3) A, B और C में से ठीक दो

(4) उपर्युक्त में से कोई नहीं

का होना निर्दिष्ट करता है ।

36. Which of the following defines probability ?

(1) $\Omega = (0, \infty)$, $A \subseteq \Omega$, $P(A) = 0$. If A is finite and $P(A) = 1$ if A in infinite.

(2) $\Omega = \{1, 2, 3, \ldots\}$, $A \subseteq \Omega$, $P(A) = \sum_{x \in A} p(x)$ where $p(x) = \left(\frac{1}{3}\right)^x$, $x = 1, 2, \ldots$

(3) $\Omega = \{1, 2, 3, \ldots, 21\}$. $A \subseteq \Omega$, $P(A) = 0$ if A has even number of element and $P(A) = 1$ if A has odd number of elements.

(4) $\Omega = \{2, 3, 4, 5, 6\}$, $A \subseteq \Omega$, $P(A) = \sum_{x \in A} p(x)$ where $p(x) = \frac{x}{20}$, $x = 2, 3, 4, 5, 6$.

(18)   (Continued)

निम्नलिखित में से कौन प्रायिकता परिभाषित करता है ?

(1) $\Omega = (0, \infty)$, $A \subseteq \Omega$, $P(A) = 0$ यदि A सीमित है और $P(A) = 1$ यदि A असीमित है ।

(2) $\Omega = \{1, 2, 3, \ldots\}$, $A \subseteq \Omega$, $P(A) = \sum_{x \in A} p(x)$ जहाँ $p(x) = \left(\frac{1}{3}\right)^x$, $x = 1, 2, \ldots$

(3) $\Omega = \{1, 2, 3, \ldots, 21\}$, $A \subseteq \Omega$, $P(A) = 0$ यदि A अवयवों की सम संख्या रखता है । और $P(A) = 1$ यदि A अवयवों की विषम संख्या रखता है ।

(4) $\Omega = \{2, 3, 4, 5, 6\}$, $A \subseteq \Omega$, $P(A) = \sum_{x \in A} p(x)$ जहाँ $p(x) = \frac{x}{20}$, $x = 2, 3, 4, 5, 6$.

37. If $f(x, y) = e^{-(x+y)}$, $x > 0$, $y > 0$, is joint probability density function of (X, Y) then $P(X < 2Y)$ is

यदि $f(x, y) = e^{-(x+y)}$, $x > 0$, $y > 0$, (X, Y) का संयुक्त प्रायिकता घनत्व फलन है, तो $P(X < 2Y)$ है

(1) 3/2   (2) 5/2   (3) 2/5   (4) 2/3

38. The standard error of sample mean is

प्रतिदर्श माध्य की मानक त्रुटि है

(1) σ^2 / n (2) $\sigma^2 / \sqrt{n}$ (3) σ / n (4) $\sigma / \sqrt{n}$

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39. Which one of the following is/are true for independent variables X and Y ?

S: $X \sim B(10,0.2)$, $Y \sim B(10,0.3)$ then $X + Y \sim B(10,0.5)$

P: $X \sim P(5)$, $Y \sim P(7)$, then $X + Y \sim P(12)$

Choose your answer from following codes :

(1) Both S and P are true

(2) S is true but P is false

(3) S is false but P is true

(4) Both S and P are false

स्वतंत्र चरों X एवं Y के लिए निम्नलिखित में से कौन सत्य है/हैं ?

S: $X \sim B(10,0.2)$, $Y \sim B(10,0.3)$ तो $X + Y \sim B(10, 0.5)$

P: $X \sim P(5)$, $Y \sim P(7)$, तो $X + Y \sim P(12)$

अपने उत्तर निम्नलिखित कूटों में से चुनिए

(1) S और P दोनों सत्य हैं

(2) S सत्य और P असत्य है

(3) S असत्य और P सत्य है

(4) S और P दोनों असत्य हैं

(Continue

40. If X and Y are independent exponential random variables with the same mean 'λ', then the distribution of $\min(X, Y)$ is

   (1) exponential with mean $\lambda/2$

   (2) exponential with mean 2λ

   (3) exponential with mean λ

   (4) Not exponential

यदि X और Y समान माध्य λ वाले स्वतन्त्र घातांकी यादृच्छ चर हैं तो न्यूनतम (X, Y) का बंटन है

   (1) माध्य $\lambda/2$ वाला घातांकी ।

   (2) माध्य 2λ वाला घातांकी ।

   (3) माध्य λ वाला घातांकी ।

   (4) घातांकी नहीं ।

41. A data set gave a 95% confidence interval (2.5, 3.6), for the mean 'μ' of a normal population with known variance. Let $\mu_0 < 2.5$ be a fixed number. If we use the same data to test $H_0 : \mu = \mu_0$ vs $H_1 : \mu \neq \mu_0$

   (1) H_0 would be necessarily rejected at $\alpha = 0.1$

   (2) H_0 would be necessarily rejected at $\alpha = 0.025$

   (3) For $\alpha = 0.1$, the information is not enough to draw a conclusion

   (4) For $\alpha = 0.025$, the information is not enough but conclusion may be drawn

ज्ञात प्रसरण वाले एक प्रसामान्य समष्टि के माध्य μ के लिये कोई आँकड़ा समुच्चय, 95% विश्वास्यता अंतराल, (2.5, 3.6) देता है । माना जाय कि $\mu_0 < 2.5$ कोई नियत संख्या है । यदि हम इन्हीं आँकड़ों को $H_0 : \mu = \mu_0$ vs $H_1 : \mu \neq \mu_0$ के परीक्षण के लिये उपयोग करते हैं, तो

   (1) $\alpha = 0.1$ पर H_0 आवश्यकत: अस्वीकृत होगा ।

   (2) $\alpha = 0.025$ पर H_0 आवश्यकत: अस्वीकृत होगा ।

   (3) $\alpha = 0.1$ के लिये, निष्कर्ष निकालने के लिये सूचना अपर्याप्त है ।

   (4) $\alpha = 0.025$ के लिये, सूचना अपर्याप्त है, फिर भी निष्कर्ष निकाला जा सकता है ।

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42. Let $X \sim N(\mu, \sigma^2)$. Let both μ and σ^2 be unknown

$$\textcircled{H} = \left\{ (\mu, \sigma^2) : -\infty < \mu < \infty, \ \sigma^2 > 0 \right\}.$$

Null hypothesis $H_0 : \mu \leq \mu_0, \ \sigma^2 > 0$ where μ_0 is a known constant and the alternative hypothesis $H_1 : \mu > \mu_0, \ \sigma^2 > 0$.

(1) both null and alternative hypothesis are simple

(2) both null and alternative hypothesis are composite

(3) null hypothesis is simple but alternative hypothesis is composite

(4) null hypothesis is composite but alternative hypothesis is simple

यदि $X \sim N(\mu, \sigma^2)$ से है। μ और σ^2 अज्ञात है एवं $\textcircled{H} = \left\{ (\mu, \sigma^2) : -\infty < \mu < \infty, \ \sigma^2 > 0 \right\}$ है। यदि शून्य परिकल्पना $H_0 : \mu \leq \mu_0, \ \sigma^2 > 0$ है, जहाँ μ_0 ज्ञात स्थिरांक है और विरुद्ध परिकल्पना $H_1 : \mu > \mu_0, \ \sigma^2 > 0$ है।

(1) शून्य और वैकल्पिक दोनों परिकल्पना साधारण हैं।

(2) शून्य और वैकल्पिक दोनों परिकल्पना मिश्रित हैं।

(3) शून्य परिकल्पना साधारण एवं वैकल्पिक परिकल्पना मिश्रित है।

(4) शून्य परिकल्पना मिश्रित एवं वैकल्पिक परिकल्पना साधारण है।

43. 'p' is the probability that a coin will turn up heads and 'X' be the no. of heads obtained in tossing the coin 100 time. For testing $H_0 : p = 0.5$ agianst $H_1 : p < 0.5$ at $\alpha = 0.05$ and with $X = 45$, the value of test statistics is

सिक्के पर शीर्ष आने की प्रायिकता 'p' है, और 100 बार सिक्के को उछालने पर शीर्षों की संख्या 'X' है। $\alpha = 0.05$ और $X = 45$ के साथ $H_0 : p = 0.5$ की $H_1 : p < 0.5$ के विरुद्ध परीक्षा के लिए परीक्षण सांख्यिकी का मान होगा

(1) −1.64   (2) −1.00   (3) −1.96   (4) −2.54

     (Continued)

44. With usual notations the condition for unbiased test is

(1) $\operatorname{Sup}_{\theta \in \Theta_0} P_T(\theta) \leq \operatorname{Inf}_{\theta \in \Theta_1} P_T(\theta)$ (2) $\operatorname{Sup}_{\theta \in \Theta_0} P_T(\theta) \geq \operatorname{Inf}_{\theta \in \Theta_1} P_T(\theta)$

(3) $\operatorname{Sup}_{\theta \in \Theta_0} P_T(\theta) = \operatorname{Inf}_{\theta \in \Theta_1} P_T(\theta)$ (4) None of these

प्रचलित संकेतों में निष्पक्ष परीक्षण के प्रतिबन्ध होता है

(1) $\operatorname{Sup}_{\theta \in \Theta_0} P_T(\theta) \leq \operatorname{Inf}_{\theta \in \Theta_1} P_T(\theta)$ (2) $\operatorname{Sup}_{\theta \in \Theta_0} P_T(\theta) \geq \operatorname{Inf}_{\theta \in \Theta_1} P_T(\theta)$

(3) $\operatorname{Sup}_{\theta \in \Theta_0} P_T(\theta) = \operatorname{Inf}_{\theta \in \Theta_1} P_T(\theta)$ (4) इनमें से कोई नहीं

45. A random sample of 10 students were selected from a class. Their marks in first semester and second semester is noted down. To test the hypothesis that there is no change in average performance of the students of that class against that it has improved, which of the following test is to be used

(1) χ^2-test   (2) two independent sample t-test

(3) paired t-test   (4) F-test

एक कक्षा से 10 छात्रों का यादृच्छिक प्रतिदर्श चुना गया है । उनके प्रथम सेमेस्टर एवं द्वितीय सेमेस्टर के अंकों को लिखा गया है । विद्यार्थियों के औसत प्रदर्शन में कोई अंतर नहीं है की इसमें सुधार हुआ है के विरुद्ध परिकल्पना परीक्षण के लिए, निम्नलिखित में से किस परीक्षण का प्रयोग किया जाता है ।

(1) χ^2 परीक्षण   (2) दो स्वतंत्र प्रतिदर्श t-परीक्षण

(3) युग्मित t-परीक्षण   (4) F-परीक्षण

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46. For testing $H_0 : \sigma^2 = \sigma_0^2$ against $H_1 : \sigma^2 \neq \sigma_0^2$, which of the following test will be used

(1) t-test

(2) One tail F-test

(3) Two tail F-test

(4) Chi-square test

$H_0 : \sigma^2 = \sigma_0^2$ के विरुद्ध $H_1 : \sigma^2 \neq \sigma_0^2$ के परीक्षण के लिए निम्नलिखित में से किस परीक्षण का प्रयोग किया जाएगा

(1) t-परीक्षण

(2) एक पुच्छ F-परीक्षण

(3) द्वि-पुच्छ F-परीक्षण

(4) काई-वर्ग परीक्षण

47. A sample of size n is drawn from normal distribution with unknown mean and unknown variance, which of the following hypothesis *is simple*

(1) $H_0 : \mu < 100, \sigma^2 = 25$

(2) $H_0 : \mu = 100$

(3) $H_0 : \sigma^2 = 25$

(4) None of the above

एक n आकार के प्रतिदर्श को अज्ञात माध्य एवं अज्ञात प्रसरण वाले प्रसामान्य बंटन में लिया गया है, इनमें से कौन सी परिकल्पना सरल है

(1) $H_0 : \mu < 100, \sigma^2 = 25$

(2) $H_0 : \mu = 100$

(3) $H_0 : \sigma^2 = 25$

(4) उपरोक्त में से कोई नहीं

48. The result : 'Unbiased estimators based on complete sufficient statistics are unique' is due to

(1) Cramer-Rao

(2) Rao-Blackwell

(3) Lehman-Scheffe

(4) Karlin-Rubin

परिणाम 'पूर्ण पर्याप्त सांख्यिकी पर आधारित अनभिनत आकलक अद्वितीय होते हैं' किसके द्वारा दिया गया हैं

(1) क्रैमर-राव

(2) राव-ब्लैकेल

(3) लेहमन-सेफ़

(4) कार्लिन-रुबिन

(Continued)

49. If T_n is a consistent estimator of 'θ', then e^{T_n} is a always

(1) Unbiased estimator of e^{θ}

(2) Consistent estimator of e^{θ}

(3) MVU estimator of e^{θ}.

(4) None of the above

यदि T_n, 'θ' का एक संगत आकलक है, तो e^{T_n} सदैव एक

(1) e^{θ} का अनभिनत आकलक होगा

(2) e^{θ} का संगत आकलक होगा

(3) e^{θ} का MVU आकलक होगा

(4) उपरोक्त में से कोई नहीं

50. Let X_1, X_2, X_3 be a random sample of size 3 from a population with mean value μ and variance σ^2. T_1, T_2 and T_3 are the estimators used to estimate mean value 'μ' where

$$T_1 = X_1 + X_2 - X_3, \quad T_2 = 2X_1 + 3X_3 - 4X_2 \quad \text{and} \quad T_3 = \frac{\lambda X_1 + X_2 + X_3}{3}$$

The best estimator in the sense of minimum variance is

(1) T_1

(2) T_2

(3) T_3

(4) None of the above

मान लीजिए कि माध्य मान μ और प्रसरण σ^2 वाले किसी समष्टि से 3 आकार का कोई यादृच्छिक प्रतिदर्श X_1, X_2, X_3 है । T_1, T_2 और T_3 आकलकों का उपयोग माध्य मान 'μ' के आकलन के लिये किया गया है, जहाँ

$$T_1 = X_1 + X_2 - X_3, \quad T_2 = 2X_1 + 3X_3 - 4X_2 \quad \text{और} \quad T_3 = \frac{\lambda X_1 + X_2 + X_3}{3}$$

न्यूनतम प्रसरण के अर्थ में सबसे अच्छा आकलक कौन सा है ?

(1) T_1

(2) T_2

(3) T_3

(4) उपरोक्त में कोई नहीं

51. If $X_1, X_2, ..., X_n$ are independent and identical variates from a density function

$f(x, \theta)$, then the Crammer-Rao bound for the variance of an estimator T_n of

$\tau(\theta)$ is given by the following inequality

यदि $X_1, X_2, ..., X_n$ घनत्व फलन $f(x, \theta)$ से स्वतन्त्र और समरूप चर हैं तो $\tau(\theta)$ के किसी

आकलक T_n के प्रसरण के लिए क्रैमर–राव सीमा निम्नलिखित असमिका द्वारा दिया जाता है

(1) $\quad V_\theta(T_n) \geq \dfrac{[\tau'(\theta)]^2}{nE\left[\dfrac{\partial}{\partial\theta}\log f(x,\theta)\right]^2}$

(2) $\quad V_\theta(T_n) \geq \dfrac{[\tau'(\theta)]^2}{nE\left[\dfrac{\partial^2}{\partial\theta^2}\log f(x,\theta)\right]}$

(3) $\quad V_\theta(T_n) \geq \dfrac{-[\tau'(\theta)]^2}{E\left[\dfrac{\partial^2 \log f(x,\theta)}{\partial\theta^2}\right]}$

(4) $\quad V_\theta(T_n) \geq \dfrac{-[\tau'(\theta)]^2}{E\left[\dfrac{\partial^2}{\partial\theta^2}\log f(x,\theta)\right]}$

52. A test T which is at least as powerful as any other test of the same size for all values of the parameter under alternative hypothesis is called

(1) Best test

(2) Most powerful test

(3) Uniformly most powerful test

(4) None of the above

एक परीक्षण T जो कि वैकल्पिक परिकल्पना के अन्तर्गत प्राचल के सभी मानों के लिए, कम से कम उतना शक्तिशाली हो जितना समान आकार का कोई अन्य परीक्षण, कहलाता है

(1) सर्वश्रेष्ठ परीक्षण

(2) सर्व शक्तिशाली परीक्षण

(3) समान रूप से सर्व शक्तिशाली परीक्षण

(4) उपरोक्त में से कोई नहीं

53. A test T for which maximum risk under H_0 and H_1 is not more than the maximum risk of any other test T^* under H_0 and H_1, is called

(1) An unbiased test

(2) Uniformly most powerful test

(3) An admissible test

(4) Minimax test

H_0 तथा H_1 के अन्तर्गत एक परीक्षण T जिसका अधिकतम जोखिम H_0 तथा H_1 के अन्तर्गत किसी अन्य परीक्षण T^* के अधिकतम जोखिम से अधिक नहीं है, कहलाता है

(1) एक निष्पक्ष परीक्षण

(2) समान रूप से सर्व शक्तिशाली परीक्षण

(3) एक ग्राह्य परीक्षण

(4) मिनिमैक्स परीक्षण

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54. The ratio of the maximized likelihood function under H_0 and under the entire parametric space, is called

   (1) Probability ratio

   (2) Sequential probability ratio

   (3) Likelihood ratio

   (4) Monotone likelihood ratio

H_0 के अन्तर्गत तथा सम्पूर्ण प्राचल व्योम के अधिकतमीकृत संभाव्यता फलन का अनुपात, कहलाता है

   (1) प्रायिकता अनुपात

   (2) क्रमिक प्रायिकता अनुपात

   (3) संभाव्यता अनुपात

   (4) एकलय सम्भाव्यता अनुपात

55. Sampling error occurs in

   (1) Sampling only

   (2) Complete enumeration only

   (3) Both in sampling and complete enumeration

   (4) Neither in sampling nor in complete enumeration

प्रतिचयन घटित होता है

   (1) केवल प्रतिचयन में

   (2) केवल संपूर्ण गणना में

   (3) प्रतिचयन तथा संपूर्ण गणना दोनों में

   (4) न तो प्रतिचयन में न ही संपूर्ण गणना में

(28)

56. If the sample values in a sample of size 5 taken from a population of size 20 with SRSWOR are 1, 2, 3, 4, 5 then the unbiased estimate of variance of sample mean will be

यदि SRSWOR विधि द्वारा 20 आकार के एक समष्टि से लिए गए 5 आकार के प्रतिदर्श में प्रतिदर्श मान 1, 2, 3, 4, 5 हो तो प्रतिदर्श माध्य के प्रसरण का अनभिनत आकलक होगा

(1) 0.07   (2) 0.05   (3) 0.375   (4) 1.5

57. From a population of size 25, a systematic sample of size 5 is drawn. If the first unit selected is 3 then the other units will be

25 आकार के समष्टि से 5 आकार का क्रमबद्ध प्रतिदर्श प्राप्त किया गया । यदि प्रथम चुनी हुई इकाई 3 हो तो बाकी इकाइयाँ होगी

(1) 8,13,18,23   (2) 8,12,15,20   (3) 10,12,14,22   (4) 10,15,17,22

58. If the values of S_i^2 for all the strata are same, then

(1) $V(\bar{y}_{st})_{Ney} = V(\bar{y}_{st})_{prop}$ (2) $V(\bar{y}_{st})_{Ney} > V(\bar{y}_{st})_{prop}$

(3) $V(\bar{y}_{st})_{Ney} < V(\bar{y}_{st})_{prop}$ (4) $V(\bar{y}_{st})_{Ney} = V(\bar{y})_{SRS}$

where $V(\bar{y}_{st})_{Ney}$, $V(\bar{y}_{st})_{prop}$ and $V(\bar{y})_{SRS}$ denote the variance of stratified sample mean $(\bar{y}_{st})$ under Neyman allocation, proportional allocation and variance of sample mean $(\bar{y})$ under simple random sampling.

यदि S_i^2 का मान सभी स्तरों के लिए बराबर हों तो

(1) $V(\bar{y}_{st})_{Ney} = V(\bar{y}_{st})_{prop}$ (2) $V(\bar{y}_{st})_{Ney} > V(\bar{y}_{st})_{prop}$

(3) $V(\bar{y}_{st})_{Ney} < V(\bar{y}_{st})_{prop}$ (4) $V(\bar{y}_{st})_{Ney} = V(\bar{y})_{SRS}$

जहाँ $V(\bar{y}_{st})_{Ney}$, $V(\bar{y}_{st})_{prop}$ और $V(\bar{y})_{SRS}$ क्रमशः स्तरित प्रतिदर्श माध्य के नेमन नियतन, अनुपाती नियतन के अन्तर्गत प्रसरण, और प्रतिदर्श माध्य $(\bar{y})$ के प्रसरण को निरूपित करता है ।

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59. In sample surveys, by choosing sample size properly, we can control the following to its minimum level

    (1) Only sampling error

    (2) Only non-sampling error

    (3) Total of sampling error and non-sampling error

    (4) Neither sampling error nor non-sampling error

प्रतिदर्श सर्वेक्षण में, प्रतिदर्श आकार के समुचित चयन द्वारा, हम निम्न को इसके न्यूनतम स्तर तक नियन्त्रित कर सकते हैं

    (1) केवल प्रतिचयन त्रुटि को

    (2) केवल अप्रतिचयन त्रुटि को

    (3) प्रतिचयन त्रुटि और अप्रतिचयन त्रुटि का योग

    (4) न तो प्रतिचयन त्रुटि न ही अप्रतिचयन त्रुटि

60. In a survey from a population consisting of $N = nk$ units, a sample of n units is selected with a random start between 1 to k and then selecting every k^{th} unit

    Assertion (A) : The variance of the unbiased estimate of the population mean cannot be estimated.

Reason (R) : No unbiased estimate of population mean exists.

Select your answer from the following codes :

    (1) Both (A) and (R) is true and (R) is correct explanation of (A)

    (2) Both (A) and (R) is true but (R) is not correct explanation of (A)

    (3) (A) is true but (R) is false

    (4) (A) is false but (R) is true

$N = nk$ इकाइयाँ रखने वाले किसी समष्टि से सर्वेक्षण में, n इकाइयों का एक प्रतिदर्श, 1 और k के मध्य किसी यादृच्छिक प्रारम्भ और फिर प्रत्येक k वें इकाई चुनते हुये, चयनित किया जाता है

कथन (A) : समष्टि माध्य के अनभिनत आकलक का प्रसरण आकलित नहीं किया जा सकता है ।

कारण (R) : समष्टि माध्य के अनभिनत आकलक का कोई अस्तित्व नहीं है ।

निम्नलिखित कूटों में से अपने उत्तर चुनिए :

(1) (A) और (R) दोनों सत्य हैं और (A) की सटीक व्याख्या (R) है

(2) (A) और (R) दोनों सत्य हैं परन्तु (A) की सटीक व्याख्या (R) नहीं है

(3) (A) सत्य है परन्तु (R) असत्य है

(4) (A) असत्य है परन्तु (R) सत्य है

61. If the coefficient of variation of the study variable Y and the auxiliary variable X in a population are 18 and 32 respectively, then for what range of the coefficient of correlation ρ between X and Y, the ratio method of estimation will be preferable over sample mean ?

(1) $\rho < 0.63$ (2) $0.33 < \rho < 0.80$

(3) $\rho > 0.63$ but less than 0.85   (4) $\rho > 0.88$

यदि किसी समष्टि में अध्ययनित चर Y और सहायक चर X का विचरण गुणांक क्रमशः 18 और 32 हैं तो X और Y के मध्य सहसम्बन्ध गुणांक ρ की किस सीमा के लिए आकलन की अनुपात विधि प्रतिदर्श माध्य पर स्पृहणीय होगी ?

(1) $\rho < 0.63$ (2) $0.33 < \rho < 0.80$

(3) $\rho > 0.63$ पर 0.85 से कम   (4) $\rho > 0.88$

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62. A population consists of 6 units (a, b, c, d, e and f) and a sample of size 2 selected by simple random sampling with replacement. The probability that units a and b are in the sample is

एक समष्टि 6 इकाइयों (a, b, c, d, e और f)रखता है और पुनर्स्थापनासहित सरल यादृच्छिक प्रतिचयन द्वारा 2 आकार का एक प्रतिदर्श चयनित किया जाता है । प्रतिदर्श में इकाइयां a और b के होने की प्रायिकता होगी

(1) 1/3   (2) 1/9   (3) 1/18   (4) 1/15

63. Two types of effects measured in a factorial experiment are

(1) Main and Interaction effects   (2) Simple and complex effects

(3) Both (1) and (2)   (4) Neither (1) nor (2)

एक बहुउपादानीय प्रयोग में मापित दो तरह के प्रभाव होते हैं

(1) मुख्य व अन्योन्यक्रिय प्रभावों से   (2) साधारण व जटिल प्रभावों से

(3) (1) व (2) दोनों   (4) (1) व (2) दोनों में कोई नहीं

64. When p be the level of the factor A and q be the level of the factor B in case of two-way ANOVA with one observation per cell, then what will be the degree of freedom of error sum of squares ?

प्रत्येक कोष्ठक में एक प्रेक्षण वाले द्विमार्गी ANOVA में, जब कारक A का स्तर p तथा B का स्तर q है तो त्रुटि वर्ग योग की स्वातन्त्र कोटि क्या होगी ?

(1) $(pq - 1)$ (2) $(p - 1)(q - 1)$

(3) $p(q - 1)$ (4) $q(p - 1)$

65. What is the critical difference (C.D.) for any two columns with h factors having k categories ?

k श्रेणी का h कारकों के साथ किसी दो पंक्ति का क्रान्तिक अन्तर (C.D.) क्या होगा ?

(1) $t_{(h-1)(k-1)}(\alpha/2)\sqrt{\dfrac{2MSE}{k}}$ (2) $t_{(h-1)(k-1)}(\alpha/2)\sqrt{\dfrac{2SSE}{k}}$

(3) $t_{(h-1)(k-1)}(\alpha/2)\sqrt{\dfrac{2MSE}{h}}$ (4) $t_{(h-1)(k-1)}(\alpha/2)\sqrt{\dfrac{2SSE}{h}}$

66. What will be the error degree of freedom in case of 8×8 Latin Square Design ?

8×8 लैटिन वर्ग अभिकल्पना में त्रुटि का स्वतन्त्र कोटि क्या होगा ?

(1) 41   (2) 42   (3) 64   (4) 43

67. What is the number of basic principles of Design of Experiment and which one is not used in C.R.D ?

(1) 2, Local Control   (2) 4, Randomisation

(3) 3, Replication   (4) 3, Local Control

प्रयोग की अभिकल्पना में बुनियादी सिद्धान्तों की संख्या क्या है और C.R.D में कौन सा नहीं प्रयोग होता है ?

(1) 2, स्थानीय नियन्त्रण   (2) 4, यादृच्छिकरण

(3) 3, पुनरावृत्ति   (4) 3, स्थानीय नियन्त्रण

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68. In a statistical model, errors are always taken to be

(1) Independent

(2) Distributed as $N(0, \sigma_e^2)$

(3) Both (1) and (2)

(4) Neither (1) nor (2)

एक सांख्यिकीय मॉडल त्रुटि को सदैव माना जाता है

(1) स्वतन्त्र

(2) $N(0, \sigma_e^2)$ की भाँति बंटित

(3) (1) व (2) दोनों

(4) (1) व (2) में कोई भी नहीं

69. q_x is the probability that a person of exact age x years will die before reaching age $x + 1$ years and m_x is the probability that a person belonging to the age-group x to $x + 1$ year will die while in that age-group, then m_x is approximated by

(1) $q_x/(2 - q_x)$

(2) $2q_x/(2 - q_x)$

(3) $q_x/(2 + q_x)$

(4) $2q_x/(2 + q_x)$

यदि सटीक आयु x वर्ष के किसी व्यक्ति के आयु $x + 1$ वर्ष पहुँचने से पूर्व मृत्यु हो जायगी, की प्रायिकता q_x है और आयु-वर्ग x से $x + 1$ वर्ष तक के किसी व्यक्ति की मृत्यु उसी आयु-वर्ग में हो जायगी, की प्रायिकता m_x है । तो m_x

(1) $q_x/(2 - q_x)$

(2) $2q_x/(2 - q_x)$

(3) $q_x/(2 + q_x)$

(4) $2q_x/(2 + q_x)$

द्वारा सन्निकट किया जाता है ।

70. For a stationary population

   (1) The overall birth rate must be less than death rate but these must remain constant.

   (2) The overall birth rate must be more than death rate but these must remain constant.

   (3) The overall birth and death rates must be equal but these must remain constant.

   (4) The overall birth and death rates must be equal but these may not remain constant.

स्थावर जनसंख्या के लिए

   (1) समस्तरूप से जन्मदर, मृत्युदर से कम होनी चाहिए परन्तु इनको स्थिर रहना चाहिए ।

   (2) समस्तरूप से जन्मदर, मृत्युदर से अधिक होनी चाहिए परन्तु इनको स्थिर रहना चाहिए ।

   (3) समस्तरूप से जन्मदर, मृत्युदर के बराबर होनी चाहिए परन्तु इनको स्थिर रहना चाहिए ।

   (4) समस्तरूप से जन्मदर, मृत्युदर के बराबर होनी चाहिए परन्तु ये स्थिर नहीं भी रह सकते हैं ।

71. Which of the following shows that how many children would be born to 1,000 women if none of them died before reaching to the end of reproductive period and if all were subjected to the observed specific fertility rates throughout this period ?

   (1) Crude birth rate   (2) General fertility rate

   (3) Total fertility rate   (4) None of the above

निम्न में से कौन दर्शाता है कि 1,000 औरतों को कितने बच्चे पैदा हुए होंगे, यदि इनमें से कोई पुनरुत्पादकता अवधि के अंत आने से पूर्व नहीं मरी और यदि सभी प्रेक्षित उर्वरतादरों के अधीन थी ?

   (1) अशोधित जन्मदर   (2) सामान्य उर्वरतादर

   (3) कुल उर्वरतादर   (4) उपर्युक्त में से कोई नहीं

72. Which of the following is not method of construction of abridged life table ?

    (1) Pearl and Reed method　　　(2) Reed and Merrill method

    (3) King's method　　　　　　　(4) Greville's method

निम्न में से कौन संगृहीत जीवन सारणी के निर्माण की विधि नहीं है ?

    (1) पर्ल और रीड विधि　　　　　　(2) रीड और मेरिल विधि

    (3) किंग की विधि　　　　　　　　(4) ग्रेबिल की विधि

73. Which of the following is not correct interpretation of L_x of life table ?

    (1) It is number of years lived, in aggregate, by the cohort between the age x and $x + 1$.

    (2) It is average size of the cohort between the age x and $x + 1$.

    (3) It is total number of years lived by the cohort after attaining age x.

    (4) It gives the age-distribution of the life table stationary population.

निम्न में से कौन जीवन सारणी के L_x की सही व्याख्या नहीं है ?

    (1) यह जनसंख्यावर्ग (कोहार्ट) द्वारा x और $x + 1$ आयु के बीच, पूर्ण योग में, जिये गए वर्षों की संख्या है ।

    (2) यह जनसंख्यावर्ग (कोहार्ट) के x और $x + 1$ आयु के बीच का औसत आकार है ।

    (3) यह जनसंख्यावर्ग (कोहार्ट) के x आयु प्राप्तोपरांत जिये गए कुल वर्षों की संख्या है ।

    (4) यह जीवन सारणी स्थावर जनसंख्या के आयु बंटन को देता है ।

　　　　　　　　　　　　　　　　(Continued)

74. In a continuous flow of manufactured products, by process control we mean that

    (1) All the goods produced are of exactly of same quality.

    (2) Variation in the quality is due to assignable causes only.

    (3) Variation in the quality is due to random causes only.

    (4) Variation in the quality is due to both assignable and random causes.

निर्मित उत्पादों के किसी सतत प्रवाह में प्रक्रिया नियंत्रण द्वारा हमारा तात्पर्य है कि

    (1) सभी उत्पादित वस्तुयें सटीक समान गुणवत्ता की हैं ।

    (2) गुणवत्ता में परिवर्तन केवल चिन्हित कारणों से हैं ।

    (3) गुणवत्ता में परिवर्तन केवल यादृच्छिक कारणों से हैं ।

    (4) गुणवत्ता में परिवर्तन चिन्हित और यादृच्छिक दोनों कारणों से है ।

75. Which of the following is/are true for product control ?

    S : The proportion of defective items being manufactured is not excessively large.

    P : The lots of the manufactured items do not contain excessively large proportion of defective items.

    Choose your answer from the following codes :

    (1) Both S and P are true.   (2) S is true but P is false.

    (3) S is false but P is true.   (4) Both S and P are false.

प्रक्रिया नियंत्रण के लिए निम्न में से कौन सत्य है/हैं ?

    S : उत्पादित की जाने वाली दोषपूर्ण वस्तुओं का अनुपात अतिशय बड़ा नहीं है ।

    P : उत्पादित की जाने वाली वस्तुओं के ढेर दोषपूर्ण वस्तुओं का अतिशय बड़ा अनुपात नहीं रखते हैं ।

अपने उत्तर निम्नलिखित कूटों में से चुनिए :

    (1) S और P दोनों सत्य हैं ।   (2) S सत्य है परन्तु P असत्य है ।

    (3) S असत्य है परन्तु P सत्य है ।   (4) S और P दोनों असत्य हैं ।

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76. Process control is carried out

    (1) before production   (2) during production

    (3) after production   (4) anytime

प्रक्रिया नियंत्रण

    (1) उत्पादन से पूर्व   (2) उत्पादन के समय

    (3) उत्पादन के पश्चात   (4) किसी भी समय

कार्यान्वित किया जाता है ।

77. The statistician who invented control charts for use in industrial quality control was

    (1) Deming   (2) Taguchi   (3) Pareto   (4) Shewhart

वह सांख्यिकीविद, जिसने औद्योगिक गुणवत्ता नियंत्रण में प्रयोग के लिए नियंत्रण-चार्टों की खोज की, था

    (1) डेमिंग   (2) तगुची   (3) पैरिटो   (4) शीवार्ट

78. In the theory of time series, shortage of certain consumer goods before annual budget is due to

    (1) Irregular variations   (2) Cyclical variations

    (3) Seasonal variations   (4) Secular trend

काल श्रेणी के सिद्धांत में सलाना बजट के समय कुछ उपभोक्ता वस्तुओं की कमी उदाहरण है

    (1) अनियमित परिवर्तन   (2) चक्रीय परिवर्तन

    (3) ऋतुनिष्ठ परिवर्तन   (4) दीर्घकालीन प्रवृत्ति

     (Continued)

79. Graph of time series is called

(1) Line graph   (2) Historigram

(3) Trend   (4) Histogram

काल श्रेणी के ग्राफ को कहा जाता है

(1) रेखीय ग्राफ   (2) कालक्रमिका आलेख

(3) प्रवृत्ति   (4) हिस्टोग्राम

80. A mixed model of a time series with components T, S, C and I is

काल श्रेणी के घटकों T, S, C और I का मिश्रित मॉडल है

(1) $I = Y \times C \times T/S$ (2) $Y = T + S \times C + I$

(3) $Y = T + S + C + I$ (4) $Y = T \times S \times C \times I$

81. Which of the following statements is correct ? Here notations have their usual meaning.

निम्नलिखित कथनों में से कौन सत्य है ? यहाँ संकेताक्षर अपने प्रचलित अर्थ रखते हैं।

(1) $\dfrac{P_{oi}^{La}}{P_{oi}^{Pa}} = 1 - \dfrac{r_{xy}\sigma_x\sigma_y}{V_{oi}}$

(2) $\dfrac{P_{oi}^{La}}{P_{oi}^{Pa}} = 1 + \dfrac{r_{xy}\sigma_x\sigma_y}{V_{oi}}$

(3) $P_{oi}^{La} \cdot P_{oi}^{Pa} = 1 + r_{xy}$

(4) $P_{oi}^{La} \cdot P_{oi}^{Fa} = P_{oi}^{La} \cdot P_{oi}^{Pa}$

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82. On a downward-sloping linear demand curve, total revenue would be maximum at the

(1) midpoint of the demand curve.

(2) lower end of the demand curve.

(3) upper end of the demand curve.

(4) It is impossible to tell without knowing prices and quantities demanded.

अधो ढालीय रैखिक माँग वक्र पर, सकल राजस्व अधिकतम होगा

(1) माँग वक्र के मध्यबिन्दु पर

(2) माँग वक्र के निम्न सिरे पर

(3) माँग वक्र के ऊपरि सिरे पर

(4) माँगी गयी मात्रा और मूल्यों को जाने बिना बताना सम्भव नहीं है ।

83. Engle's law states that

(1) As income grows, the proportion of income spent on food decreases.

(2) As income grows, the proportion of income spent on food increases.

(3) There is no effect of income growth on proportion of income spent on food.

(4) As income grows, the proportion of income spent on food first increases then decrease

ऐंजेल नियम बताता है की

(1) जैसे वेतन बढ़ता है, खाने पर होने वाला खर्च वेतन का अनुपात कम ।

(2) जैसे वेतन बढ़ता है, खाने पर होने वाला खर्च वेतन का अनुपात बढ़ता ।

(3) वेतन बढ़ोत्तरी का खाने पर होने वाले खर्च वेतन के अनुपात पर कोई प्रभाव नहीं होता है ।

(4) जैसे वेतन बढ़ता है, खाने पर होने वाले खर्च वेतन का अनुपात पहले बढ़ता है फिर घटता है ।

84. The price elasticity of demand of a commodity is $\dfrac{3p}{(p-1)(p+2)}$. If the quantity demanded is 8 units and price is ₹ 2, then demand function is

किसी वस्तु के माँग का मूल्य लोच $\dfrac{3p}{(p-1)(p+2)}$ है । यदि माँगी गयी मात्रा 8 इकाई है और मूल्य ₹ 2 हो, तो माँग फलन होगा

(1) $x = \dfrac{(p-1)}{2(p+2)}$

(2) $x = \dfrac{2(p+2)}{(p-1)}$

(3) $x = (p-1)(p+2)$

(4) $x = \dfrac{(p+2)}{(p-1)}$

85. Fisher's index number is ideal, because it satisfy

(1) Circular test

(2) Only Factor reversal test

(3) Only Time reversal test

(4) Factor reversal test and Time reversal test both

फिशर का सूचकांक आदर्श है क्यों की यह सन्तुष्ट करता है

(1) वृत्तीय परीक्षण

(2) केवल उत्पादन उत्क्रमण परीक्षण

(3) केवल समय उत्क्रमण परीक्षण

(4) दोनों उत्पादन और समय उत्क्रमण परीक्षण

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86. In a Linear programming problem, if dual has an unbounded solution, primal has

   (1) no feasible solution   (2) unbounded solution

   (3) feasible solution   (4) None of these

रैखिक प्रोग्रामन समस्या में, यदि द्विक के पास एक असीम समाधान है तो प्राथमिक के पास है

   (1) कोई संभव समाधान नहीं   (2) असीम समाधान

   (3) संभव समाधान   (4) इनमें से कोई नहीं

87. Which of the following methods is used to verify the optimality of the current solution of the transportation problem ?

   (1) Least cost method

   (2) Vogel's approximation method

   (3) Modified distribution method

   (4) All of the above

परिवहन की समस्या के वर्तमान समाधान की उत्तमता को सत्यापित करने के लिए निम्न में से कौन सी पद्धति का उपयोग किया जाता है ?

   (1) कम लागत वाली विधि

   (2) वागल की सन्निकरण विधि

   (3) संशोधित वितरण विधि

   (4) उपरोक्त सभी

88. The Hungarian method for solving an assignment problem can also be used to solve

    (1) a transportation problem

    (2) a travelling salesman problem

    (3) both (1) and (2)

    (4) only (2)

एक सम्नुदेशन समस्या को सुलझाने की हंगरियन विधि का उपयोग निम्न को सुलझाने में भी किया जा सकता है

    (1) एक परिवहन समस्या

    (2) एक यात्रा विक्रता समस्या

    (3) (1) तथा (2) दोनों

    (4) केवल (2)

89. Let Δ be the forward difference operator with interval of differencing to be one. The value of $\Delta^3\{(1+x)(1-3x)(1+5x)\}$ is

यदि Δ अग्रगामी अन्तर चालक है जिसके अन्तर का अन्तराल इकाई है तो $\Delta^3\{(1+x)(1-3x)(1+5x)\}$ का मान है

    (1) −6   (2) −15   (3) 15   (4) −90

90. If Δ is forward difference operator, then under the consideration of 'differences of zero', the value of $\Delta^3 0^3$ is

यदि Δ अग्रगामी अन्तर चालक है तो 'शून्य के अन्तरों' की मान्यता के अन्तर्गत $\Delta^3 0^3$ का मान है

    (1) 6   (2) 3   (3) 1   (4) 0

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91. For a given set of values $(x_i, f(x_i); i = 1, n)$ of arguments and entries, the inverse interpolation is used to obtain (in the given range of values), the value of

    (1) $f(x_0)$ corresponding to given x_0

    (2) x_0 corresponding to given $f(x_0)$

    (3) Inverse of $f(x_0)$

    (4) All of the above

दिये गये नियन्ताओं व प्रविष्टियों के मानो $(x_i, f(x_i); i = 1, n)$ द्वारा (दिये गये मानों की सीमा में), व्युत्क्रम अन्तर्वेशन का प्रयोग निम्नलिखित में से किसका मान प्राप्त करने के लिये किया जाता है

    (1) $f(x_0)$ का मान, यदि सम्बन्धित x_0 का मान दिया हो

    (2) x_0 का मान, यदि सम्बन्धित $f(x_0)$ का मान दिया हो

    (3) $f(x_0)$ के व्युत्क्रम का मान

    (4) उपरोक्त सभी

92. Given $f(0) = 1$ and $f(1) = 3$, then the value of integral $\int f(x)dx$, using Trapezoidal rule, comes out to be

दिया है $f(0) = 1$ तथा $f(1) = 3$ तब ट्रपिजोइडल नियम द्वारा समाकलन $\int f(x)dx$ का मान है

    (1) 1.5   (2) 1   (3) 2   (4) 4

93. The order and degree of the difference equation

$$f^3(x)f^4(x+1)-2f(x) f(x+2)+4f^2(x+3) = p(x)$$

is :

अन्तर समीकरण

$$f^3(x)f^4(x+1)-2f(x) f(x+2)+4f^2(x+3) = p(x)$$

का क्रम व घातांक होगा

(1) 3, 4   (2) 4, 3   (3) 3, 7   (4) 2, 5

94. If Δ is forward difference operator and ∇ is backward difference operator, then $(1+\Delta)(1-\nabla)$ is equivalent to

यदि Δ अग्रगामी अन्तर चालक है तथा ∇ पश्चगामी अन्तर चालक है तो $(1+\Delta)(1-\nabla)$ समतुल्य है

(1) $\Delta \nabla$ (2) $\Delta - \nabla$ (3) 0   (4) 1

95. When interval of differencing is 1, the first difference of a junction $f(x)$ is e^x. Then which of the following is $f(x)$

जब अन्तरण का अन्तराल 1 है तब एक फलन $f(x)$ का प्रथम अन्तर e^x है । निम्न में से कौन $f(x)$ है

(1) e^x (2) e^{x+1} (3) $\dfrac{e^x}{e-1}$ (4) $\dfrac{e^{x+1}}{e-1}$

96. Games which involve more than two players are called

(1) Conflicting games   (2) Negotiable games

(3) N-person games   (4) All of them

खेल जिसमें दो से अधिक खिलाड़ी शामिल है, कहा जाता है

(1) परस्पर विरोधी खेल   (2) परक्रामण खेल

(3) N-व्यक्ति खेल   (4) इनमें से सभी

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97. In moving ~~average~~ .... ~~.......~~ .... values of some

(1) Middle period   (2) Starting periods

(3) End period   (4) Starting and end periods

गतिमान माध्य विधि में हम प्रवृत्ति के कुछ मान नहीं निकाल पायेंगे

(1) बीच के अवधि के   (2) शुरु के अवधि के

(3) अंत के अवधि के   (4) शुरु और अंत के अवधि के

98. Secular trend is indicative of long-term variation towards

(1) Increase only   (2) Decrease only

(3) Constant   (4) Either increase or decrease

दीर्घकालीन प्रवृत्ति लंबे समय में बदलाव का संकेत है

(1) खाली बढ़ने का   (2) खाली घटने का

(3) एक समान   (4) घटने या बढ़ने का

99. In double sampling plan, if the number of defectives in the lot is in between the two cut off numbers then

(1) Accept the lot

(2) Reject the lot

(3) Take another sample

(4) Go for inspection of each item of the lot

द्विप्रतिचयन योजना में, यदि ढेर में दोषपूर्णों की संख्या दो विच्छेदन संख्याओं के मध्य हो तो

(1) ढेर को स्वीकृत करिए

(2) ढेर को अस्वीकृत करिए

(3) दूसरा प्रतिदर्श लीजिये

(4) ढेर के प्रत्येक वस्तु का निरीक्षण कीजिए

     (Continued)

100. Each contrast among *k* treatments has following degrees of freedom
k उपचारों के बीच प्रत्येक कन्ट्रास्ट निम्न स्वातंत्र कोटि रखता है

(1) $(k-1)$ (2) 1

(3) k (4) $(k-2)$

101. What *is* the name of following layout ?
नीचे दिये विस्तार की अभिकल्पना का नाम क्या है ?

A	B	C	D
A	C	B	D
B	A	C	C
A	A	B	C

(1) CRD   (2) RBD

(3) LSD   (4) Factorial (बहुउपादानी)

102. The amount of bias in regression estimator of $\bar{Y}$ may be very high due to

(1) High value of higher order moments

(2) High value of correlation coefficient

(3) High value of regression coefficient

(4) High value of coefficient of variation

$\bar{Y}$ के समाश्रयण आकलक में भिनत की मात्रा बहुत ज्यादा हो सकती है

(1) उच्च घातीय आघूर्णों के मानों के ज्यादा होने पर

(2) सहसम्बन्ध गुणांक का मान ज्यादा होने पर

(3) समाश्रयण गुणांक के मान ज्यादा होने पर

(4) विचरन गुणांक का मान ज्यादा होने पर

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103. An exhaustive list of all **members** of the population along with their *identification* particulars is called

    (1) Sampling design   (2) Sampling frame

    (3) Population design   (4) Population frame

समष्टि के सभी सदस्यों की सूची, उनके पहचान विशिष्टताओं के साथ, को कहते हैं

    (1) प्रतिदर्श अभिकल्प   (2) प्रतिदर्श ढाँचा

    (3) समष्टि अभिकल्प   (4) समष्टि ढाँचा

104. Critical region of size α which minimises β amongst all critical regions of size α, is called

    (1) Powerful critical region   (2) Minimum critical region

    (3) Best critical region   (4) Unbiased critical region

α आकार के सभी क्रान्तिक क्षेत्रों के बीच, α आकार का क्रान्तिक क्षेत्र जो β को न्यूनतम करता है, कहलाता है

    (1) शक्तिशाली क्रान्तिक क्षेत्र   (2) निम्नतम क्रान्तिक क्षेत्र

    (3) सर्वोत्तम क्रान्तिक क्षेत्र   (4) अनभिनत क्रान्तिक क्षेत्र

105. In reference to the properties of estimators, choose the correct statements :

    (i) Consistent estimators need not be unbiased.

    (ii) Unbiased estimators are necessarily consistent.

    (iii) Unbiased estimators are unique.

    (iv) Consistent estimators are never unique.

        (Continued)

Choose your answer from the following codes :

(1) (i) and (ii)   (2) (i) and (iii)

(3) (i) and (iv)   (4) (iii) and (iv)

आकलकों के गुणों के सन्दर्भ में सही कथन का चुनाव कीजिये :

(i)   संगत आकलक जरूरी नहीं है कि अनभिनत है ।

(ii) अनभिनत आकलक आवश्यकत: संगत होते हैं ।

(iii) अनभिनत आकलक अद्वितीय होते हैं ।

(iv) संगत आकलक कभी भी अद्वितीय नहीं होते हैं ।

अपने उत्तर निम्नलिखित कूटों में से चुनिए :

(1) (i) और (ii)   (2) (i) और (iii)

(3) (i) और (iv)   (4) (iii) और (iv)

106. If $X_1, X_2, \ldots X_n$ is a random sample from any distribution having finite k-th moment $E(X^k)$, the consistent estimator for $E(X^k)$ is

(1) $\sum_{i=1}^{n} X_i^k$ (2) $\frac{1}{n}\sum_{i=1}^{n} X_i^k$

(3) Both (1) and (2)   (4) None of (1) and (2)

यदि $X_1, X_2, \ldots X_n$, सीमित k वाँ $E(X^k)$ आघूर्ण रखने वाले किसी बंटन से एक यादृच्छिक प्रतिदर्श है, तो $E(X^k)$ का संगत आकलक होगा

(1) $\sum_{i=1}^{n} X_i^k$ (2) $\frac{1}{n}\sum_{i=1}^{n} X_i^k$

(3) (1) और (2) दोनों   (4) (1) और (2) में से कोई नहीं

107. If x_1 and x_2 are two independent Poisson variates with parameters λ_1 and λ_2 respectively, the variable $(x_1 + x_2)$ follows

यदि x_1 और x_2 स्वतंत्र प्वायसाँ चर है जिनका प्राचल λ_1 और λ_2 है तो चर $(x_1 + x_2)$ होगा

(1) $B(\lambda_1 + \lambda_2)$

(2) $P(\lambda_1 + \lambda_2)$

(3) $N(\mu, \sigma^2)$

(4) $E(n, \lambda)$

108. If $X \sim B\left(3, \frac{1}{2}\right)$ and $Y \sim B\left(5, \frac{1}{2}\right)$, the probability of $P(X + Y = 3)$ is

यदि $X \sim B\left(3, \frac{1}{2}\right)$ और $Y \sim B\left(5, \frac{1}{2}\right)$, तो प्रायिकता $P(X + Y = 3)$ होगी

(1) 7/16   (2) 7/32   (3) 11/16   (4) 0

109. If $X \sim B(n, p)$, the distribution of $Y = (n - x)$ is

यदि $X \sim B(n, p)$ है तो $Y = (n - x)$ का बंटन होगा

(1) $B(n, 1)$ (2) $B(n, x)$ (3) $B(n, p)$ (4) $B(n, q)$

110. If $X \sim N(\mu, \sigma^2)$, and $Z = \frac{X - \mu}{\sigma}$ then $P(|Z| > 3)$ is

यदि $X \sim N(\mu, \sigma^2)$ एवं $Z = \frac{X - \mu}{\sigma}$, तो $P(|Z| > 3)$ होगा

(1) 1   (2) 0.05   (3) 0   (4) 0.0027

(Continued)

111. For Poisson distribution

प्वायसों बंटन के लिए

(1) $\beta_1 = \beta_2$
(2) $\beta_2 - \beta_1 - 3 = 0$
(3) $\beta_1 - \beta_2 = 1$
(4) $\beta_2 - \beta_1 + 1 = 0$

112. Poisson distribution $P(\lambda)$ is always

(1) positively skewed

(2) negatively skewed

(3) symmetric

(4) negatively skewed only for $\lambda > 5$

प्वायसों बंटन $P(\lambda)$ सदैव

(1) धनात्मक विषम होता है

(2) ऋणात्मक विषम होता है

(3) सममित होता है

(4) केवल $\lambda > 5$ के लिए ऋणात्मक विषम होता है

113. X is any continuous random variable having cumulative distribution function $F(x)$ and $E(X)$ exists; then $E(X)$ can be given as

(1) $\int_{-\infty}^{\infty} [1 - F(x)] dx$
(2) $\int_{0}^{\infty} [1 - F(x)] dx$

(3) $\int_{-\infty}^{\infty} [1 - F(x) + F(-x)] dx$
(4) $\int_{0}^{\infty} [1 - F(x) + F(-x)] dx$

X, संचयी बंटन फलन $F(x)$, रखने वाला कोई सतत चर है और $E(X)$ का अस्तित्व हैं; तो $E(X)$

(1) $\int_{-\infty}^{\infty} [1 - F(x)] dx$
(2) $\int_{0}^{\infty} [1 - F(x)] dx$

(3) $\int_{-\infty}^{\infty} [1 - F(x) + F(-x)] dx$
(4) $\int_{0}^{\infty} [1 - F(x) + F(-x)] dx$

की तरह दिया जा सकता है ।

(Turn Over)

114. *X* is a continuous random variable having cummulative distribution function *F(x)* and probability density function *f(x)*. Which of the following statement/ statements is/are true ?

   S : *f(x)* cannot exceed *F(x)* for any *x*.

   P : *f(x)* cannot exceed one for any *x*.

Choose your answer from the following codes :

(1) Both *S* and *P* are true.

(2) Both *S* and *P* are false.

(3) *S* is true but *P* is false.

(4) *S* is false but *P* is true.

X , संचयी बंटन फलन *F(x)* और प्रायिकता घनत्व फलन *f(x)* रखने वाला एक सतत यादृच्छिक चर है । निम्नलिखित कथन/कथनों में से कौन सत्य है/हैं ?

   S : किसी भी *x* के लिए *f(x)*, *F(x)* से अधिक नहीं हो सकता है ।

   P : किसी भी *x* के लिए *f(x)* एक से अधिक नहीं हो सकता है ।

निम्नलिखित कूटों में से अपना उत्तर चुनिए :

(1) *S* और *P* दोनों सत्य हैं ।

(2) *S* और *P* दोनों असत्य हैं ।

(3) *S* सत्य है परन्तु *P* असत्य है ।

(4) *S* असत्य है परन्तु *P* सत्य है ।

115. For three attributes A, B and C, the number of second order class frequencies is

किन्हीं तीन गुणधर्मों A, B और C के लिए, द्वितीय क्रम की वर्ग बारम्बारताओं की संख्या होगी

(1) 6   (2) 9   (3) 12   (4) 15

116. For three attributes A, B and C, the class frequency $(\alpha\beta\gamma)$ in terms of other class frequencies can be expressed as :

किन्हीं तीन गुणधर्मों A, B और C के लिए वर्ग बारम्बारता $(\alpha\beta\gamma)$ अन्य वर्ग बारम्बारता के पदों में व्यक्त होगा

(1) $(AB) + (AC) - (B) - (ABC)$

(2) $(ABC) - (B) + (AB) - (BC)$

(3) $(ABC) - (A) - (C) + (B)$

(4) $(B) - (AB) - (BC) + (ABC)$

117. If in case of two attributes A and B, the class frequency $(AB) = 0$, the value of Q is

(1) 1   (2) -1

(3) 0   (4) Any value between 0 and -1

यदि दो गुणधर्मों A और B की स्थिति में, वर्ग बारम्बारता $(AB) = 0$, तब मूल गुणांक, Q , का मान होगा

(1) 1   (2) -1

(3) 0   (4) 0 और -1 के बीच का कोई मान

18P/221/23 (1)

118. The relation between Yule's Q and coefficient of colligation Y is

यूल के Q , और अनुबंधन के गुणांक Y के बीच सम्बन्ध होगा

    (1) $Q = Y/(1 + Y^2)$ (2) $Q = 2Y/(1 + Y^2)$

    (3) $Q = Y/(1 + 2Y^2)$ (4) $Q = 2Y/(1 + 2Y)$

119. Given the cell frequencies for two attributes as,

        $(AB) = 90$, $(\alpha B) = 60$, $(A\beta) = 180$ and $(\alpha\beta) = 30$,

the coefficient of colligation is

दो गुणधर्मों के लिए वर्ग बारम्बारताएं निम्न है

        $(AB) = 90$, $(\alpha B) = 60$, $(A\beta) = 180$ और $(\alpha\beta) = 30$

तब अनुबंधन का गुणांक है

    (1) −1   (2) 2/3   (3) −1/3   (4) 0

120. Given that $(AB) = 150$, $(A\beta) = 250$, $(\alpha B) = 260$, $(\alpha\beta) = 2340$; find the value of N.

यदि दिया हो, $(AB) = 150$, $(A\beta) = 250$, $(\alpha B) = 260$, $(\alpha\beta) = 2340$ तब N का मान होगा

    (1) 2000   (2) 2500   (3) 3000   (4) 3500

—————————

B-2,000

MSc in Statistics and Computation
code No. (501)

Set No. 1

Question Booklet No.

00025

17P/297/17(i)

Roll No.

Serial No. of OMR Answer Sheet 2017   206.

Day and Date ....

(Signature of Invigilator)

SEAL

INSTRUCTIONS TO CANDIDATES

(Use only *blue/black ball-point pen* in the space above and on both sides of the Answer Sheet).

1. Within 30 minutes of the issue of the Question Booklet, check the Question Booklet to ensure that it contains all the pages in correct sequence and that no page/question is missing. In case of faulty Question Booklet bring it to the notice of the Superintendent/Invigilators immediately to obtain a fresh Question Booklet.

2. Do not bring any loose paper, written or blank, inside the Examination Hall *except the Admit Card without its envelope*.

3. *A separate Answer Sheet is given. It should not be folded or mutilated. A second Answer Sheet shall not be provided. Only the Answer Sheet will be evaluated.*

4. Write your Roll Number and Serial Number of the Answer Sheet by pen in the space provided above.

5. *On the front page of the Answer Sheet, write by pen your Roll Number in the space provided at the top and by darkening the circles at the bottom. Also, wherever applicable, write the Question Booklet Number and the Set Number in appropriate places.*

6. *No overwriting is allowed in the entries of Roll No., Question Booklet no. and Set no. (if any) on OMR sheet and Roll No. and OMR sheet no. on the Question Booklet.*

7. *Any change in the aforesaid entries is to be verified by the invigilator, otherwise it will be taken as unfairmeans.*

8. *Each question in this Booklet is followed by four alternative answers. For each question, you are to record the correct option on the Answer Sheet by darkening the appropriate circle in the corresponding row of the Answer Sheet, by pen as mentioned in the guidelines given on the first page of the Answer Sheet.*

9. For each question, darken only one circle on the Answer Sheet. If you darken more than one circle or darken a circle partially, the answer will be treated as incorrect.

10. Note *that the answer once filled in ink cannot be changed. If you do not wish to attempt a question, leave all the circles in the corresponding row blank (such question will be awarded zero marks).*

11. For rough work, use the inner back page of the title cover and the blank page at the end of this Booklet.

12. Deposit only OMR *Answer Sheet* at the end of the Test.

13. You are not permitted to leave the Examination Hall until the end of the Test.

14. If a candidate attempts to use any unfair means, he/she shall be liable to such punishment as the University may determine and impose on him/her.

Total No. of Printed Pages : 48

[उपर्युक्त निर्देश हिन्दी में अन्तिम आवरण पृष्ठ पर दिये गए हैं।]

183.

Msc. in Statistics and Computation
code No (501)
2017

17P/297/17(i)

No. of Questions : 120

Time : 2 Hours   Full Marks : 360

Note : (1) Attempt as many questions as you can. Each question carries 3 (Three) marks. *One mark will be deducted for each incorrect answer. Zero* mark will be awarded for each unattempted question.

(2) If more than one alternative answers seem to be approximate to the correct answer, choose the closest one.

01. Two suppliers offer a machine part with the required 1" diameter. Supplier A's product has a mean 1.2" and standard deviation of 0.24", whereas supplier B's product has mean 0.9" and standard deviation of 0.18".

Assertion (A) : The quality of the products of supplier A and supplier B are same.

Reason (R) : The value of coefficient of variation for the product of both is 20%. Choose your answer from the following codes :

(1) Both A and R is true and R is correct explanation of A.

(2) Both A and R is true but R is not correct explanation of A.

(3) A is true but R is false

(4) A is false but R is true

3   P.T.O.

02. Let us define a new statistic as the distance between 70th sample percentile and 30th sample percentile. This new statistic would give us information concerning :
   (1) central tendency.   (2) Dispersion
   (3) Skewness   (4) Kurtosis

03. A frequency distribution is bell shaped. Keeping the total number of observations same, if the equal frequency at both the tails are increased, then the standard deviation shall :
   (1) Decrease
   (2) Increase
   (3) Remain constant
   (4) Nothing definite can be said unless exact data is given

04. A reading test with 50 possible point yields a bell-shaped distribution with scores ranging from 5 to 48 on a large sample of third graders. If the same test were administred to fifth graders, what would we expect the form of the frequency distribution to be ?
   (1) Negatively skewed
   (2) Symmetric and bell-shaped
   (3) Symmetric, but not bell- shaped
   (4) Positively skewed

05. A percentile score of 40 indicates that a person :
   (1) answered 40% of the questions correctly on the test
   (2) knows 40% of the material covered by the examination
   (3) has earned a score equal to or better than 40 persons in his class
   (4) has earned a score equal to or better than 40% of the persons in his class

4

06. Consider the following distribution :

class interval	f	Cum f	Cum %
75-83	5	200	100.0
66-74	12	195	97.5
57-65	15	183	91.5
48-56	38	168	84.0
39-47	60	130	65.0
30-38	40	90	35.0
21-29	13	30	15.0
12-20	10	17	8.5
3-11	7	7	3.5

The frequency of 38 in the interval 48-56 means :

(1) 38 frequencies are at the upper real limit of the interval.

(2) 38 frequencies are at the lower real limit of the interval.

(3) 38 frequencies are spread out throughout the interval.

(4) 38 frequencies are at the upper apparent limit of the interval.

07. Frequency distributions are useful for All BUT which of the following objectives ?

(1) Investigation of characteristics of each observation.

(2) Summarization of data.

(3) Condensation of large sets into smaller sets.

(4) Illustration of the amount of variability in data.

$\frac{5}{4}$,

P.T.O.

08. A graphical presentation may accomplish ALL BUT which of the following objectives ?
   (1) Illustrate the amount of variation in the data
   (2) Illustrate approximately where the mean is
   (3) Allow comparison with similar data
   (4) Will have the exact same shape regardless of what units are used on the axes.

09. Mr. X *wants to* purchase a car but he is confused to choose the one. The probabilities that he will go for the category B or category C cars are respectively 0.54 and 0.46. If he selects category B cars, he will buy either Palio or Indica with respective probabilities 0.48 and 0.52. On the other hand if he goes for category C, the probalities of buying Accent is 0.59 and that of Ikon is 0.41. In the light of the above information, which car do you *think* Mr. X is most likely to purchase ?
   (1) Palio   (2) . Indica
   (3) Accent   (4) Ikon

10. An unbiased coin is tossed until a head is obtained or the total number of tosses is 7. It is desired to calculate probability of the event E that coin is tossed at lest three times. In this context read the following carefully :

   (i)   The total number of mutaually exclusive and equally likely outcomes is 8.

   (ii) The number of favourable outcomes to event E is 3.

   (iii) Probability of E is 3/8

   Choose the correct answer from the following :

   (1) (i) is true but (ii) and (iii) are false

   (2) (i) is false but (ii) and (iii) are true

   (3) All are true

   (4) All are false

6

11. In tossing of a four times, the events E_1 and E_2 are mutually exclusive if :

   (1) E_1 : Getting at least two heads and E_2 : Getting at most two tails.

   (2) E_1 : Getting at least two heads and E_2 : Getting at least two tails.

   (3) E_1 : Getting at least three heads and E_2 : Getting at most three tails.

   (4) E_1 : Getting at least three heads and E_2 : Getting at least three tails.

12. In a multiple choice test having m choices in each question, an examinee either knows the answer with probability p or guesses with probability (1-p). The probability of answering the question correctly is 1, if he knows the answer and 1/m, if he guesses. If an examinee answers a question correctly, the probability that he really knew the answer is :

   (1) $mp/(1+mp)$
   (2) $(m-1)p/(1+mp)$
   (3) $mp/(1+(m-1)P)$
   (4) $(m-1)p/(1+(m-1)p)$

13. Which of the following is always true ?

   (1) If a random variable X has no moments, its moment generating function will never exist.

   (2) If a random variable X has all or some of the moments, even then its moments generating function may not exist except only at one point

   (3) If a random variable X has all or some of the moments and moment generating function exists, it will always generate those moments which exists

   (4) If a random variable X has all the moment, its moment generating function $M_x(t)$ exist always exists for all real t such that $|t| \leq t_o$ (some real positive number)

7

P.T.O.

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14. Which of the following CANNOT be probability generating function ?
   (1) $s^{-3} (2-s)^{-1}$
   (2) $(1-s^{10})/10(1-s)$
   (3) $s/(2+s)$
   (4) $4^{-n}(1+3s)^n$

15. The joint probability mass function of random variables X and Y

   $$f(x,y) = \frac{\lambda^x e^{-x} p^y (1-p)^{x-y}}{y!(x-y)!}; y = 0, 1, \ldots\ldots x, y = 0, 1\ldots\ldots$$

   The marginal distribution of :
   (1) X and Y both are Poisson
   (2) X and Y both are binomial
   (3) X is binomial and that of Y is Poisson
   (4) X is Poisson and that of Y is binomial

16. The joint probability density function of (X,Y) is $f(x,y) = \exp\{-(x+y)\}$, for $0 < x < \infty$ and $0 < y < \infty$.
   Statement S : X and Y are independently distributed.
   Statement P : $P(x < Y | X < 2Y) = P(X < Y)$.
   Choose your answer from the following codes :
   (1) Both S and P are true
   (2) S is true but P is false
   (3) S is false but P is true
   (4) Both S and P are false

17. If random variable X has Beta type I distribution $\beta_1(a,b)$ then the distribution of random variable $Y = 1 - X$ will be :
   (1) $\beta_1(1, b)$
   (2) $\beta_1(b, a)$
   (3) $\beta_2(a, b)$
   (4) $\beta_2(b, a)$

8

18. Read the following statements carefully in context of the function given below :

$\varphi(t) = 1 - |t|$, if $|t| \leq 1$

$= 0$, if $|t| > 1$

Assertion (A) : $\varphi(t)$ cannot be characteristics function of any random variable.

Reason (R) : $\varphi(t)$ is not continuous function of t.

Select your answer from the following **codes** ;

   (1)   Both A and R is true and R is correct explanation of A.

   (2)   Both A and R is true but R is not correct explanation of A.

   (3)   Both A and R is false

   (4)   A is true but R is false

19. Mean is always less than variance for :

   (1)   Negative Binomial distribution only

   (2)   Geometirc disribution only

   (3)   Negative Binomial distribution and Geometric distribution both

   (4)   Neither Negative Binomial distribution nor Geometric distribution

20. The t-distribution with one degree of freedom is :

   (1)   Cauchy's distribution

   (2)   Beta distribution of first kind

   (3)   Beta distribution of second kind

   (4)   Normal distribution

21. The joint distribution of X and Y is $f_{xy}(x,y) = [n!/\{x!\,y!\,(n-x-y)!\}]$ $p^x q^y (1-p-q)^{n-x-y}$ for x, y = 0, 1,2,...... n ; x + y $\leq$ n ; 0 $\leq$ p, q $\leq$ 1 and p + q < 1. Read the following statements carefully :

Assertion (A) : X and Y are binomially distributed with parameter (n,p) and (n,q) respectively

Reason (R) : X and Y are dependent having non-linerar regressions.

Select your answer from the following codes ;

(1) Both A and R is true and R is correct explanation of A.

(2) Both A and R is true but R is not correct explanation of A.

(3) Both A and R is false

(4) A is true but R is false

22. The probability density function of X is :

$$f(x) = \frac{1}{\pi(1+x^2)}; \ -\infty < x < \infty$$

Then, the distribution of X^2 would be

(1) N (0, 1) distribution   (2) t - distribution

(3) x^2 distribution   (4) F - distribution

23. For normal distribution with mean 10 and standard deviation 15, the ratio of mean deviation, standard deviation and quartile deviation would be :

(1) 10 : 12 : 15   (2) 10 : 15 : 12

(3) 12 : 15 : 10   (4) 12 : 10 : 15

24. X and Y has the joint probability density function f(x,y). The marginal distribution g(x) of X and h(y) of Y are normal. The covariance between X and Y is zero. Then,

    (1)   f(x,y) must be bivariate normal and should be equal to g(x) h (y)

    (2)   f(x,y) must be bivariate normal but may not be equal to g(x)h(y)

    (3)   f(x,y) may not be bivariate normal but should be equal to g(x) h (y)

    (4)   f(x,y) may not be bivariate normal and may not be equal to g(x) h (y)

25. X and Y are independent random variables such that X is normally distributed with mean zero and variance σ^2 and Y takes values + 1 or - 1 with equal probability. The distribution of $S = XY + X/Y$ is :

    (1)   Normal with mean zero and variance σ^2

    (2)   Normal with mean zero and variance $2\sigma^2$

    (3)   Normal with mean zero and variance $4\sigma^2$

    (4)   Not normal distribution but mixture of normal distributions

26. X is a binomial variable with parameter (n,p) and F is F-statistic with (2k, 2(n-k+1)) degrees of freedom. Then :

    (1) $P(x \le k-1) = P(F > (n - k + 1) p/k (1 - p))$

    (2) $P(x \le k-1) = P(F \le (n - k + 1) p/k (1 - p))$

    (3) $P(x \le p-1) = P(F > (n - p + 1) k/p (1 - k))$

    (4) $P(x \le p -1) = P(F \le (n - p + 1) k/p (1 - k))$

P.T.O.

27. Which of the following is true relation between Pearson's β_1 and β_2 coefficients ?

(1) $\beta_2 \geq \beta_1 - 1$ 　　　　　(2) $\beta_2 \geq \beta_1 + 1$

(3) $\beta_1 \geq \beta_2 - 1$ 　　　　　(4) $\beta_1 \geq \beta_2 + 1$

28. A cyclist pedals from his house to his college (which is 7 kms. Away from his house) at a speed of 10 kilometers per hour and returns back from the college to his house at 15 kilometers per hour. His average speed is :

(1) 12.5 　　　(2) 12 　　　(3) 13 　　　(4) 11

29. In a frequency table, the upper boundary of each class is k times of the lower boundary. X_i and f_i are the midpoint and corresponding frequency of the ith (i = 1, 2, ... m) class. N is the sum of all the frequencies. Then which of the following statements is/are true ?

Statement S: $x_i = x_1 k^i$

Statement P : Geometric mean of the data is $\exp(\log x_1 + \frac{\log k}{N} \sum_{i=1}^{M} i f_i)$

Choose your answer from the following codes :

(1) Both S and P are true 　　　(2) S is true but P is false

(3) S is false but P is true 　　　(4) Both S and P are false

12

30. We have a data set consisting of 40 observations where an observation can be either 5 or 10. Which of the following statements are true ?

S1 : The mean and median for the data will be same iff the variance for the data is zero.

S2 : The mean and median for the data will always differ if the range for the data is 5.

Select the correct answer from the following codes :

(1) Both S_1 and S_2 are true   (2) S_1 is true but S_2 false

(3) S_1 is false but S_2 is true   (4) Both S_1 and S_2 are false

31. Under usual notations, it is given that $r_{12} = r_{13} = r_{23} = \rho$, then

(1) $R_{1.23} = \rho$ and $r_{12.3} = \rho$.

(2) $R_{1.23} = \rho \sqrt{2}/\sqrt{(1+\rho)}$ and $r_{12.3} = \rho \sqrt{2}/\sqrt{(1+\rho)}$

(3) $R_{1.23} = \rho \sqrt{2}/\sqrt{(1+\rho)}$ and $r_{12.3} = \rho/(1+\rho)$

(4) $R_{1.23} = \rho/(1+\rho)$ and $r_{12.3} = \rho \sqrt{2}/\sqrt{(1+\rho)}$

32. **Assertion(A)** : The range of multiple correlation coefficient is $[-1, +1]$.

Reason (R) : Multiple correlation coefficient is simple correlation coefficient (having range $[-1, +1]$) between observed values of a variable and its estimated values calculated from a linear relation of the variable with rest of the variables determined by least square method.

Select your answer from the following codes :

(1) Both A and R is true and R is correct explanation of A.

(2) Both A and R is true but R is not correct explanation of A.

(3) A is false but R is true

(4) A is true but R is false

13

P.T.O.

17P/297/17(1)

33. X is normally distributed with mean zero and variance σ^2 and Y independently follows exponential distributon with mean $2\sigma^2$. We wish to test $H_0 : \sigma^2 \leq 1$ against $H_1 : \sigma^2 > 1$ at α percent level of significance. The uniformly most powerful (UMP) test :

(1) does not exist

(2) is a chis-quare test.

(3) is a t-test

(4) is a F-test

34. Let L denote the likelihood function and T be an unbiased estimator of $g(\theta)$. Then for $K(\theta) > 0$ T attains the minimum variance bound if :

(1) $L = K(\theta)(T - g(\theta))$

(2) $\log L = K'(\theta)(T - g(\theta))$

(3) $\dfrac{d}{d\theta}\log L = K(\theta)(T - g(\theta))$

(4) $\dfrac{d^2}{d\theta^2}\log L = K(\theta)(T - g(\theta))$

35. If $x_{(1)} < x_{(2)} < .. < x_{(n)}$ be ordered observations from the following density function :

$$f(x, \theta) = \frac{1}{2}\theta - 1 < x < \theta + 1$$

The maximum likelihood estimate of θ

(1) is $x_{(1)}$ only

(2) is $x_{(n)}$ only

(3) All values greater than $x_{(1)} + 1$ but less than $x_{(n)} - 1$

(4) All values greater than $x_{(n)} - 1$ but less than $x_{(1)} + 1$

14

36. Let $x_1, x_2 \ldots\ldots x_n$ be iid B $(1, \theta)$ random variables, $0 < \theta < 1$. Then, the estimator of θ : $T(x) = \dfrac{n\bar{x} + \dfrac{\sqrt{n}}{2}}{n + \sqrt{n}}$ is :

(1) Both unbiased and consistent

(2) Unbiased but NOT consistent

(3) Consistent but NOT unbiased

(4) Neither unbiased nor consistent

37. In sample from the population with pdf :

$$f(x, \theta) = \frac{1}{\pi[1 + (x - \theta)^2]} - \infty < x, \theta < \infty$$

The Cramer Rao lower bound for an unbiased estimator of θ is:

(1) $\dfrac{n}{2}$　　(2) $\dfrac{2}{n}$　　(3) $\dfrac{n^2}{2}$　　(4) $\dfrac{n}{4}$

38. When we are sampling from a normal population with unknown mean μ and unknown variance σ^2, which of the following is a simple hypothesis ?

(1) $H_0 : \mu = 10$

(2) $H_0 : \mu = 20, \sigma^2 = 4$

(3) $H_0 : \sigma^2 = 4$

(4) All the three mentioned above

39. Let $x_1, x_2, \ldots x_n$ be a random sample from a uniform distribution on the interval $(0, \theta)$. then consider the following :

(1) $x_{(n)}$ is the complete sufficient statistics for θ

(2) $x_{(n)}$ is an unbiased estimator for θ

(3) $\left(\dfrac{n+1}{n}\right) x_{(n)}$ is the asymptotically unbiased for θ

(4) $\left(\dfrac{n+1}{n}\right) x_{(n)}$ is the UMVUE for θ

40. Let $X_1, X_2, \ldots X_n$ be a random sample from normal distribution with mean θ and variance θ, If $T_1 = \sum\limits_{i=1}^{n} x_i$ and $T_2 = \sum\limits_{i=1}^{n} x_i^2$, then

(1) T_1 and T_2 are jointly sufficient for θ

(2) only T_1 is sufficient for θ

(3) only T_2 is sufficient for θ

(4) neither T_1 nor T_2 is sufficient for θ

41. A study compared five different methods for teaching descriptive statistics. The five methods were traditional lecture and discussion, programmed textbook instruction, programmmed text with lectures computer instruction, and compurter instruction with lectures. 45 students were randomly assigned, 9 to each method. After completing the course, students took a 1-hour exam. Which of the following is the correct degree f freedom for an F-test for evaluating if the avgerage test scores are different for the different teaching methods ?

(1) (5, 45)   (2) (5, 44)

(3) (4, 44)   (4) (4, 40)

16.

42. In a survey of population consisting of N = nk units, a sample of n units is selected with a random start between 1 to k and then selecting every kth unit.

Assertion (A) : The variance of the unbiased estimate of the population mean cannot be estimated.

Reason (R) : No unbiased estimate of population mean exists.

Select your answer from the following codes :

(1) Both A and R is true and R is correct explanation of A.

(2) Both A and R is true but R is not correct explanation of A.

(3) A is true but R is false

(4) A is false but R is true

43. Under usual notations, the effect total [A] in a factorial experiment is given by :

(1) (1) + (a) - (b) + (ab) + (c) + (ac) - (bc) + (abc)

(2) -(1) - (a) - (b) - (ab) + (c) + (ac) + (bc) + (abc)

(3) -(1) + (a) - (b) + (ab) - (c) + (ac) - (bc) + (abc)

(4) -(1) - (a) - (b) + (ab) + (c) + (ac) - (bc) + (abc)

44. An exhaustive list of all members of the population along with their identification particulars is called :

(1) Sampling design

(2) Sampling frame

(3) Population design

(4) Population frame

45. Read the following statements carefully :

S_1 : Systematic sampling is partly probabilistic and partly non-probabilistic.

S_2 : Systematic sampling provides unbiased estimates if there are some periodic feature in the list of units.

Choose the correct answer from the following :

(1) Both S_1 and S_2 are true   (2) S_1 is true but S_2 is false

(3) S_1 is false but S_2 is true   (4) Both S_1 and S_2 are false

46. The responses in a factorial experiment with factors A and B each at two levels with three replicatios are as follows (in usual notations):

[1] = 18, [a] = 17, [b] = 25 and [ab] = 30

The sum of square due to interaction AB is :

(1) 6   (2) 4

(3) 3   (4) None of above

47. In randomized block design with k treatments and two blocks with mean B_1 and B_2 which one of the following is the orrect sum of the squares due to blocks ?

(1) $(B_1 - B_2)^2/k$ (2) $(B_1 - B_2)^2/2k$

(3) $K(B_1 - B_2)^2/2$ (4) $(B_1 - B_2)^2/2$

18

48. For a political science class, it was required to get opinion on free primary education of members of a particular party from a town. The town ws divided into 17 blocks, each with similar socio-economic status distribution and other diversities. Rather than trying to obtain a list of all members of that party of the town. It was decided to select 3 blocks at random, using simple random sampling without replacement. For selected blocks, the list of all current members of the party was collected from the block office of the party. Then opinion on free primary education of the members was collected. What kind of design was used ?

    (1) simple random sampling   (2) Stratified sampling

    (3) systematic sampling   (4) None of the above

49. A researcher who wanted to determine the benefits of using a new beginning algebra study tehnique obtained permission from the school of a district to select students. The researcher prepared a list of all beginning algebra students of that school and selected 50 out of them at random. The researcher divided the students randomly into two groups each consisting of 25 students. One group participated in the new study program and the other group was trained through the traditional study techniques. The greatest weakness of this study is :

    (1) the division of the sample into two groups of 25

    (2) the use of only 50 students in the sample

    (3) the use of students from only one school

    (4) the use of only two different study techniques

19

50. A random sample of size n is drawn from a population of size N, having mean μ and standard deviation σ, using simple random sampling without replacement. The covariance between any two sample observations will be :

(1) $-\sigma^2/N$ (2) $-\sigma^2/(N-1)$

(3) $-\sigma^2/n$ (4) $-\sigma^2/(n-1)$

51. Assertion (A) : The total error insample surveys will be more than that in complete enumeration.

Reason (R) : In sample surveys both sampling and non-sampling errors occur where as in complete enumeration only non-sampling errors occur.

Choose your answr from the following codes :

(1) Both A and R is true and R is correct explanation of A.

(2) Both A and R is true but R is not correct explanation of A.

(3) A is true but R is false

(4) A is false but R is true

52. The geometric mean of 6 values is 59 and the geometric mean of 4 of them is 69. The geometric mean of the other two is ;

(1) $(69)^6/(59)^2$ (2) $(69)^3/(59)^2$

(3) $(59)^6/(69)^2$ (4) $(59)^3/(69)^2$

20

53. The daily maximum temperature of Varanasi city was recorded in Celsius for all 31 days of May 2015. The arithmetic mean and geometric mean of these 31 observations were found to be 45^0 C (degree Celsius) and 40^0 C respectively. A 'C' degree Celsius temperature is equal to 'F' degree Fahrenheit (^{0}F) where $F = 32 + 9C/5$. If the above data would have been measured in Fahrenheit.

S1 : The arithmetic mean would have been 113^0F

S2 : The geometric mean would have been 104^0F

Choose yours answr from the following codes :
(1) Both S1 and S2 are correct
(2) S1 is correct but S2 is false
(3) S1 is false but S2 is correct
(4) Both S1 and S2 are false

54. The mean and median of 100 observations are 50 and 52 respectively. The value of the largest observation is 100. It is later found that it is actually 110. The correct mean and median is respectively :
(1) 50, 52
(2) 50, 62
(3) 50.1, 52
(4) 50.1, 52.1

55. If the random variables X and Y are such that $Y = X^2$, then the Pearson's correlation coefficient between X and Y :
(1) Will be always zero
(2) Will be always positive and greater than Zero
(3) May be negative, if equally spaced non-negative values of X and correspondig values of Y are taken as data
(4) May be positive, negative or zero dependig on the choice values of x and corresponding values of Y.

56. From population of size 100, a simple random sample drawn by using without replacement method has the observations as 4, 2, 2, 4 and 3.

Asseritlon (A) : The sample total 15 is net unbiased estimate of population total.

Reason (R) : The given sample canot be a simple random sample drawn by using without replacement method

Select your answr from the following codes :

(1) Both A and R is true and R is correct explanation of A.

(2) Both A and R is true but R is not correct explanation of A.

(3) A is false but R is true

(4) A is true but R is false

57. $X_1 \, X_2 \, ... \, X_n$ is a random sample from with known mean 9 and unknown variance σ^2.

S1 : $\{(X_1 + X_2 ... + X_n)^2/n\} - 9n$ is not unbiased estimator of σ^2

S2: The only unbiased estimator of σ^2 is

$$\left\{ \left(x_1^2 + x_2^2 + ... + x_n^2 \right) - \left(x_1 + x_2 + ... + x_n \right)^2 / n \right\} / (n - 1)$$

Choose yours answer from the following codes :

(1) Both S1 and S2 are correct

(2) S1 is correct but S2 is false

(3) S1 is false but S2 is correct

(4) Both S1 and S2 are false

22

58. 3x + 4Y = 11 and 4X + 3Y = 10 are the equations of the pair of regression lines for a given data. Then:

(1) 3X + 4Y = 11 is the equation of regression of X on Y.

(2) 4X + 3Y = 10 is the equation of regression of Y on X.

(3) Correlation coefficient between X and Y is 0.75

(4) Variance of X and Y are equal

59. In case of three variables X_1, X_2 and X_3, all pairwise simple correlation coefficients are equal. Then (in the usual notations)

(1) $R^2_{1.23} = r_{12.3}r_{13.2}$

(2) $R^2_{1.23} = 2r_{12.3}r_{13.2}$

(3) $R^2_{1.23} = \dfrac{r_{12.3}r_{13.2}}{2}$

(4) $R^2_{1.23} = \dfrac{r_{12.3}r_{13.2}}{4}$

60. The following results were obtained from the analysis of a randomized block design with 6 treatments in 5 block :

Mean sum of square due to block = 20

Mean sum of square due to treatment = 20

Total sum of squares = 220

The error mean square is

(1) 4   (2) 2   (3) 10   (4) 20

61. A population consists of 6 units (a, b, c, d, e and f) a sample of size 2 is selected by SRSWR. The probability that units a and b are in the sample is :

(1) 1/3   (2) 1/9   (3) 1/18   (4) 1/15

62. Each observation in a data is multiplied by a positive integer 'm' and then 'm' is subtracted from each. If the origial value of the coefficient of variation is VO and the new value is VN, then

   (1) VO > VN

   (2) VO < VN

   (3) VO = VN

   (4) Nothing definite can be said unless the exact value of 'm' is known.

63. X and Y are the random variables taking values between zero and one. If correlation coefficient between X and Y is 0.7, the correlation coefficient between U = 10 + 3X and V = 10 - 3Y will be :

   (1) Less than 0.7 but greater than zero

   (2) Zero

   (3) 0.7

   (4) -0.7

64. In testing the following hypothesis, in which case we CANNOT use F-test, even when we assume that the data is drawn from the normal populations (s) (notations carry their usual meaning).

   (1) $H_0 : \sigma_1^2 = \sigma_2^2$ aganist $H_1 : \sigma_1^2 = \sigma_2^2$

   (2) $H_0 : \rho = 0$ aganist $H_0 : \rho > 0$

   (3) $H_0 : \mu_1 = \mu_2 = ...\ \mu_k$ aganist $H_0 : \mu_1 = \mu_2$ forsome $i = j$

   (4) $H_0 : \sigma_1^2 = 25$ against $H_0 : \sigma_1^2 \neq 25$

24

65. The joint p.d.f of random variable (X, Y) is f(x,y) which is equal to k (real constant) for $0 < x < y < 1$ and zero elsewhere. The value of k is :

(1) 1

(2) 2

(3) 1/2

(4) Any number between 0 and 1

66. Read the following statement in context of intra-class correlation coefficient

   S1 : It can take positive and negative values.

   S2 : A negative value of it has same significance as a departure from independence as an equivalent positive

   Choose your answer from the following codes :

   (1) Both S1 and S2 are correct

   (2) S1 is correct but S2 is false

   (3) S1 is false but S2 is correct

   (4) Both S1 and S2 are false

67. In case of three variables X_1, X_2 and X_3 all pair wise simple correlation coefficients are equal to r. Then the partial correlation coefficient $r_{12.3}$ is :

(1) r

(2) $\dfrac{1}{r+1}$

(3) $\dfrac{r}{r+1}$

(4) $\dfrac{1}{1-r}$

25

P.T.O.

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68. For a given frequency distribution, the value of second, third central and fourth moments are reproted as 4, 16 and 80 respectively.

Assertion (A) : The frequency curve will be positively skewed and leptokurtic.

Reason (R) : The central moments are in increasing order.

Select your answer from the following codes :
(1) Both A and R is true and R is correct explanation of A.
(2) Both A and R is true but R is not correct explanation of A.
(3) A is true but R is false
(4) Both A and R is false

69. The test for goodness of fit is :
(1) Right tail test
(2) Left tail test
(3) Two tail (both right and left) test
(4) Neither right nor left tail test

70. A group of 30 students are classified as folwos :

Colour of the eye

Sex	Blue	Brown	Black	Total
Male	5	8	2	15
Female	5	5	5	15
Total	10	13	7	30

What is the probability that a randomly selected student will be either female or has black eye colour ?

Select your answer from the following :
(1) 7/30
(2) 15/30
(3) 28/30
(4) 17/30

26

71. The standard error of the sample correlation coefficient r based on n paired observations is :

(1) $\dfrac{1+r^2}{\sqrt{n}}$

(2) $\dfrac{1-r^2}{n}$

(3) $\dfrac{1-r^2}{\sqrt{n}}$

(4) $\dfrac{1+r^2}{n}$

72. A group of 20 boys and 20 girls aged 2 years were randomly selected and are paired so that each pair consists of one boy and one girl. Their increase in weight in a year was noted down. It is known that increase in weight of boys and girls are normally distributed. We want to test the null hypothesis that the average increase in the weight of boys and girls are same against the alternative hypothesis that increase in the weight of boys is more than that of girls :

Assertion (A) : We should use one tail paired t-test.

Reason (R) : The observations are paired.

Select your answer from the following codes :

(1) Both A and R is true and R is correct explanation of A.

(2) Both A and R is true but R is not correct explanation of A.

(3) A is true but R is false

(4) A is false but R is true

27

P.T.O.

17P/297/17(i)

73. If X follows standard Cauchy distribution then $1/X$ will follow :

    (a) Standard Cauchy distribution

    (b) The same distribution as that of square root of F-statistic with $(1,1)$ degree of freedom.

    (c) The same distribution as that of t-statistic with one degree of freedom.

    Choose your answer from the following :

    (1) Only (a) and (b) are correct

    (2) Only (a) and (c) are correct

    (3) Only (c) and (b) are correct

    (4) (a), (b) and (c) all are correct

74. The variance of the mean of a simple random sample drawn by using without replacement method from a population of 36 uits is one tenth of the population variance. The sample size would be :

    (1) 8   (2) 9   (3) 10   (4) 11

75. X and Y are independent random variables with zero mean and standard deviations 9 and 4 respectively, If $X + 2Y$ anf $KX-Y$ are uncorrelated, the value of K would be :

    (1) 32/81   (2) 64/81   (3) 1/2   (4) 2

28

76. In order to fit a polynomial of degree 'r' based on 'n' observation (r < n + 1) using least square method, the summations that we need to calculate is :

(1) 3n + 1

(2) 3r + 1

(3) n + 1

(4) r + 1

77. In CRD with 5 treatments, the degree of freedom for the error is 16. If the replications for the treatments first, second, fourth and fifth are 3, 4. 4 and 5 respectively, then the number of replications for third treatemtn is :

(1) 3

(2) 4

(3) 5

(4) 6

78. A single observation X is drawn from the Bernoulli population with parameter θ. On the basis of it, we wish to test the null hypothesis H_0 : $\theta = 2/3$ against H_1 : $\theta > 2/3$. The test procedure is to reject H_0 if X = 0. However if X = 1, we toss two unbiased coins and reject H_0 if no head appears. The power function of the test would be :

(1) $1/2 - 3\theta/8$

(2) $1 - 3\theta/4$

(3) $\theta/2$

(4) $\theta/4$

79. Select the answer from the following :

For testing the goodness of fit, we use

(1) Chi-square test only

(2) Kolmogroy - Smirnov test only

(3) Either of the above two

(4) Neither of the above two

29

P.T.O.

80. For the given sample of data, the equations of pair of regression lines as reported by a student are X - 2Y = 2 and X + 3Y = 12

Assertion (A) : The mean of X and Y for the given data cannot be 6 and 2 respectively.

Reaseon (R) : The above mentiaoned equations can never be pair of regression lines for any data.

Select your answer from the following codes :

(1) Both A and R is true and R is correct explanation of A.

(2) Both A and R is true but R is not correct explanation of A.

(3) A is true but R is false

(4) A is false but R is true

81. Three treatments A, B and C are distributed randomly to 9 the plots of a square field consisting of 3plots in each row and each column. The final distribution of the treatments is given below :

A	B	C
B	A	C
C	A	B

Assertion (A) : It is layout of a Randomized block design.

Reason (R) : Each treatment is replicated equal number of times

Select your answer from the following codes :

(1) Both A and R is true and R is correct explanation of A.

(2) Both A and R is true but R is not correct explanation of A.

(3) A is true but R is false

(4) A is false but R is true

30

82. The joint p.d.f. of random variable (X, Y) is f(x,y) which is equal to 2 for 0<x<y<1 and zero elsewhere. If (mean, variance) of X and Y are (mx, vx) and (my, vy) respectively Then :

(1) mx < my and vx < vy

(2) mx < my and vx = vy

(3) mx = my and vx < vy

(4) mx > my and vx > vy

83. Mean and variance both of a variable X having frequency disribution as given below are 10.

Class Interval	X_1-X_2	X_2-X_3	X_3-X_4	X_4-X_5	X_5-X_6	X_6-X_7	X_7-X_8
$d_i = \dfrac{(x_i - a)}{n}$	-3	-2	-1	0	1	2	3
f_i	1	3	4	4	4	3	1

What are values of X_1 and X_8 ?

(1) 2,15

(2) 5,15

(3) 0,10

(4) 3,17

84. Which of the following are probability mass functions ?

(i) f(x) = (x-6)/5, for x = 7, 8, 9 and zero elsewhere.

(ii) f(x) = x/21, for x = 1, 2, 3, 4, 5, 6 and zero elsewhere.

(iii) f(x) = x²/55, for x = 1, 2, 3, 4, 5 and zero elsewhere.

Choose the answer from the following :

(1) Only (i) and (ii)

(2) Only (i) and (iii)

(3) Only (ii) and (iii)

(4) All the three

31

P.T.O.

85. Consider the function $F_{x,y}$ (x,y) = 1 for x + 2y $\geq$ 1 and zero for x + 2y < 1

in this context, read the following carefully :

Asseration (A) : Fx, y (x, y) is not joint cumulative distribution function any random variable (X, Y).

Reason (R) : The value of $F_{x,y}$ (x,y) jumps from 0 to 1 at every point (x,y) lying on the line x + 2y = 1

Choose your answer from the following codes :

(1) Both A and R is true and R is correct explanation of A.

(2) Both A and R is true but R is not correct explanation of A.

(3) A is true but R is false

(4) A is false but R is true

86. F is the cumulative distribution and f, which is symmetric about zero, is the corresponding probability density function of a continuous random variable. Then which of the following statements are true for all choices of a > 0 ?

(i) f (-a) + f (a) = 1

(ii) P (|X| > a) = 2 F (-a)

(iii) P (|X| $\leq$ a) = 2F (a) -1

Choose the answer from the following : .

(1) Only (i) and (ii)   (2) Only (i) and (iii)

(3) Only (ii) and (iii)   (4) All the three

32

87. The random variable (x, y) has the joint probability density function

$$f(x,y) = \begin{cases} kx(x-y) & \text{for } 0 < x < 2 \text{ and } -x < y < x \\ o, & \text{elsewher} \end{cases}$$

Which of the following expressions give the correct value of k ?

$$\mathbf{S}: K^{-1} = \int_0^2 \int_{-x}^x x(x-y)dy\, dx$$

$$\mathbf{P}: K^{-1} = \int_0^2 \int_y^2 x(x-y)dx\, dy + \int_{-2}^0 \int_{-y}^2 x(x-y)dx\, dy$$

Choose your answer from the following codes :

(1) Bothe S and P are true   (2) S is true but P is false

(3) S is false but P is true   (4) Both S and P are false

88. The random variable (x,y) has the joint probability density function

$$f(x,y) = \begin{cases} x(x-y)/8 & \text{for } 0 < x < 2 \text{ and } -x < y < x \\ o, & \text{elsewher} \end{cases}$$

Which of the following give the correct expression for the marginal disribution of Y ?

$$S: g(y) = \int_0^2 \frac{x(x-y)}{8}dx$$

$$P: g(y) = \begin{cases} \int_y^2 \frac{x(x-y)}{B}dx, & \text{if } 0 < y < 2 \\ \int_{-y}^2 \frac{x(x-y)}{B}dx, & \text{if } -2 < y < 0 \end{cases}$$

Choose your answer from the following codes :

(1) Both S and P are true   (2) S is true but P is false

(3) S is false but P is true   (4) Both S and P are false

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89. X and Y are two random variables having finite means. Which of the following are always true ?

(i) E [Min. (X,Y)] $\leq$ Min. [E(X),E(Y)]

(ii) E [Max. (X,Y)] $\leq$ Max. [E(X),E(Y)]

(iii) E [Min. (X,Y) + Min.(X,Y)+] =[E(X), E(Y)]

Chooose th answer from the following :

(1) Only (i) and (ii)   (2) Only (i) and (iii)
(3) Only (ii) and (iii)   (4) All the three

90. Consider the following joint probability density function of random variable (X,Y).

$f(x, y) = [2x^2 y]^{-1} 1_{(1,\infty)}(x) 1_{(1/x, x)}(y).$

The marginal distribution of Y is obtained from

(1) $\left[\int_1^\infty \frac{1}{2x^2 y} dx\right] 1_{(1,\infty)}(y)$

(2) $\left[\int_{1/y}^\infty \frac{1}{2x^2 y} dx\right] 1_{(0,1)}(y)$

(3) $\left[\int_0^y \frac{1}{2x^2 y} dx\right] 1_{(0,1)}(y) + \left[\int_y^\infty \frac{1}{2x^2 y} dx\right] 1_{(1,\infty)}(y)$

(4) $\left[\int_{\frac{1}{y}}^\infty \frac{1}{2x^2 y} dx\right] 1_{(0,1)}(y) + \left[\int_y^\infty \frac{1}{2x^2 y} dx\right] 1_{(1,\infty)}(y)$

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91. Which of the graph uses only one axis to show the data summary ?

(1) Histogram   (2) Line diagram

(3) Box and whisker plot   (4) Frequency polygon

92. In a systemaic sample of size 10 taken from a population of size 100, the 27th, 87th, 57th, 97th and 7th units of the population are included, then rest of the five units of the sample are :

(1) 17th, 67th, 37th, 77th and 47th units of the population

(2) 10th, 20th, 30th, 40th and 50th units of the population

(3) 1th, 2nd, 3rd, 4th and 5th units of the population

(4) Any five units of the population

93. If the coefficient of variations of the study variable Y and the auxiliary variable X in a population are 18 and 32 respectively, for what range of the coefficient of correlation ρ between X and Y the ratio method of estimation will be preferable over simple random sample ?

(1) $\rho < 0.63$ (2) $0.33 < \rho < 0.80$

(3) ρ . 0.63 but less than 0.85   (4) $\rho > 0.88$

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94. Read the following statements :

S1 : Classical definition of probability sometimes fails to provide the measure of probability even when the sample space (space of outcomes) is discrete and finite.

S2 : Statistical definition only provides a frequentist's interpretaion of probability.

Choose the most appropriate answer from the *following* codes :

(1) Both S1 and S2 are correct

(2) S1 is correct but S2 is incorrect

(3) S1 is incorrect but S2 is correct

(4) Neither S1 nor S2 are correct

95. Simpsons 1/3rd rule is obtained by taking n = ... in the general quadrature formula. Fill up the above blank from one of the following :

(1) 1 (2) 2 (3) 3 (4) 4

96. X and Y are jointly distributed with probability density function

$f(x,y) = (1 + xy)/4$; $-1 < x < +1$ and $-1 < y < +1$

$= 0$; elsewhere

Comment on the independence of the variables and choose your answer form the following codes :

(1) X and Y are independent   (2) X and Y^2 are independent

(3) X^2 and Y are independent   (4) X^2 and Y^2 are independent

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97. A random variable X has the cumulative distribution function F(x) given below :

F(x) = 0, if x ≤ 0

= x, if 0 < x ≤ 1

= 1, if 1 < x

The probability density function corresponding to F(x), if it exists, is denoted by f(x). Then

S : f(x) = 1, if 0 < x < 1

= 0, elsewhere

P : F(x) is discontinuous at x = 0 and x = 1

Choose your answer from the following codes :

(1) Both S and P are true
(2) S is true but P is false
(3) S is false but P is true
(4) Both S and P are false

98. S is the set of positive real number less than or equal to 6 i.e. S = {x : 0 ≤ x ≤ 6}. If A = {x : 1 ≤ x ≤ 3}, B = {x : 2 < x ≤ 6}, C = {x : 3 ≤ x < 5} and D = {x : 0 ≤ x < 2}, which of the following is **NOT correct** ?

(1) A ∪ B = {x : 1 ≤ x ≤ 6}   (2) B ∪ D = S

(3) A ∩ B = {x : 2 < x ≤ 3}   (4) C ∩ B = C

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99. Consider the following function f(x) :

f(x) = x, if 0 < x ≤ 1

= 2 - x, if 1 < c ≤ 2

= 0, elsewhere

In this context, read the following statement carefully :

Assertion (A) : f(x) is neither a cumulative distribution function nor a probability density function.

Reason (R) : f(x) is neither a monotone non- decreasing function of x nor a non-negative continuous function of x.

Select your answer from the following codes :

(1) Both A and R is true and R is correct explanation of A.

(2) Both A and R is true but R is not correct explanation of A.

(3) A is true but R is false

(4) Both A and R are false

100. Which of the following is most useful for checking the equal variance across groups for ANOVA ?

(1) Side-by-side box plots showing roughly equally sized boxes for each group.

(2) Histograms suggesting nearly normal disributions of data i each group.

(3) Summary statisics suggesting that the means of each group are roughly equal.

(4) Summary statisics suggesting roughly equal ranges for each group

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101. Consider the following segment of C program :

Int x, y, n ;

x = 1;

y = 1;

if (n > 0)

x = x + 1 ;

else

y = y - 1;

After execution of above program segment the value of x and y if n=1 is:

(1)   x = 2, y = 0;

(2)   x = 1, y = 0 ;

(3)   x = 1, y = 1 ;

(4)   x = 2, y = 1

102. Consider the following segment of C program

int a, b, c, d, f, g ;

float e;

a = 15

b = 10;

c = a++ - b;

d =++b +a;

b--;

e = float (a)/b;

f = a%b;

a* =b;

Values of a, b, c, d, e and f after execution of above segments are :

(1)   a = 176, b = 10, c = 5, d = 27 , e = 1.600, f = 6

(2)   a = 170, b = 10, c = 5, d = 26 , e = 1, f = 5

(3)   a = 176, b = 11, c = 5, d = 26 , e = 1, f = 5

(4)   a = 160, b = 10, c = 5, d = 27 , e = 1.600, f = 6

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103. How many of the following declarations are correct ?

Int x ;

float letter, DIGIT;

double = p, q

m, n, z ; INTEGER

long int m; count;

long float temp;

Select your answer from the following codes ;

(1) 3   (2) 1   (3) 2   (4) 6

104. C language has been developed by :

(1) Dennis Ritchie   (2) Ken Thompson

(3) Peter Norton   (4) Martin Richards

105. C program is converted into machine language with the help of :

(1) an interpreter   (2) a compiler

(3) an Operating System   (4) Arithmetic Logic Unit

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106. Consider the following C program :

```
main ()

{

int num 1, num 2, num 3;

scanf ("%2d %5d", & num 1, & num 2);

scanf ("%2d", & num3);

printf ("%d%d%d", num 1, num2, num3);

}
```

If the data input to the program 31426, 50, and 100 then the output will be :

(1) 31426,50,100

(2) 50.31426,100

(3) 314.2650,100

(4) 31.426, 50

107. Consider the following C program :

```
main ()

{

int num 1, num 2, num 3;

scanf ("%d %*d%d", & num 1, & num 2, & num 3);

printf ("%d%d%", num 1, num2);

}
```

If the data input to the program 123, 456, and 789 then the output will be :

(1) 123, 789

(2) 123, 456

(3) 456, 789

(4) 12, 34

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108. Which of the following is valid "real variable" in FORTRAN ?

    (1) PRAVEEN   (2) SIGMA

    (3) LION   (4) C

109. Words having 8-bits are to be stored into computer memory. The numbers of lines required for writing into memory are :

    (1) 1   (2) 2   (3) 4   (4) 8

110. Which of the following is valid in FORTRAN ?

    (1) 146.86E + 27   (2) 125*E9

    (3) +142.7E   (4) 123,45E - 6

111. -8 is equal to signed binary number :

    (1) 10001000   (2) 00001000

    (3) 10000000   (4) 11000000

112. Which of the following is volatile memory ?

    (1) ROM   (2) RAM

    (3) PROM   (4) EEPROM

113. In FORTRAN what will be the correct representaion for 457000 ?

    (1) $.46 \times 10^6$ (2) 45.7×10^3

    (3)   .45E6   (4)   .45E-6

114. What is the correct expression for, $\log_e \sqrt{\dfrac{x}{yz}}$

    (1)   LOG(SQRT (X/Y*Z)))   (2)   LOG(SQRT (X/Y**Z)))
    (3)   ALOG(SQRT (X/Y*Z))   (4)   ALOG(SQRT (X/Y**Z)))

115. The hexadecimal number 'A0' has the decimal value equivalent to :

    (1)   80   (2)   256   (3)   100   (4)   160

116. The default MS Excel file extension is :

    (1)   .XLR   (2)   .EXE

    (3)   .EXL   (4)   .XLS

117. Which of the following are special characters in FORTRAN 77 ?

    (a) + (b) $ (c) : (d) % (e) blank

    Choose your answer from the following codes :

    (1)   (a), (b), (c), (d)   (2)   (a), (c), (d), (e)

    (3)   (a), (b), (c), (e)   (4)   (b), (c), (d), (e)

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118. The product of two binary nummbers (1011) and (1001) is :

(1) 1100011

(2) 1010100

(3) 1011001

(4) 100110

119. FORTRAN statements are written starting from the :

(1) 6th column to column 72

(2) 6th column to column 73

(3) 7th column to column 72

(4) 7th column to column 73

120. Which of the following is not a Statistical Package ?

(1) SPSS

(2) SAS

(3) STATA

(4) C

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