CSIR-NET Dec 2019 Que Paper

Application No	
Candidate Name	
Roll No.	
Test Date	15/12/2019
Test Time	2:30 PM - 5:30 PM
Subject	Mathematical Sciences

Section : **Part A Mathematical Sciences**

Q.1 A dart is randomly thrown at a circular board on which two concentric rings of radii R and 2R having the same width (width much less than R) are marked. The probability of the dart hitting the smaller ring is

(1) twice the probability that it hits the larger ring.

(2) half of the probability that it hits the larger ring.

(3) four times the probability that it hits the larger ring.

(4) one-fourth the probability that it hits the larger ring.

Options 1. 1
2. 2
3. 3
4. 4

Question Type : **MSQ**
Question ID : **1879801750**
Option 1 ID : **1879806997**
Option 2 ID : **1879806998**
Option 3 ID : **1879806999**
Option 4 ID : **1879807000**
Status : **Not Answered**
Chosen Option : **--**

Q.2

Examine the following statements: [2]

a. Fat cells normally produce hormone A in proportion to the amount of fat. Obese individuals, however, have lower than normal levels of hormone A.

b. Hormone A reduces food intake

Which among the following is a valid inference based on the above statements?

(1) Impaired production of hormone A causes obesity

(2) Impaired action of hormone A causes obesity

(3) Obesity results into low levels of hormone A

(4) Excess food intake causes depletion of hormone A

Options 1. 1
2. 2
3. 3
4. 4

Question Type : **MSQ**
Question ID : **1879801760**
Option 1 ID : **1879807037**
Option 2 ID : **1879807038**
Option 3 ID : **1879807039**
Option 4 ID : **1879807040**
Status : **Not Answered**
Chosen Option : **--**

Q.3 The length of a rod is measured repeatedly by two persons. Person A reports the length to be 1002 ± 1 cm while person B reports the length to be 1001 ± 2 cm. It is known from a more reliable method that the length is 1000.1 ± 0.5 cm. Which one of the following statements is correct?

(1) Measurements made by B are less accurate, but more precise, compared to those by A.

(2) Measurements made by A are less accurate, but more precise, compared to those by B.

(3) Measurements made by B are more precise and more accurate, compared to those by A.

(4) Measurements made by A are more precise and more accurate, compared to those by B.

Options 1. 1
2. 2
3. 3
4. 4

Question Type : **MSQ**
Question ID : **1879801751**
Option 1 ID : **1879807001**
Option 2 ID : **1879807002**
Option 3 ID : **1879807003**
Option 4 ID : **1879807004**
Status : **Not Answered**

Chosen Option : --

Q.4 Seven chairs numbered 1 to 7 are placed around a round table. Starting from chair number 5, a person keeps going around the table anticlockwise. After crossing 41 chairs, the person will reach the chair number

(1) 1

(2) 3

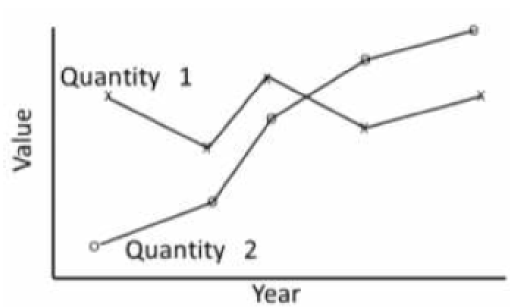
(3) 5

(4) 7

Options 1. 1
2. 2
3. 3
4. 4

Question Type : **MSQ**
Question ID : **1879801752**
Option 1 ID : **1879807005**
Option 2 ID : **1879807006**
Option 3 ID : **1879807007**
Option 4 ID : **1879807008**
Status : **Answered**
Chosen Option : **3**

Q.5



The trends of two quantities over five years are shown in the graph. Which of the following are valid inferences?

A. The mean values of the quantities are nearly equal

B. The variations in the two quantities are nearly equal

C. Quantity 1 varies less over the given period as compared to Quantity 2

(1) Only A is true

(2) Only B is true

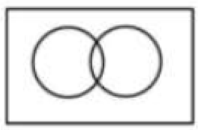
(3) A and C are true

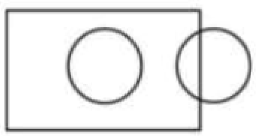
(4) A and B are true

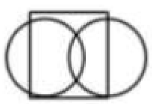
Options 1. 1
2. 2
3. 3
4. 4

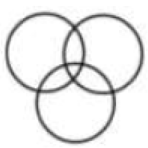
Question Type : **MSQ**
Question ID : **1879801746**
Option 1 ID : **1879806981**
Option 2 ID : **1879806982**
Option 3 ID : **1879806983**
Option 4 ID : **1879806984**
Status : **Not Answered**
Chosen Option : **--**

Q.6 Which among the following diagrams can represent the relationships between houses, offices and buildings?

(1) 

(2) 

(3) 

(4) 

Options
1. 1
2. 2
3. 3
4. 4

Question Type : **MSQ**
Question ID : **1879801747**
Option 1 ID : **1879806985**
Option 2 ID : **1879806986**
Option 3 ID : **1879806987**
Option 4 ID : **1879806988**
Status : **Answered**
Chosen Option : **3**

Q.7 The difference between the squares of two consecutive integers is 408235. The sum of the numbers is

(1) 16324

(2) 27061

(3) 180235

(4) 408235

Options 1. 1

2. 2

3. 3

4. 4

Question Type : **MSQ**
Question ID : **1879801757**
Option 1 ID : **1879807025**
Option 2 ID : **1879807026**
Option 3 ID : **1879807027**
Option 4 ID : **1879807028**
Status : **Not Answered**
Chosen Option : **--**

Q.8 In a certain cipher language 'BIKE' is coded as 'YFHB' and 'CAR' is coded as 'ZXO' then 'SCOOTER' can be coded as

(1) TAPPIYB

(2) PYVVAHJ

(3) PZLLQBO

(4) JZKKMCO

Options 1. 1

2. 2

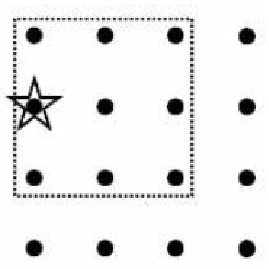
3. 3

4. 4

Question Type : **MSQ**
Question ID : **1879801745**
Option 1 ID : **1879806977**
Option 2 ID : **1879806978**
Option 3 ID : **1879806979**
Option 4 ID : **1879806980**
Status : **Not Answered**
Chosen Option : **--**

Q.9

A move of a coin is defined as crossing any number of points in a straight line on the 4 × 4 grid (horizontally, vertically or diagonally). What is the least number of moves in which a coin, starting from the indicated position, can cover all nine points within the marked square?



(1) four

(2) five

(3) six

(4) seven

Options 1. 1
2. 2
3. 3
4. 4

Question Type : **MSQ**
Question ID : **1879801755**
Option 1 ID : **1879807017**
Option 2 ID : **1879807018**
Option 3 ID : **1879807019**
Option 4 ID : **1879807020**
Status : **Not Answered**
Chosen Option : **--**

Q.10 Consider a location on the Earth where the Sun is overhead at noon. Compared to its shadow at 10.00 AM, the shadow of a tower at 4.00 PM would be

(1) twice longer

(2) three times longer

(3) four times longer

(4) eight times longer

Options 1. 1
2. 2
3. 3
4. 4

Question Type : **MSQ**
Question ID : **1879801748**
Option 1 ID : **1879806989**
Option 2 ID : **1879806990**
Option 3 ID : **1879806991**
Option 4 ID : **1879806992**

Status : **Not Answered**
Chosen Option : **--**

Q.11 There are nine identical balls, one of which is heavier than the other eight. What is the least number of weighings, using a two-pan balance, needed for definitely identifying the heavier ball?

(1) One

(2) Two

(3) Three

(4) Four

Options 1. 1
2. 2
3. 3
4. 4

Question Type : **MSQ**
Question ID : **1879801741**
Option 1 ID : **1879806961**
Option 2 ID : **1879806962**
Option 3 ID : **1879806963**
Option 4 ID : **1879806964**
Status : **Not Answered**
Chosen Option : **--**

Q.12 A, B, C and D are four consecutive points on a circle such that chords AB=BC=CD=10.0 cm and DA = 20.0 cm. The radius of the circle (in cm) is

(1) 10.0

(2) $10\sqrt{2}$

(3) $10\sqrt{3}$

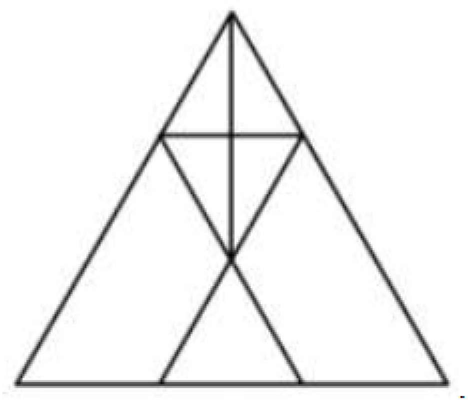
(4) 20.0

Options 1. 1
2. 2
3. 3
4. 4

Question Type : **MSQ**
Question ID : **1879801753**
Option 1 ID : **1879807009**
Option 2 ID : **1879807010**
Option 3 ID : **1879807011**
Option 4 ID : **1879807012**
Status : **Not Answered**
Chosen Option : **--**

Q.13

The number of triangles in the figure is



(1) 9

(2) 10

(3) 11

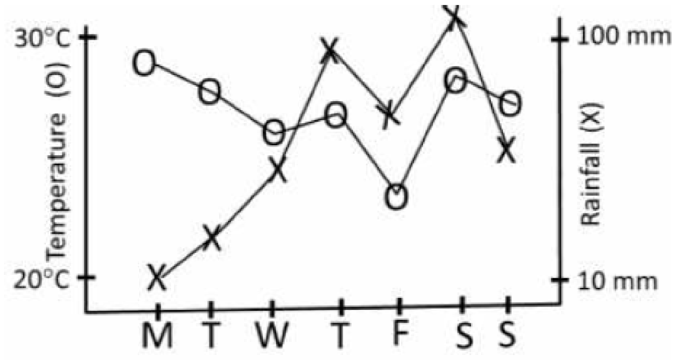
(4) 12

Options 1. 1
2. 2
3. 3
4. 4

Question Type : **MSQ**
Question ID : **1879801742**
Option 1 ID : **1879806965**
Option 2 ID : **1879806966**
Option 3 ID : **1879806967**
Option 4 ID : **1879806968**
Status : **Answered**
Chosen Option : **4**

Q.14

The graph below shows the rainfall and temperature at a place over one week. Which day of the week would feel the most humid?



(1) Monday

(2) Wednesday

(3) Thursday

(4) Saturday

Options 1. 1
2. 2
3. 3
4. 4

Question Type : **MSQ**
Question ID : **1879801756**
Option 1 ID : **1879807021**
Option 2 ID : **1879807022**
Option 3 ID : **1879807023**
Option 4 ID : **1879807024**
Status : **Answered**
Chosen Option : **1**

Q.15 The difference, the sum and the product of two integers are in the proportion 1:3:10. The two integers are:

(1) 3, 9

(2) 2, 5

(3) 5, 10

(4) 3, 10

Options 1. 1
2. 2
3. 3
4. 4

Question Type : **MSQ**
Question ID : **1879801743**
Option 1 ID : **1879806969**
Option 2 ID : **1879806970**
Option 3 ID : **1879806971**

Option 4 ID : **1879806972**
Status : **Answered**
Chosen Option : **3**

Q.16 In a population of 900, the number of married couples is as much as the number of singles. There are 100 twins of which 50 twins are singles. The population has 400 females in all. What is the number of married persons?

(1) 325

(2) 600

(3) 250

(4) 300

Options 1. 1
2. 2
3. 3
4. 4

Question Type : **MSQ**
Question ID : **1879801744**
Option 1 ID : **1879806973**
Option 2 ID : **1879806974**
Option 3 ID : **1879806975**
Option 4 ID : **1879806976**
Status : **Not Answered**
Chosen Option : **--**

Q.17 A tells B, "I could be visiting you on any day in the next two months and you must give me gold coins of as much total weight in grams as the number of days that would elapse from today". If gold coins are available in integer gram weights, what is the least number of coins with which B can meet A's demand on any day?

(1) 31

(2) 7

(3) 6

(4) 13

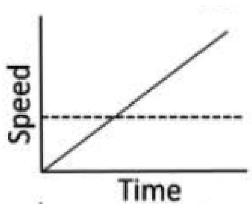
Options 1. 1
2. 2
3. 3
4. 4

Question Type : **MSQ**
Question ID : **1879801754**
Option 1 ID : **1879807013**
Option 2 ID : **1879807014**
Option 3 ID : **1879807015**
Option 4 ID : **1879807016**
Status : **Not Answered**
Chosen Option : **--**

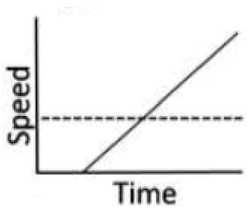
Q.18

A girl is running at constant speed to catch a bus which is stationary. Before she reaches the bus, the bus leaves and moves with a constant acceleration. Which one of these graphs describes the situation correctly?

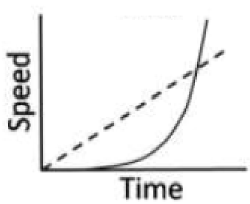
(1)



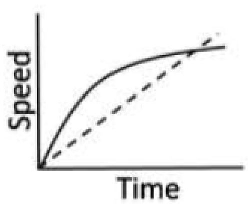
(2)



(3)



(4)



Options 1. 1

2. 2
3. 3
4. 4

Question Type : **MSQ**
Question ID : **1879801749**
Option 1 ID : **1879806993**
Option 2 ID : **1879806994**
Option 3 ID : **1879806995**
Option 4 ID : **1879806996**
Status : **Not Answered**
Chosen Option : **--**

Q.19

A partially filled hour glass has water falling from the upper bowl to the lower bowl. Which of the following statements is correct?

(1) The level of water rises in the lower bowl at the same rate as the fall in the upper bowl

(2) The level of water rises in the lower bowl at the half rate as the fall in the upper bowl

(3) The rate of increase in the volume of water in the lower bowl is the same as the rate of decrease in the upper bowl

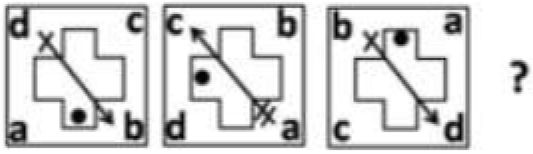
(4) The area of top surface of the water column is the same in both bowls at all times

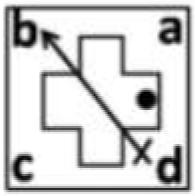
Options 1. 1
2. 2
3. 3
4. 4

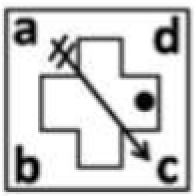
Question Type : **MSQ**
Question ID : **1879801759**
Option 1 ID : **1879807033**
Option 2 ID : **1879807034**
Option 3 ID : **1879807035**
Option 4 ID : **1879807036**
Status : **Not Answered**
Chosen Option : **--**

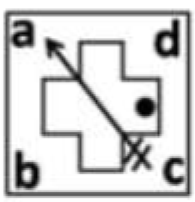
Q.20

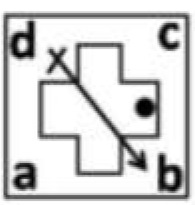
Find out the next figure in following sequence? [13]



(1) 

(2) 

(3) 

(4) 

Options 1. 1
2. 2
3. 3
4. 4

Question Type : **MSQ**
Question ID : **1879801758**
Option 1 ID : **1879807029**
Option 2 ID : **1879807030**
Option 3 ID : **1879807031**
Option 4 ID : **1879807032**
Status : **Answered**
Chosen Option : **2**

Section : **Part B Mathematical Sciences**

Q.1 For $t \in \mathbb{R}$, define

$$M(t) = \begin{pmatrix} 1 & t & 0 \\ 1 & 1 & t^2 \\ 0 & 1 & 1 \end{pmatrix}.$$

Then which of the following statements is true?

(1) $\det M(t)$ is a polynomial function of degree 3 in t

(2) $\det M(t) = 0$ for all $t \in \mathbb{R}$

(3) $\det M(t)$ is zero for infinitely many $t \in \mathbb{R}$

(4) $\det M(t)$ is zero for exactly two $t \in \mathbb{R}$

Options 1. 1
2. 2
3. 3
4. 4

Question Type : **MSQ**
Question ID : **1879801769**
Option 1 ID : **1879807073**
Option 2 ID : **1879807074**
Option 3 ID : **1879807075**
Option 4 ID : **1879807076**
Status : **Answered**
Chosen Option : **4**

Q.2 Let $\leq$ be the usual order on the field $\mathbb{R}$ of real numbers. Define an order $\preccurlyeq$ on $\mathbb{R}^2$ by $(a,b) \preccurlyeq (c,d)$ if $(a < c)$, or $(a = c$ and $b \leq d)$. Consider the subset $\mathrm{E} = \left\{\left(\frac{1}{n}, 1 - \frac{1}{n}\right) \in \mathbb{R}^2 : n \in \mathbb{N}\right\}$. With respect to $\preccurlyeq$ which of the following statements is true?

(1) $\inf(\mathrm{E}) = (0,1)$ and $\sup(\mathrm{E}) = (1,0)$

(2) $\inf(\mathrm{E})$ does not exist but $\sup(\mathrm{E}) = (1,0)$

(3) $\inf(\mathrm{E}) = (0,1)$ but $\sup(\mathrm{E})$ does not exist

(4) Both $\inf(\mathrm{E})$ and $\sup(\mathrm{E})$ do not exist

Options 1. 1
2. 2
3. 3
4. 4

Question Type : **MSQ**
Question ID : **1879801763**
Option 1 ID : **1879807049**

Option 2 ID : **1879807050**
Option 3 ID : **1879807051**
Option 4 ID : **1879807052**
Status : **Answered**
Chosen Option : **4**

Q.3 For a quadratic form in 3 variables over $\mathbb{R}$, let r be the rank and s be the signature. The number of possible pairs (r, s) is

(1) 13

(2) 9

(3) 10

(4) 16

Options 1. 1
2. 2
3. 3
4. 4

Question Type : **MSQ**
Question ID : **1879801772**
Option 1 ID : **1879807085**
Option 2 ID : **1879807086**
Option 3 ID : **1879807087**
Option 4 ID : **1879807088**
Status : **Not Answered**
Chosen Option : **--**

Q.4 Let $E = \left\{\frac{1}{n} \mid n \in \mathbb{N}\right\}$. For each $m \in \mathbb{N}$ define $f_m : E \to \mathbb{R}$ by

$$f_m(x) = \begin{cases} \cos(mx) \text{ if } x \geq \frac{1}{m} \\ 0 \text{ if } \frac{1}{m+10} < x < \frac{1}{m} \\ x \text{ if } x \leq \frac{1}{m+10} \end{cases}$$

Then which of the following statements is true?

(1) No subsequence of $(f_m)_{m\geq 1}$ converges at every point of E

(2) Every subsequence of $(f_m)_{m\geq 1}$ converges at every point of E

(3) There exist infinitely many subsequences of $(f_m)_{m\geq 1}$ which converge at every point of E

(4) There exists a subsequence of $(f_m)_{m\geq 1}$ which converges to 0 at every point of E

Options 1. 1
2. 2
3. 3
4. 4

Question Type : **MSQ**
Question ID : **1879801766**
Option 1 ID : **1879807061**

Option 2 ID : **1879807062**
Option 3 ID : **1879807063**
Option 4 ID : **1879807064**
Status : **Answered**
Chosen Option : **4**

Q.5 Let $M_4(\mathbb{R})$ be the space of all (4×4) matrices over $\mathbb{R}$. Let

$$W = \left\{(a_{ij}) \in M_4(\mathbb{R}) \mid \sum_{i+j=k} a_{ij} = 0, \text{for } k = 2,3,4,5,6,7,8\right\}$$

Then $\dim(W)$ is

(1) 7

(2) 8

(3) 9

(4) 10

Options 1. 1
2. 2
3. 3
4. 4

Question Type : **MSQ**
Question ID : **1879801767**
Option 1 ID : **1879807065**
Option 2 ID : **1879807066**
Option 3 ID : **1879807067**
Option 4 ID : **1879807068**
Status : **Not Answered**
Chosen Option : **--**

Q.6 Let V be a vector space of dimension 3 over $\mathbb{R}$. Let $T: V \to V$ be a linear transformation, given by the matrix $A = \begin{pmatrix} 1 & -1 & 0 \\ 1 & -4 & 3 \\ -2 & 5 & -3 \end{pmatrix}$ with respect to an ordered basis $\{v_1, v_2, v_3\}$ of V. Then which of the following statements is true?

(1) $T(v_3) = 0$

(2) $T(v_1 + v_2) = 0$

(3) $T(v_1 + v_2 + v_3) = 0$

(4) $T(v_1 + v_3) = T(v_2)$

Options 1. 1
2. 2
3. 3
4. 4

Question Type : **MSQ**

Question ID : **1879801770**
Option 1 ID : **1879807077**
Option 2 ID : **1879807078**
Option 3 ID : **1879807079**
Option 4 ID : **1879807080**
Status : **Answered**
Chosen Option : **1**

Q.7 Let $X \subset \mathbb{R}$ be an infinite countable bounded subset of $\mathbb{R}$.
Which of the following statements is true?

(1) X cannot be compact

(2) X contains an interior point

(3) X may be closed

(4) closure of X is countable

Options 1. 1
2. 2
3. 3
4. 4

Question Type : **MSQ**
Question ID : **1879801765**
Option 1 ID : **1879807057**
Option 2 ID : **1879807058**
Option 3 ID : **1879807059**
Option 4 ID : **1879807060**
Status : **Answered**
Chosen Option : **1**

Q.8 Which of the following sets is countable?

(1) The set of all functions from $\mathbb{Q}$ to $\mathbb{Q}$

(2) The set of all functions from $\mathbb{Q}$ to $\{0, 1\}$

(3) The set of all functions from $\mathbb{Q}$ to $\{0, 1\}$ which vanish outside a finite set

(4) The set of all subsets of $\mathbb{N}$

Options 1. 1
2. 2
3. 3
4. 4

Question Type : **MSQ**
Question ID : **1879801762**
Option 1 ID : **1879807045**
Option 2 ID : **1879807046**
Option 3 ID : **1879807047**
Option 4 ID : **1879807048**
Status : **Answered**
Chosen Option : **4**

Q.9 Let $(x_n)_{n\geq1}$ be a sequence of non-negative real numbers. Then, which of the following is true?

(1) $\liminf x_n = 0 \Rightarrow \lim x_n^2 = 0$

(2) $\limsup x_n = 0 \Rightarrow \lim x_n^2 = 0$

(3) $\liminf x_n = 0 \Rightarrow (x_n)_{n\geq1}$ is bounded

(4) $\liminf x_n^2 > 4 \Rightarrow \limsup x_n > 4$

Options 1. 1
2. 2
3. 3
4. 4

Question Type : **MSQ**
Question ID : **1879801761**
Option 1 ID : **1879807041**
Option 2 ID : **1879807042**
Option 3 ID : **1879807043**
Option 4 ID : **1879807044**
Status : **Answered**
Chosen Option : **3**

Q.10 Let $C[0,1]$ be the space of continuous real valued functions on $[0,1]$. Define
$\langle f,g\rangle = \int_0^1 f(t)(g(t))^2 dt$ for all $f,g \in C[0,1]$
Then which of the following statements is true?

(1) $\langle\ ,\ \rangle$ is an inner product on $C[0,1]$

(2) $\langle\ ,\ \rangle$ is a bilinear form on $C[0,1]$ but is not an inner product on $C[0,1]$

(3) $\langle\ ,\ \rangle$ is not a bilinear form on $C[0,1]$

(4) $\langle f,f\rangle \geq 0$ for all $f \in C[0,1]$

Options 1. 1
2. 2
3. 3
4. 4

Question Type : **MSQ**
Question ID : **1879801771**

Option 1 ID : **1879807081**
Option 2 ID : **1879807082**
Option 3 ID : **1879807083**
Option 4 ID : **1879807084**
Status : **Answered**
Chosen Option : **4**

Q.11

Let $A = \begin{pmatrix} 2 & 0 & 5 \\ 1 & 2 & 3 \\ -1 & 5 & 1 \end{pmatrix}$. The system of linear equations $AX = Y$ has a solution

(1) only for $Y = \begin{pmatrix} x \\ 0 \\ 0 \end{pmatrix}, x \in \mathbb{R}$

(2) only for $Y = \begin{pmatrix} 0 \\ y \\ 0 \end{pmatrix}, y \in \mathbb{R}$

(3) only for $Y = \begin{pmatrix} 0 \\ y \\ z \end{pmatrix}, y, z \in \mathbb{R}$

(4) for all $Y \in \mathbb{R}^3$

Options 1. 1
2. 2
3. 3
4. 4

Question Type : **MSQ**
Question ID : **1879801768**
Option 1 ID : **1879807069**
Option 2 ID : **1879807070**
Option 3 ID : **1879807071**
Option 4 ID : **1879807072**
Status : **Answered**
Chosen Option : **4**

Q.12

What is the sum of the following series?

$$\left(\frac{1}{2\cdot 3}+\frac{1}{2^2\cdot 3}\right)+\left(\frac{1}{2^2\cdot 3^2}+\frac{1}{2^3\cdot 3^2}\right)+\cdots+\left(\frac{1}{2^a\cdot 3^a}+\frac{1}{2^{a+1}\cdot 3^a}\right)+\cdots$$

(1) $\frac{3}{8}$

(2) $\frac{3}{10}$

(3) $\frac{3}{14}$

(4) $\frac{3}{16}$

Options 1. 1
2. 2
3. 3
4. 4

Question Type : **MSQ**
Question ID : **1879801764**
Option 1 ID : **1879807053**
Option 2 ID : **1879807054**
Option 3 ID : **1879807055**
Option 4 ID : **1879807056**
Status : **Not Answered**
Chosen Option : **--**

Q.13 A permutation σ of $[n]=\{1,2,\cdots,n\}$ is called irreducible, if the restriction $\sigma|_{[k]}$ is not a permutation of $[k]$ for any $1\le k<n$. Let a_n be the number of irreducible permutations of $[n]$. Then $a_1=1, a_2=1$ and $a_3=3$. The value of a_4 is

(1) 12

(2) 13

(3) 14

(4) 15

Options 1. 1
2. 2
3. 3
4. 4

Question Type : **MSQ**
Question ID : **1879801778**
Option 1 ID : **1879807109**
Option 2 ID : **1879807110**
Option 3 ID : **1879807111**
Option 4 ID : **1879807112**
Status : **Not Answered**
Chosen Option : **--**

Q.14 Let X be an infinite set. Consider the topology τ on X whose non-empty open sets are complements of finite sets. Then which of the following statements is true?

(1) X is disconnected

(2) X is compact

(3) No sequence in X converges in X

(4) Every sequence in X converges to a unique point in X

Options 1. 1
2. 2
3. 3
4. 4

Question Type : **MSQ**
Question ID : **1879801780**
Option 1 ID : **1879807117**
Option 2 ID : **1879807118**
Option 3 ID : **1879807119**
Option 4 ID : **1879807120**
Status : **Not Answered**
Chosen Option : **--**

Q.15 Let $T: \mathbb{C} \to \mathrm{M}_2(\mathbb{R})$ be the map given by

$$T(z) = T(x+iy) = \begin{bmatrix} x & y \\ -y & x \end{bmatrix}$$

Then which of the following statements is false?

(1) $T(z_1 z_2) = T(z_1)T(z_2)$ for all $z_1,\ z_2 \in \mathbb{C}$

(2) $T(z)$ is singular if and only if $z = 0$

(3) There does not exist non-zero $A \in \mathrm{M}_2(\mathbb{R})$ such that the trace of $T(z)A$ is zero for all $z \in \mathbb{C}$

(4) $T(z_1 + z_2) = T(z_1) + T(z_2)$ for all $z_1,\ z_2 \in \mathbb{C}$

Options 1. 1
2. 2
3. 3
4. 4

Question Type : **MSQ**
Question ID : **1879801773**
Option 1 ID : **1879807089**
Option 2 ID : **1879807090**
Option 3 ID : **1879807091**
Option 4 ID : **1879807092**
Status : **Answered**
Chosen Option : **3**

Q.16

Let S_5 be the symmetric group on five symbols. Then which of the following statements is false?

(1) S_5 contains a cyclic subgroup of order 6

(2) S_5 contains a non-Abelian subgroup of order 8

(3) S_5 does not contain a subgroup isomorphic to $\mathbb{Z}/2\mathbb{Z} \times \mathbb{Z}/2\mathbb{Z}$

(4) S_5 does not contain a subgroup of order 7

Options 1. 1
2. 2
3. 3
4. 4

Question Type : **MSQ**
Question ID : **1879801779**
Option 1 ID : **1879807113**
Option 2 ID : **1879807114**
Option 3 ID : **1879807115**
Option 4 ID : **1879807116**
Status : **Not Answered**
Chosen Option : **--**

Q.17

Consider the polynomial $f(z) = z^2 + az + p^{11}$, where $a \in \mathbb{Z}\setminus\{0\}$ and $p \geq 13$ is a prime. Suppose that $a^2 \leq 4p^{11}$. Which of the following statements is true?

(1) f has a zero on the imaginary axis

(2) f has a zero for which the real and imaginary parts are equal

(3) f has distinct roots

(4) f has exactly one real root

Options 1. 1
2. 2
3. 3
4. 4

Question Type : **MSQ**
Question ID : **1879801775**
Option 1 ID : **1879807097**
Option 2 ID : **1879807098**
Option 3 ID : **1879807099**
Option 4 ID : **1879807100**
Status : **Answered**
Chosen Option : **3**

Q.18

Let G be a group of order p^n, p a prime number and $n > 1$. Then which of the following is true?

(1) Centre of G has at least two elements

(2) G is always an Abelian group

(3) G has exactly two normal subgroups (i.e., G is a simple group)

(4) If H is any other group of order p^n, then G is isomorphic to H

Options 1. 1
2. 2
3. 3
4. 4

Question Type : **MSQ**
Question ID : **1879801777**
Option 1 ID : **1879807105**
Option 2 ID : **1879807106**
Option 3 ID : **1879807107**
Option 4 ID : **1879807108**
Status : **Not Answered**
Chosen Option : **--**

Q.19

Let $f: \mathbb{C} \to \mathbb{C}$ be an entire function with $f\left(\frac{1}{n}\right) = \frac{1}{n^2}$ for all $n \in \mathbb{N}$. Then which of the following statements is true?

(1) No such f exists

(2) such an f is not unique

(3) $f(z) = z^2$ for all $z \in \mathbb{C}$

(4) f need not be a polynomial function

Options 1. 1
2. 2
3. 3
4. 4

Question Type : **MSQ**
Question ID : **1879801776**
Option 1 ID : **1879807101**
Option 2 ID : **1879807102**
Option 3 ID : **1879807103**
Option 4 ID : **1879807104**
Status : **Answered**
Chosen Option : **3**

Q.20

For $z \in \mathbb{C}$, let $f(z) = \begin{cases} \frac{\bar{z}^2}{z} & \text{if } z \neq 0, \\ 0 & \text{otherwise.} \end{cases}$

Then which of the following statements is false?

(1) $f(z)$ is continuous everywhere

(2) $f(z)$ is not analytic in any open neighbourhood of zero

(3) $zf(z)$ satisfies the Cauchy-Riemann equations at zero

(4) $f(z)$ is analytic in some open subset of $\mathbb{C}$

Options 1. 1
2. 2
3. 3
4. 4

Question Type : **MSQ**
Question ID : **1879801774**
Option 1 ID : **1879807093**
Option 2 ID : **1879807094**
Option 3 ID : **1879807095**
Option 4 ID : **1879807096**
Status : **Answered**
Chosen Option : **3**

Q.21 Let ϕ be the solution of

$\phi(x) = 1 - 2x - 4x^2 + \int_0^x [3 + 6(x-t) - 4(x-t)^2]\phi(t)dt.$

Then $\phi(1)$ is equal to

(1) e^{-1}

(2) e^{-2}

(3) e

(4) e^2

Options 1. 1
2. 2
3. 3
4. 4

Question Type : **MSQ**
Question ID : **1879801787**
Option 1 ID : **1879807145**
Option 2 ID : **1879807146**
Option 3 ID : **1879807147**
Option 4 ID : **1879807148**
Status : **Not Answered**
Chosen Option : **--**

Q.22 Let $x = \xi$ be a solution of $x^4 - 3x^2 + x - 10 = 0$. The rate of convergence for the iterative method $x_{n+1} = 10 - x_n^4 + 3x_n^2$ is equal to

(1) 1

(2) 2

(3) 3

(4) 4

Options 1. 1
2. 2
3. 3
4. 4

Question Type : **MSQ**
Question ID : **1879801785**
Option 1 ID : **1879807137**
Option 2 ID : **1879807138**
Option 3 ID : **1879807139**
Option 4 ID : **1879807140**
Status : **Not Answered**
Chosen Option : **--**

Q.23 For the following system of ordinary differential equations

$$\frac{dx}{dt} = x(3 - 2x - 2y),$$

$$\frac{dy}{dt} = y(2 - 2x - y),$$

the critical point $(0, 2)$ is

(1) a stable spiral

(2) an unstable spiral

(3) a stable node

(4) an unstable node

Options 1. 1
2. 2

3. 3
4. 4

Question Type : **MSQ**
Question ID : **1879801781**
Option 1 ID : **1879807121**
Option 2 ID : **1879807122**
Option 3 ID : **1879807123**
Option 4 ID : **1879807124**
Status : **Answered**
Chosen Option : **4**

Q.24

Let $y=\phi(x)$ be the extremizing function for the functional $I(y)=\int_0^1 y^2\left(\frac{dy}{dx}\right)^2 dx$,

subject to $y(0)=0,\ y(1)=1$. Then $\phi(1/4)$ is equal to

(1) 1/2

(2) 1/4

(3) 1/8

(4) 1/12

Options 1. 1
2. 2
3. 3
4. 4

Question Type : **MSQ**
Question ID : **1879801786**
Option 1 ID : **1879807141**
Option 2 ID : **1879807142**
Option 3 ID : **1879807143**
Option 4 ID : **1879807144**
Status : **Not Answered**
Chosen Option : **--**

Q.25

Consider the system of ordinary differential equations

$$\frac{dx}{dt} = 4x^3y^2 - x^5y^4,$$

$$\frac{dy}{dt} = x^4y^5 + 2x^2y^3.$$

Then for this system there exists

(1) a closed path in $\{(x, y) \in \mathbb{R}^2 | x^2 + y^2 \leq 5\}$

(2) a closed path in $\{(x, y) \in \mathbb{R}^2 | 5 < x^2 + y^2 \leq 10\}$

(3) a closed path in $\{(x, y) \in \mathbb{R}^2 | x^2 + y^2 > 10\}$

(4) no closed path in $\mathbb{R}^2$

Options 1. 1
2. 2
3. 3
4. 4

Question Type : **MSQ**
Question ID : **1879801782**
Option 1 ID : **1879807125**
Option 2 ID : **1879807126**
Option 3 ID : **1879807127**
Option 4 ID : **1879807128**
Status : **Not Answered**
Chosen Option : **--**

Q.26

Let $u(x, y)$ be the solution of $\frac{\partial^2 u}{\partial x^2} + \frac{\partial^2 u}{\partial y^2} = 64$ in the unit disc $\{(x, y) | x^2 + y^2 < 1\}$ and such that u vanishes on the boundary of the disc. Then $u\left(\frac{1}{4}, \frac{1}{\sqrt{2}}\right)$ is equal to

(1) 7

(2) 16

(3) -7

(4) -16

Options 1. 1
2. 2
3. 3
4. 4

Question Type : **MSQ**
Question ID : **1879801783**
Option 1 ID : **1879807129**
Option 2 ID : **1879807130**

Option 3 ID : **1879807131**
Option 4 ID : **1879807132**
Status : **Not Answered**
Chosen Option : **--**

Q.27 Consider a mass-less infinite straight wire with one end fixed at O. Assume that the wire is rotating in a plane about the point O with constant angular velocity ω. Consider a bead of mass m sliding along the wire in the absence of external forces. Let $r(t)$ denote the distance of the bead from O at time $t \geq 0$, and $\frac{dr}{dt}(0) = 0$. Then which of the following statements is true?

(1) $\exists M > 0, \alpha > 0$ such that $r(t) > Me^{\alpha t},\ t > 0$

(2) $r(t) \to 0$ as $t \to \infty$

(3) $r(t)$ is a constant function

(4) $\frac{dr(t)}{dt}$ changes its sign for some $t > 0$

Options 1. 1
2. 2
3. 3
4. 4

Question Type : **MSQ**
Question ID : **1879801788**
Option 1 ID : **1879807149**
Option 2 ID : **1879807150**
Option 3 ID : **1879807151**
Option 4 ID : **1879807152**
Status : **Not Answered**
Chosen Option : **--**

Q.28 The Cauchy problem

$$y\frac{\partial z}{\partial x} - x\frac{\partial z}{\partial y} = 0$$

and $x_0(s) = \cos(s), y_0(s) = \sin(s), z_0(s) = 1,\ s > 0$ has

(1) a unique solution

(2) no solution

(3) more than one but finite number of solutions

(4) infinitely many solutions

Options 1. 1
2. 2
3. 3
4. 4

Question Type : **MSQ**
Question ID : **1879801784**
Option 1 ID : **1879807133**
Option 2 ID : **1879807134**
Option 3 ID : **1879807135**
Option 4 ID : **1879807136**
Status : **Not Answered**
Chosen Option : **--**

Q.29 In a 2^3 factorial design, the treatment combinations of three treatments A, B and C are allotted to 2 blocks of 4 plots each. Suppose the key block is as follows.

Key block: (1), a, bc, abc

Then the confounded treatment combination is

(1) AB

(2) AC

(3) BC

(4) ABC

Options 1. 1
2. 2
3. 3
4. 4

Question Type : **MSQ**
Question ID : **1879801799**
Option 1 ID : **1879807193**
Option 2 ID : **1879807194**
Option 3 ID : **1879807195**
Option 4 ID : **1879807196**
Status : **Not Answered**
Chosen Option : **--**

Q.30 Suppose data $(X_1, Y_1), (X_2, Y_2), \cdots, (X_n, Y_n)$ are generated as follows : $Y_1, Y_2, \cdots, Y_n \sim$ i. i. d. Bernoulli $\left(\frac{1}{2}\right)$ and $X_i | Y_i = y \sim$ Uniform $(0, y+1)$. Define

$$h(x) = \begin{cases} 1 & \text{if } x \geq 1 \\ 0 & \text{otherwise.} \end{cases}$$

Then, which of the following is a correct linear regression model for $m(x) = E(Y_i | X_i = x)$, in the sense that the true $m(x)$ is obtained for some values of the parameters $\alpha_0, \alpha_1, \alpha_2$ for all x?

(1) $m(x) = \alpha_0 + \alpha_1 x$

(2) $m(x) = \alpha_0 + \alpha_1 x + \alpha_2 x^2$

(3) $m(x) = \alpha_0 + \alpha_1 x + \alpha_2 x\, h(x)$

(4) $m(x) = \alpha_0 + \alpha_1 x + \alpha_2 h(x)$

Options 1. 1
2. 2
3. 3
4. 4

Question Type : **MSQ**
Question ID : **1879801796**
Option 1 ID : **1879807181**
Option 2 ID : **1879807182**
Option 3 ID : **1879807183**
Option 4 ID : **1879807184**
Status : **Not Answered**
Chosen Option : **--**

Q.31 Let X_1 and X_2 be a random sample of size 2 from Uniform $[0, \theta]$ distribution, $\theta > 0$. Define $M = \max\{X_1, X_2\}$. What is the confidence coefficient of the confidence interval $\left[\frac{3}{7}M, 2M\right]$ for θ?

(1) 0.6285 -

(2) 0.75 3[illegible]

(3) 0.8333

(4) 0.95

Options 1. 1
2. 2
3. 3
4. 4

Question Type : **MSQ**
Question ID : **1879801794**
Option 1 ID : **1879807173**
Option 2 ID : **1879807174**
Option 3 ID : **1879807175**
Option 4 ID : **1879807176**
Status : **Not Answered**
Chosen Option : **--**

Q.32 Let X be a real-valued random variable such that $E[e^X] < \infty$ and $E[e^X] = e^{E[X]}$. Then which of the following is correct?

(1) $P(X \geq a) \geq e^{E[X]-a}$ for all $a \in \mathbb{R}$

(2) $E[X^3] = (E[X])^3$

(3) $\text{Var}(X) \neq 0$

(4) $X \geq 0$ almost surely

Options 1. 1
2. 2
3. 3
4. 4

Question Type : **MSQ**
Question ID : **1879801789**
Option 1 ID : **1879807153**
Option 2 ID : **1879807154**

Option 3 ID : **1879807155**
Option 4 ID : **1879807156**
Status : **Not Answered**
Chosen Option : **--**

Q.33

Suppose $\binom{X_1}{Y_1}, \binom{X_2}{Y_2}, \binom{X_3}{Y_3}$ are i.i.d. observations from the Uniform distribution on the unit square$[0, 1] \times [0, 1]$. What is the probability that the rank correlation between the X_i and the Y_i values is 1?

(1) 0

(2) $\frac{1}{2}$

(3) $\frac{1}{3}$

(4) $\frac{1}{6}$

Options 1. 1
2. 2
3. 3
4. 4

Question Type : **MSQ**
Question ID : **1879801795**
Option 1 ID : **1879807177**
Option 2 ID : **1879807178**
Option 3 ID : **1879807179**
Option 4 ID : **1879807180**
Status : **Not Answered**
Chosen Option : **--**

Q.34

Let X and Y be independent Exponential random variables with means $\frac{1}{\lambda}$ and $\frac{1}{\mu}$ respectively with $\lambda \neq \mu$. Let $f_Z(z)$ denote the density function of $Z = X + Y$. Then for $z > 0$,

(1) $f_Z(z) = (\lambda + \mu)e^{-(\lambda+\mu)z}$

(2) $f_Z(z) = \frac{\lambda\mu}{\lambda+\mu} e^{\frac{-\lambda\mu}{\lambda+\mu}z}$

(3) $f_Z(z) = \frac{\lambda\mu}{\lambda-\mu}\left(e^{-\mu z} - e^{-\lambda z}\right)$

(4) $f_Z(z) = \begin{cases} \frac{\lambda\mu}{\lambda-\mu} e^{\frac{-\lambda\mu}{\lambda-\mu}z} \; if \; \lambda > \mu \\ \frac{\lambda\mu}{\mu-\lambda} e^{\frac{-\lambda\mu}{\mu-\lambda}z} \; if \; \mu > \lambda \end{cases}$

Options 1. 1
2. 2
3. 3
4. 4

Question Type : **MSQ**
Question ID : **1879801792**

Option 1 ID : **1879807165**
Option 2 ID : **1879807166**
Option 3 ID : **1879807167**
Option 4 ID : **1879807168**
Status : **Not Answered**
Chosen Option : **--**

Q.35 Let $X_1, X_2, \cdots, X_n$ $(n \geq 2)$ be a random sample from a distribution with probability density function f_θ, $\theta > 0$, unknown, where

$$f_\theta(x) = \begin{cases} \frac{2(\theta - x)}{\theta^2}, 0 \leq x \leq \theta, \\ 0, \quad \text{otherwise.} \end{cases}$$

Let $\bar{X}_n$ be the sample mean and $X_{(n)} = max\{X_1, X_2, \cdots, X_n\}$.

Then which of the following statements is correct?

(1) $X_{(n)}$ is sufficient for θ

(2) $X_{(n)}$ is unbiased for θ

(3) $3\bar{X}_n$ is unbiased for θ

(4) $3\bar{X}_n$ is sufficient for θ

Options 1. 1
2. 2
3. 3
4. 4

Question Type : **MSQ**
Question ID : **1879801793**
Option 1 ID : **1879807169**
Option 2 ID : **1879807170**
Option 3 ID : **1879807171**
Option 4 ID : **1879807172**
Status : **Not Answered**
Chosen Option : **--**

Q.36 To draw a sample of size $n(\geq 5)$ using a without replacement scheme from a finite population $\{U_1, U_2, \dots, U_N\}$ of size N, the first unit is chosen using $PPS(p_1, p_2, \dots, p_N)$ scheme and the remaining $(n-1)$ units are drawn using SRSWOR. Then the probability that U_2 is included in the sample is

(1) $\frac{N-n}{N-1}p_2 + \frac{1}{N-1}$

(2) $\frac{N-n}{N-1}p_2 + \frac{n-2}{N-1}$

(3) $\frac{N-n}{N-1}p_2 + \frac{N-n}{N-1}$

(4) $\frac{N-n}{N-1}p_2 + \frac{n-1}{N-1}$

Options 1. 1

2. 2

3. 3
4. 4

Question Type : **MSQ**
Question ID : **1879801798**
Option 1 ID : **1879807189**
Option 2 ID : **1879807190**
Option 3 ID : **1879807191**
Option 4 ID : **1879807192**
Status : **Not Answered**
Chosen Option : **--**

Q.37

Subject to the conditions

$0 \leq x \leq 10,\ 0 \leq y \leq 5,$

the minimum value of the function $4x - 5y + 10$ is

(1) 10

(2) 0

(3) -25

(4) -15

Options 1. 1
2. 2
3. 3
4. 4

Question Type : **MSQ**
Question ID : **1879801800**
Option 1 ID : **1879807197**
Option 2 ID : **1879807198**
Option 3 ID : **1879807199**
Option 4 ID : **1879807200**
Status : **Answered**
Chosen Option : **1**

Q.38

There are three urns U_1, U_2, U_3, each with balls of two colours. U_1 contains 2 white balls and 3 black balls, U_2 contains 3 white balls and 2 black balls and U_3 contains 5 white balls and 5 black balls. An urn is chosen at random and a ball is drawn from that urn at random. What is the probability that U_2 was chosen given that the ball picked is black in colour?

(1) $\frac{1}{3}$

(2) $\frac{4}{15}$

(3) $\frac{2}{15}$

(4) $\frac{1}{6}$

Options 1. 1
2. 2
3. 3
4. 4

Question Type :	**MSQ**
Question ID :	**1879801790**
Option 1 ID :	**1879807157**
Option 2 ID :	**1879807158**
Option 3 ID :	**1879807159**
Option 4 ID :	**1879807160**
Status :	**Not Answered**
Chosen Option :	**--**

Q.39 Let $(X_1, Y_1), (X_2, Y_2) \cdots (X_n, Y_n), n \geq 5,$ be a random sample from a Bivariate Normal $(\mu_1, \mu_2, \sigma_1, \sigma_2, \rho)$ distribution with all parameters unknown. For testing $H_0: \rho = 0$ against $H_1: \rho \neq 0$ if you use the usual t-test and your observed sample correlation coefficient is 0, then what is the p-value?

(1) 0

(2) 0.05

(3) 0.5

(4) 1

Options 1. 1
2. 2
3. 3
4. 4

Question Type :	**MSQ**
Question ID :	**1879801797**
Option 1 ID :	**1879807185**
Option 2 ID :	**1879807186**
Option 3 ID :	**1879807187**
Option 4 ID :	**1879807188**
Status :	**Not Answered**
Chosen Option :	**--**

Q.40

Let $\{X_n : n \geq 0\}$ be a two state Markov chain with state space $\{0, 1\}$ and transition matrix

$$P = \begin{bmatrix} \frac{1}{2} & \frac{1}{2} \\ \frac{1}{3} & \frac{2}{3} \end{bmatrix}$$

Assuming $X_0 = 0$, the expected return time to 0 is

(1) $\frac{5}{2}$

(2) $\frac{9}{4}$

(3) $\frac{3}{2}$

(4) 3

Options 1. 1

2. 2

3. 3

4. 4

Question Type : **MSQ**
Question ID : **1879801791**
Option 1 ID : **1879807161**
Option 2 ID : **1879807162**
Option 3 ID : **1879807163**
Option 4 ID : **1879807164**
Status : **Not Answered**
Chosen Option : **--**

Section : **Part C Mathematical Sciences**

Q.1 For each natural number $n \geq 1$, let $a_n = \frac{n}{10^{\lceil \log_{10} n \rceil}}$,

where $\lceil x \rceil$ =smallest integer greater than or equal to x. Which of the following statements are true?

(1) $\liminf_{n\to\infty} a_n = 0$

(2) $\liminf_{n\to\infty} a_n$ does not exist

(3) $\liminf_{n\to\infty} a_n = 0.15$

(4) $\limsup_{n\to\infty} a_n = 1$

Options 1. 1

2. 2

3. 3

4. 4

Question Type : **MSQ**
Question ID : **1879801802**
Option 1 ID : **1879807205**

Option 2 ID : **1879807206**
Option 3 ID : **1879807207**
Option 4 ID : **1879807208**
Status : **Not Answered**
Chosen Option : **--**

Q.2 Let n be a fixed natural number. Then the series

$$\sum_{m\geq n} \frac{(-1)^m}{m} \text{ is}$$

(1) Absolutely convergent

(2) Divergent

(3) Absolutely convergent if $n > 100$

(4) Convergent

Options 1. 1
2. 2
3. 3
4. 4

Question Type : **MSQ**
Question ID : **1879801801**
Option 1 ID : **1879807201**
Option 2 ID : **1879807202**
Option 3 ID : **1879807203**
Option 4 ID : **1879807204**
Status : **Answered**
Chosen Option : **1,3,4**

Q.3

Let $N \geq 5$ be an integer. Then which of the following statements are true?

(1) $\sum_{n=1}^{N} \frac{1}{n} \leq 1 + \log N$

(2) $\sum_{n=1}^{N} \frac{1}{n} < 1 + \log N$

(3) $\sum_{n=1}^{N} \frac{1}{n} \leq \log N$

(4) $\sum_{n=1}^{N} \frac{1}{n} \geq \log N$

Options 1. 1
2. 2
3. 3
4. 4

Question Type : **MSQ**
Question ID : **1879801806**
Option 1 ID : **1879807221**
Option 2 ID : **1879807222**
Option 3 ID : **1879807223**
Option 4 ID : **1879807224**
Status : **Answered**
Chosen Option : **1,2,3**

Q.4 Let $A \in M_3(\mathbb{R})$ and let $X = \{C \in GL_3(\mathbb{R}) \mid CAC^{-1} \text{is triangular}\}$. Then

(1) $X \neq \emptyset$.

(2) If $X = \emptyset$, then A is not diagonalisable over $\mathbb{C}$

(3) If $X = \emptyset$, then A is diagonalisable over $\mathbb{C}$

(4) If $X = \emptyset$, then A has no real eigenvalue

Options 1. 1
2. 2
3. 3
4. 4

Question Type : **MSQ**
Question ID : **1879801814**
Option 1 ID : **1879807253**
Option 2 ID : **1879807254**
Option 3 ID : **1879807255**
Option 4 ID : **1879807256**
Status : **Answered**

Chosen Option : **3,4**

Q.5 Let $U \subseteq \mathbb{R}^n$ be an open subset of $\mathbb{R}^n$ and $f: U \to \mathbb{R}^n$ be a C^∞ −function.
Suppose that for every $x \in U$, the derivative at x, df_x, is non singular. Then which of the following statements are true?

(1) If $V \subset U$ is open then $f(V)$ is open in $\mathbb{R}^n$

(2) $f: U \to f(U)$ is a homeomorphism.

(3) f is one-one

(4) If $V \subset U$ is closed, then $f(V)$ is closed in $\mathbb{R}^n$.

Options 1. 1
2. 2
3. 3
4. 4

Question Type : **MSQ**
Question ID : **1879801809**
Option 1 ID : **1879807233**
Option 2 ID : **1879807234**
Option 3 ID : **1879807235**
Option 4 ID : **1879807236**
Status : **Not Answered**
Chosen Option : **--**

Q.6 Let X be a finite dimensional inner product space over $\mathbb{C}$. Let $T: X \to X$ be any linear transformation. Then which of the following statements are true?

(1) T is unitary $\Rightarrow T$ is self adjoint

(2) T is self adjoint $\Rightarrow T$ is normal

(3) T is unitary $\Rightarrow T$ is normal

(4) T is normal $\Rightarrow T$ is unitary

Options 1. 1
2. 2
3. 3
4. 4

Question Type : **MSQ**
Question ID : **1879801816**
Option 1 ID : **1879807261**
Option 2 ID : **1879807262**
Option 3 ID : **1879807263**
Option 4 ID : **1879807264**
Status : **Not Answered**
Chosen Option : **--**

Q.7 Let $T: \mathbb{C}^n \to \mathbb{C}^n$ be a linear transformation, $n \geq 2$. Suppose 1 is the only eigenvalue of T. Which of the following statements are true?

(1) $T^k \neq I$ for any $k \in \mathbb{N}$

(2) $(T - I)^{n-1} = 0$

(3) $(T - I)^n = 0$

(4) $(T - I)^{n+1} = 0$

Options 1. 1
2. 2
3. 3
4. 4

Question Type : **MSQ**
Question ID : **1879801813**
Option 1 ID : **1879807249**
Option 2 ID : **1879807250**
Option 3 ID : **1879807251**
Option 4 ID : **1879807252**
Status : **Answered**
Chosen Option : **3,4**

Q.8 Let $\{a_n\}_{n\geq 1}$ be a bounded sequence of real numbers. Then

(1) Every subsequence of $\{a_n\}_{n\geq 1}$ is convergent

(2) There is exactly one subsequence of $\{a_n\}_{n\geq 1}$ which is convergent

(3) There are infinitely many subsequences of $\{a_n\}_{n\geq 1}$ which are convergent

(4) There is a subsequence of $\{a_n\}_{n\geq 1}$ which is convergent

Options 1. 1
2. 2
3. 3
4. 4

Question Type : **MSQ**
Question ID : **1879801803**
Option 1 ID : **1879807209**
Option 2 ID : **1879807210**
Option 3 ID : **1879807211**
Option 4 ID : **1879807212**
Status : **Answered**
Chosen Option : **3,4**

Q.9

Let (X, d) be a compact metric space. Let $T: X \to X$ be a continuous function satisfying $\inf_{n\in\mathbb{N}} d(T^n(x), T^n(y)) \neq 0$ for every $x, y \in X$ with $x \neq y$. Then which of the following statements are true?

(1) T is a one-one function

(2) T is not a one-one function

(3) Image of T is closed in X

(4) If X is finite, then T is onto

Options 1. 1
2. 2
3. 3
4. 4

Question Type : **MSQ**
Question ID : **1879801810**
Option 1 ID : **1879807237**
Option 2 ID : **1879807238**
Option 3 ID : **1879807239**
Option 4 ID : **1879807240**
Status : **Answered**
Chosen Option : **1,3**

Q.10 Which of the following statements are true?

(1) Any two quadratic forms of same rank in n-variables over $\mathbb{R}$ are isomorphic

(2) Any two quadratic forms of same rank in n-variables over $\mathbb{C}$ are isomorphic

(3) Any two quadratic forms in n-variables are isomorphic over $\mathbb{C}$

(4) A quadratic form in 4 variables may be isomorphic to a quadratic form in 10 variables

Options 1. 1
2. 2
3. 3
4. 4

Question Type : **MSQ**
Question ID : **1879801818**
Option 1 ID : **1879807269**
Option 2 ID : **1879807270**
Option 3 ID : **1879807271**
Option 4 ID : **1879807272**
Status : **Answered**
Chosen Option : **1,2**

Q.11

Let $f: [0,1] \to \mathbb{R}$ be a monotonic function with $f\left(\frac{1}{4}\right) f\left(\frac{3}{4}\right) < 0$.

Suppose $sup\{x \in [0,1]: f(x) < 0\} = \alpha$.

Which of the following statements are correct?

(1) $f(\alpha) < 0$

(2) If f is increasing, then $f(\alpha) \leq 0$

(3) If f is continuous and $\frac{1}{4} < \alpha < \frac{3}{4}$, then $f(\alpha) = 0$

(4) If f is decreasing, then $f(\alpha) < 0$

Options 1. 1
2. 2
3. 3
4. 4

Question Type : **MSQ**
Question ID : **1879801804**
Option 1 ID : **1879807213**
Option 2 ID : **1879807214**
Option 3 ID : **1879807215**
Option 4 ID : **1879807216**
Status : **Answered**
Chosen Option : **1,3,4**

Q.12 Let $p(x)$ be a polynomial function in one variable of odd degree and g be a continuous function from $\mathbb{R}$ to $\mathbb{R}$. Then which of the following statements are true.

(1) $\exists$ a point $x_0 \in \mathbb{R}$ such that $p(x_0) = g(x_0)$

(2) If g is a polynomial function then there exists $x_0 \in \mathbb{R}$ such that $p(x_0) = g(x_0)$

(3) If g is a bounded function there exists $x_0 \in \mathbb{R}$ such that $p(x_0) = g(x_0)$

(4) There is a unique point $x_0 \in \mathbb{R}$ such that $p(x_0) = g(x_0)$

Options 1. 1
2. 2
3. 3
4. 4

Question Type : **MSQ**
Question ID : **1879801811**
Option 1 ID : **1879807241**
Option 2 ID : **1879807242**
Option 3 ID : **1879807243**
Option 4 ID : **1879807244**
Status : **Answered**

Chosen Option : **1,2,3**

Q.13 Let $n \geq 1$ and $\alpha, \beta \in \mathbb{R}$ with $\alpha \neq \beta$. Suppose $A_n(\alpha, \beta) = [a_{ij}]$ is an $n \times n$ matrix such that $a_{ii} = \alpha$ and $a_{ij} = \beta$ for $i \neq j, 1 \leq i, j \leq n$. Let D_n be the determinant of $A_n(\alpha, \beta)$. Which of the following statements are true?

(1) $D_n = (\alpha - \beta)D_{n-1} + \beta$ for $n \geq 2$

(2) $\frac{D_n}{(\alpha-\beta)^{n-1}} = \frac{D_{n-1}}{(\alpha-\beta)^{n-2}} + \beta$ for $n \geq 2$

(3) $D_n = (\alpha + (n-1)\beta)^{n-1}(\alpha - \beta)$ for $n \geq 2$

(4) $D_n = (\alpha + (n-1)\beta)(\alpha - \beta)^{n-1}$ for $n \geq 2$

Options 1. 1
2. 2
3. 3
4. 4

Question Type : **MSQ**
Question ID : **1879801812**
Option 1 ID : **1879807245**
Option 2 ID : **1879807246**
Option 3 ID : **1879807247**
Option 4 ID : **1879807248**
Status : **Not Answered**
Chosen Option : **--**

Q.14 Let $f(x)$ be a real polynomial of degree 4. Suppose $f(-1) = 0, f(0) = 0,$

$f(1) = 1$ and $f^{(1)}(0) = 0$, where $f^{(k)}(a)$ is the value of k^{th} derivative of $f(x)$ at $x = a$. Which of the following statements are true?

(1) There exists $a \in (-1,1)$ such that $f^{(3)}(a) \geq 3$

(2) $f^{(3)}(a) \geq 3$ for all $a \in (-1,1)$

(3) $0 < f^{(3)}(0) \leq 2$

(4) $f^{(3)}(0) \geq 3$

Options 1. 1
2. 2
3. 3
4. 4

Question Type : **MSQ**
Question ID : **1879801805**
Option 1 ID : **1879807217**
Option 2 ID : **1879807218**
Option 3 ID : **1879807219**
Option 4 ID : **1879807220**
Status : **Answered**
Chosen Option : **1,3**

Q.15 Let $T: \mathbb{R}^4 \to \mathbb{R}^4$ be a linear transformation with characteristic polynomial $(x-2)^4$ and minimal polynomial $(x-2)^2$. Jordan canonical form of T can be

(1) $\begin{pmatrix} 2 & 0 & 0 & 0 \\ 1 & 2 & 0 & 0 \\ 0 & 0 & 2 & 0 \\ 0 & 0 & 1 & 2 \end{pmatrix}$

(2) $\begin{pmatrix} 2 & 0 & 0 & 0 \\ 0 & 2 & 0 & 0 \\ 0 & 0 & 2 & 0 \\ 0 & 0 & 1 & 2 \end{pmatrix}$

(3) $\begin{pmatrix} 2 & 0 & 0 & 0 \\ 0 & 2 & 0 & 0 \\ 0 & 0 & 2 & 0 \\ 0 & 0 & 0 & 2 \end{pmatrix}$

(4) $\begin{pmatrix} 2 & 0 & 0 & 0 \\ 1 & 2 & 0 & 0 \\ 0 & 1 & 2 & 0 \\ 0 & 0 & 0 & 2 \end{pmatrix}$

Options 1. 1
2. 2
3. 3
4. 4

Question Type :	**MSQ**
Question ID :	**1879801815**
Option 1 ID :	**1879807257**
Option 2 ID :	**1879807258**
Option 3 ID :	**1879807259**
Option 4 ID :	**1879807260**
Status :	**Answered**
Chosen Option :	**1,2**

Q.16 Let $L^2([-\pi,\pi])$ be the metric space of Lebesgue square integrable functions on $[-\pi,\pi]$ with a metric d given by

$$d(f,g) = \left[\int_{-\pi}^{\pi} (f(x) - g(x))^2 dx\right]^{1/2} \text{ for } f,g \in L^2([-\pi,\pi])$$

Consider the subset

$S = \{\sin(2^n x) : n \in \mathbb{N}\}$ of $L^2([-\pi,\pi])$.

Which of the following statements are true?

(1) S is bounded

(2) S is closed

(3) S is compact

(4) S is non-compact

Options 1. 1
2. 2

3. 3
4. 4

Question Type :	**MSQ**
Question ID :	**1879801807**
Option 1 ID :	**1879807225**
Option 2 ID :	**1879807226**
Option 3 ID :	**1879807227**
Option 4 ID :	**1879807228**
Status :	**Not Answered**
Chosen Option :	**--**

Q.17

Let $f : [0,1]^2 \to \mathbb{R}$ be a function defined by

$$f(x,y) = \frac{xy}{x^2+y^2} \text{ if either } x \neq 0 \text{ or } y \neq 0$$

$$= 0 \text{ if } x = y = 0.$$

Then which of the following statements are true?

(1) f is continuous at $(0,0)$

(2) f is a bounded function

(3) $\int_0^1 \int_0^1 f(x,y)dxdy$ exists

(4) f is continuous at $(1,0)$

Options
1. 1
2. 2
3. 3
4. 4

Question Type :	**MSQ**
Question ID :	**1879801808**
Option 1 ID :	**1879807229**
Option 2 ID :	**1879807230**
Option 3 ID :	**1879807231**
Option 4 ID :	**1879807232**
Status :	**Answered**
Chosen Option :	**1,2,4**

Q.18

Which of the following statements regarding quadratic forms in 3 variables are true?

(1) Any two quadratic forms of rank 3 are isomorphic over $\mathbb{R}$

(2) Any two quadratic forms of rank 3 are isomorphic over $\mathbb{C}$

(3) There are exactly three non zero quadratic forms of rank ≤ 3 upto isomorphism over $\mathbb{C}$

(4) There are exactly three non zero quadratic forms of rank 2 upto isomorphism over $\mathbb{R}$ and $\mathbb{C}$

Options 1. 1
2. 2
3. 3
4. 4

Question Type : **MSQ**
Question ID : **1879801817**
Option 1 ID : **1879807265**
Option 2 ID : **1879807266**
Option 3 ID : **1879807267**
Option 4 ID : **1879807268**
Status : **Answered**
Chosen Option : **1,2,3**

Q.19 Let $C[0,1]$ be the ring of all real valued continuous function on $[0,1]$.

Let $A = \{f \in C[0,1] : f(^1/_4) = f(^3/_4) = 0\}$. Then which of the following statements are true?

(1) A is an ideal in $C[0,1]$ but is not a prime ideal in $C[0,1]$

(2) A is a prime ideal in $C[0,1]$

(3) A is a maximal ideal in $C[0,1]$

(4) A is a prime ideal in $C[0,1]$, but is not a maximal ideal in $C[0,1]$

Options 1. 1
2. 2
3. 3
4. 4

Question Type : **MSQ**
Question ID : **1879801823**
Option 1 ID : **1879807289**
Option 2 ID : **1879807290**
Option 3 ID : **1879807291**
Option 4 ID : **1879807292**
Status : **Answered**
Chosen Option : **1**

Q.20

Which of the following statements are true?

(1) There exist three mutually disjoint subsets of $\mathbb{R}$, each of which is countable and dense in $\mathbb{R}$

(2) For each $n \in \mathbb{N}$, there exist n mutually disjoint subsets of $\mathbb{R}$, each of which is countable and dense in $\mathbb{R}$

(3) There exist countably infinite number of mutually disjoint subsets of $\mathbb{R}$, each of which is countable and dense in $\mathbb{R}$

(4) There exist uncountable number of mutually disjoint subsets of $\mathbb{R}$, each of which is countable and dense in $\mathbb{R}$

Options 1. 1
2. 2
3. 3
4. 4

Question Type : **MSQ**
Question ID : **1879801829**
Option 1 ID : **1879807313**
Option 2 ID : **1879807314**
Option 3 ID : **1879807315**
Option 4 ID : **1879807316**
Status : **Not Answered**
Chosen Option : **--**

Q.21 Consider the power series

$$f(z) = \sum_{n=0}^{\infty} (-1)^n \frac{z^{2n+1}}{(2n)!}$$

Which of the following are true?

(1) Radius of convergence of $f(z)$ is infinite

(2) The set $\{f(x): x \in \mathbb{R}\}$ is bounded

(3) The set $\{f(x): -1 < x < 1\}$ is bounded

(4) $f(z)$ has infinitely many zeroes

Options 1. 1
2. 2
3. 3
4. 4

Question Type : **MSQ**
Question ID : **1879801820**
Option 1 ID : **1879807277**
Option 2 ID : **1879807278**

Option 3 ID : **1879807279**
Option 4 ID : **1879807280**
Status : **Answered**
Chosen Option : **1,4**

Q.22 Let $F[X]$ be the polynomial ring in one variable over a field F. Then which of the following statements are true?

(1) $F[X]$ is a UFD

(2) $F[X]$ is a PID

(3) $F[X]$ is a Euclidean domain

(4) $F[X]$ is a PID but is not an Euclidean domain

Options 1. 1
2. 2
3. 3
4. 4

Question Type : **MSQ**
Question ID : **1879801826**
Option 1 ID : **1879807301**
Option 2 ID : **1879807302**
Option 3 ID : **1879807303**
Option 4 ID : **1879807304**
Status : **Answered**
Chosen Option : **1,2,3**

Q.23 Let $f(x) \in \mathbb{Z}[x]$ be a monic polynomial of degree n. Then which of the following are true?

(1) If $f(x)$ is irreducible in $\mathbb{Z}[x]$, then it is irreducible in $\mathbb{Q}[x]$

(2) If $f(x)$ is irreducible in $\mathbb{Q}[x]$, then it is irreducible in $\mathbb{Z}[x]$

(3) If $f(x)$ is reducible in $\mathbb{Z}[x]$, then it has a real root

(4) If $f(x)$ has a real root, then it is reducible in $\mathbb{Z}[x]$

Options 1. 1
2. 2
3. 3
4. 4

Question Type : **MSQ**
Question ID : **1879801827**
Option 1 ID : **1879807305**
Option 2 ID : **1879807306**
Option 3 ID : **1879807307**
Option 4 ID : **1879807308**
Status : **Answered**
Chosen Option : **1,2**

Q.24

Let $f: \mathbb{C} \to \mathbb{C}$ be an analytic function. For $z_0 \in \mathbb{C}$, which of the following statements are true?

(1) f can take the value z_0 at finitely many points in $\left\{\frac{1}{n} \mid n \in \mathbb{N}\right\}$

(2) $f(1/n) = z_0$ for all $n \in \mathbb{N} \Rightarrow f$ is the constant function z_0

(3) $f(n) = z_0$ for all $n \in \mathbb{N} \Rightarrow f$ is the constant function z_0

(4) $f(r) = z_0$ for all $r \in \mathbb{Q} \cap [1, 2] \Rightarrow f$ is the constant function z_0

Options 1. 1
2. 2
3. 3
4. 4

Question Type : **MSQ**
Question ID : **1879801822**
Option 1 ID : **1879807285**
Option 2 ID : **1879807286**
Option 3 ID : **1879807287**
Option 4 ID : **1879807288**
Status : **Answered**
Chosen Option : **1,3**

Q.25 Let I be an ideal of $\mathbb{Z}$. Then which of the following statements are true?

(1) I is a principal ideal

(2) I is a prime ideal of $\mathbb{Z}$

(3) If I is a prime ideal of $\mathbb{Z}$, then I is a maximal ideal in $\mathbb{Z}$

(4) If I is a maximal ideal in $\mathbb{Z}$, then I is a prime ideal of $\mathbb{Z}$

Options 1. 1
2. 2
3. 3
4. 4

Question Type : **MSQ**
Question ID : **1879801825**
Option 1 ID : **1879807297**
Option 2 ID : **1879807298**
Option 3 ID : **1879807299**
Option 4 ID : **1879807300**
Status : **Answered**
Chosen Option : **3,4**

Q.26 Let U be an open subset of $\mathbb{C}$ and $f: U \to \mathbb{C}$ be an analytic function. Then which of the following are true?

(1) If f is one-one, then $f(U)$ is open in $\mathbb{C}$

(2) If f is onto, then $U = \mathbb{C}$.

(3) If f is onto, then f is one-one

(4) If $f(U)$ is closed in $\mathbb{C}$, then $f(U)$ is connected

Options 1. 1
2. 2
3. 3
4. 4

Question Type : **MSQ**
Question ID : **1879801821**
Option 1 ID : **1879807281**
Option 2 ID : **1879807282**
Option 3 ID : **1879807283**
Option 4 ID : **1879807284**
Status : **Answered**
Chosen Option : **1,3,4**

Q.27 Consider $[n] = \{1,2, \dots, n\}$ with the discrete topology and let

$$X = \prod_{n \geq 1} [n]$$

be the product space with the product topology. For $x = (a_1, a_2, \dots) \in X$, define $T(x) = (1, a_1, a_2, \dots)$. Then which of the following statements are true?

(1) Let $x_n \in X$ for $n = 1,2,3, \dots$ be a sequence in X. Then it is convergent.

(2) X is a compact, Hausdorff space

(3) The map $T: X \to X$ is continuous

(4) The map $T: X \to X$ has a unique fixed point

Options 1. 1
2. 2
3. 3
4. 4

Question Type : **MSQ**
Question ID : **1879801830**
Option 1 ID : **1879807317**
Option 2 ID : **1879807318**
Option 3 ID : **1879807319**
Option 4 ID : **1879807320**
Status : **Not Answered**

Chosen Option : --

Q.28 Let F be a field. Then which of the following statements are true?

(1) All extensions of degree 2 of F are isomorphic as fields

(2) All finite extensions of F of same degree are isomorphic as fields if $Char(F) > 0$

(3) All finite extensions of F of same degree are isomorphic as fields if F is finite

(4) All finite normal extensions of F are isomorphic as fields if $Char(F) = 0$

Options 1. 1
2. 2
3. 3
4. 4

Question Type : **MSQ**
Question ID : **1879801828**
Option 1 ID : **1879807309**
Option 2 ID : **1879807310**
Option 3 ID : **1879807311**
Option 4 ID : **1879807312**
Status : **Not Answered**
Chosen Option : **--**

Q.29 Let $U \subset \mathbb{C}$ be an open connected set and $f : U \to \mathbb{C}$ be a non-constant analytic function.
Consider the following two sets:

$X = \{z \in U : f(z) = 0\}$

$Y = \{z \in U : f$ vanishes on an open neighbourhood of z in $U\}$.

Then which of the following statements are true?

(1) X is closed in U

(2) Y is closed in U

(3) X has empty interior

(4) Y is open in U

Options 1. 1
2. 2
3. 3
4. 4

Question Type : **MSQ**
Question ID : **1879801819**
Option 1 ID : **1879807273**
Option 2 ID : **1879807274**
Option 3 ID : **1879807275**
Option 4 ID : **1879807276**

Status : **Not Answered**
Chosen Option : **--**

Q.30 For a given integer k, which of the following statements are false?

(1) If $k \pmod{72}$ is a unit in $\mathbb{Z}_{72}$, then $k \pmod 9$ is a unit in $\mathbb{Z}_9$

(2) If $k \pmod{72}$ is a unit in $\mathbb{Z}_{72}$, then $k \pmod 8$ is a unit in $\mathbb{Z}_8$

(3) If $k \pmod 8$ is a unit in $\mathbb{Z}_8$, then $k \pmod{72}$ is a unit in $\mathbb{Z}_{72}$

(4) If $k \pmod 9$ is a unit in $\mathbb{Z}_9$, then $k \pmod{72}$ is a unit in $\mathbb{Z}_{72}$

Options 1. 1
2. 2
3. 3
4. 4

Question Type : **MSQ**
Question ID : **1879801824**
Option 1 ID : **1879807293**
Option 2 ID : **1879807294**
Option 3 ID : **1879807295**
Option 4 ID : **1879807296**
Status : **Not Answered**
Chosen Option : **--**

Q.31 Consider the initial value problem $\frac{dy}{dx} = x^2 + y^2,\ y(0) = 1;\ 0 \le x \le 1$. Then which of the following statements are true?

(1) There exists a unique solution in $\left[0, \frac{\pi}{4}\right]$

(2) Every solution is bounded in $\left[0, \frac{\pi}{4}\right]$

(3) The solution exhibits a singularity at some point in [0,1]

(4) The solution becomes unbounded in some subinterval of $\left[\frac{\pi}{4}, 1\right]$

Options 1. 1
2. 2
3. 3
4. 4

Question Type : **MSQ**
Question ID : **1879801831**
Option 1 ID : **1879807321**
Option 2 ID : **1879807322**
Option 3 ID : **1879807323**
Option 4 ID : **1879807324**
Status : **Not Answered**

Chosen Option : --

Q.32

Consider the eigenvalue problem

$((1+x^4)y')' + \lambda y = 0, x \in (0,1),$

$y(0) = 0, y(1) + 2y'(1) = 0.$

Then which of the following statements are true?

(1) all the eigenvalues are negative

(2) all the eigenvalues are positive

(3) there exist some negative eigenvalues and some positive eigenvalues

(4) there are no eigenvalues

Options 1. 1
2. 2
3. 3
4. 4

Question Type : **MSQ**
Question ID : **1879801832**
Option 1 ID : **1879807325**
Option 2 ID : **1879807326**
Option 3 ID : **1879807327**
Option 4 ID : **1879807328**
Status : **Not Answered**
Chosen Option : --

Q.33

A possible initial strip $(x_0, y_0, z_0, p_0, q_0)$ for the Cauchy problem $pq = 1$

where $p = \frac{\partial z}{\partial x}, q = \frac{\partial z}{\partial y}$ and $x_0(s) = s, y_0(s) = \frac{1}{s}, z_0(s) = 1$ for $s > 1$ is

(1) $\left(s, \frac{1}{s}, 1, \frac{1}{s}, s\right)$

(2) $\left(s, \frac{1}{s}, 1, -\frac{1}{s}, -s\right)$

(3) $\left(s, \frac{1}{s}, 1, \frac{1}{s}, -s\right)$

(4) $\left(s, \frac{1}{s}, 1, -\frac{1}{s}, s\right)$

Options 1. 1
2. 2
3. 3
4. 4

Question Type : **MSQ**
Question ID : **1879801834**
Option 1 ID : **1879807333**
Option 2 ID : **1879807334**
Option 3 ID : **1879807335**
Option 4 ID : **1879807336**
Status : **Not Answered**
Chosen Option : **--**

Q.34 Let $u(x,t)$ be the solution of

$$\frac{\partial^2 u}{\partial t^2} - \frac{\partial^2 u}{\partial x^2} = xt\ , \quad -\infty < x < \infty, t > 0,$$

$$u(x,0) = \frac{\partial u}{\partial t}(x,0) = 0, -\infty < x < \infty.$$

Then $u(2,3)$ is equal to

(1) 9

(2) 1

(3) 27

(4) 12

Options 1. 1
2. 2
3. 3
4. 4

Question Type : **MSQ**
Question ID : **1879801835**
Option 1 ID : **1879807337**
Option 2 ID : **1879807338**
Option 3 ID : **1879807339**
Option 4 ID : **1879807340**
Status : **Not Answered**
Chosen Option : **--**

Q.35

The values of α, A, B, C for which the quadrature formula

$$\int_{-1}^{1}(1-x)f(x)dx = Af(-\alpha)+Bf(0)+Cf(\alpha)$$

is exact for polynomials of highest possible degree, are

(1) $\alpha=\sqrt{\frac{3}{5}}, A=\frac{5}{9}+\frac{\sqrt{5}}{3\sqrt{3}}, B=\frac{8}{9}, C=\frac{5}{9}-\frac{\sqrt{5}}{3\sqrt{3}}$

(2) $\alpha=\sqrt{\frac{3}{5}}, A=\frac{5}{9}-\frac{\sqrt{5}}{3\sqrt{3}}, B=\frac{8}{9}, C=\frac{5}{9}+\frac{\sqrt{5}}{3\sqrt{3}}$

(3) $\alpha=\sqrt{\frac{3}{5}}, A=\frac{5}{9}\left(1-\frac{\sqrt{3}}{\sqrt{5}}\right), B=\frac{8}{9}, C=\frac{5}{9}\left(1+\frac{\sqrt{3}}{\sqrt{5}}\right)$

(4) $\alpha=\sqrt{\frac{3}{5}}, A=\frac{5}{9}\left(1+\frac{\sqrt{3}}{\sqrt{5}}\right), B=\frac{8}{9}, C=\frac{5}{9}\left(1-\frac{\sqrt{3}}{\sqrt{5}}\right)$

Options 1. 1
2. 2
3. 3
4. 4

Question Type : **MSQ**
Question ID : **1879801836**
Option 1 ID : **1879807341**
Option 2 ID : **1879807342**
Option 3 ID : **1879807343**
Option 4 ID : **1879807344**
Status : **Not Answered**
Chosen Option : **--**

Q.36

Assume that h_1, h_2, g_1 and $g_2 \in C([a,b])$.

Let $\phi(x) = f(x) + \lambda \int_a^b [h_1(t)g_1(x) + h_2(t)g_2(x)]\phi(t)dt$

be an integral equation. Consider the following statements:

S_1: If the given integral equation has a solution for some $f \in C([a,b])$, then

$\int_a^b f(t)g_1(t)dt = 0 = \int_a^b f(t)g_2(t)dt$.

S_2: The given integral equation has a unique solution for every $f \in C([a,b])$ if λ is not a characteristic number of the corresponding homogeneous equation.

Then

(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

Options 1. 1
2. 2
3. 3
4. 4

Question Type : **MSQ**
Question ID : **1879801840**
Option 1 ID : **1879807357**
Option 2 ID : **1879807358**
Option 3 ID : **1879807359**
Option 4 ID : **1879807360**
Status : **Not Answered**
Chosen Option : **--**

Q.37 The minimum value of the functional

$$I(y) = \int_0^\pi \left(\frac{dy}{dx}\right)^2 dx,$$

subject to $\int_0^\pi y^2(x)dx = 1, \ y(0) = 0 = y(\pi)$ is equal to

(1) 1/2

(2) 1

(3) 2

(4) 1/3

Options 1. 1

2. 2
3. 3
4. 4

Question Type : **MSQ**
Question ID : **1879801838**
Option 1 ID : **1879807349**
Option 2 ID : **1879807350**
Option 3 ID : **1879807351**
Option 4 ID : **1879807352**
Status : **Not Answered**
Chosen Option : **--**

Q.38 Consider a mechanical system whose position is described using the generalized coordinates $q_1, \ldots, q_n$. Let $T(q_1, \ldots, q_n, \dot{q}_1, \ldots, \dot{q}_n)$ be the kinetic energy of the system. If the generalized force Q_j, $1 \le j \le n$, acting on the system is zero, then the Lagrange equations of motion are

(1) $\frac{d}{dt}\left(\frac{\partial T}{\partial \dot{q}_j}\right) - \frac{\partial T}{\partial q_j} = 0,\ 1 \le j \le n$

(2) $\frac{d}{dt}\left(\frac{\partial T}{\partial q_j}\right) - \frac{\partial T}{\partial \dot{q}_j} = 0,\ 1 \le j \le n$

(3) $\frac{\partial}{\partial \dot{q}_j}\left(\frac{dT}{dt}\right) - 2\frac{\partial T}{\partial q_j} = 0,\ 1 \le j \le n$

(4) $\frac{\partial}{\partial \dot{q}_j}\left(\frac{dT}{dt}\right) - \frac{\partial T}{\partial q_j} = 0,\ 1 \le j \le n$

Options 1. 1
2. 2
3. 3
4. 4

Question Type : **MSQ**
Question ID : **1879801842**
Option 1 ID : **1879807365**
Option 2 ID : **1879807366**
Option 3 ID : **1879807367**
Option 4 ID : **1879807368**
Status : **Not Answered**
Chosen Option : **--**

Q.39

Let y be a solution of

$(1+x^2)y'' + (1+4x^2)y = 0, x > 0$

$y(0) = 0$. Then y has

(1) infinitely many zeros in $[0,1]$

(2) infinitely many zeros in $[1,\infty)$

(3) at least n zeros in $[0, n\pi], \forall n \in \mathbb{N}$

(4) at most $3n$ zeros in $[0, n\pi], \forall n \in \mathbb{N}$

Options 1. 1
2. 2
3. 3
4. 4

Question Type : **MSQ**
Question ID : **1879801833**
Option 1 ID : **1879807329**
Option 2 ID : **1879807330**
Option 3 ID : **1879807331**
Option 4 ID : **1879807332**
Status : **Not Answered**
Chosen Option : **--**

Q.40 Let $y = y(x) \in C^4([0,1])$ be an extremizing function for the functional

$I(y) = \int_0^1 \left[\left(\frac{d^2y}{dx^2}\right)^2 - 2y\right] dx$, satisfying $y(0) = 0 = y(1)$. Then an extremal $y(x)$, satisfying the given conditions at 0 and 1 together with the natural boundary conditions, is given by

(1) $\frac{x}{24}(x-1)^3$

(2) $\frac{x^2}{24}(x-1)^2$

(3) $\frac{x}{24}(x^3 - 2x^2 + 1)$

(4) $\frac{x}{24}(x^3 + x^2 - 2)$

Options 1. 1
2. 2
3. 3
4. 4

Question Type : **MSQ**
Question ID : **1879801839**
Option 1 ID : **1879807353**
Option 2 ID : **1879807354**

Option 3 ID : **1879807355**
Option 4 ID : **1879807356**
Status : **Not Answered**
Chosen Option : **--**

Q.41

The integral equation

$$\phi(x) = 1 + \frac{2}{\pi} \int_0^{\pi} (\cos^2 x)\, \phi(t) dt$$

has

(1) no solution

(2) unique solution

(3) more than one but finitely many solutions

(4) infinitely many solutions

Options 1. 1
2. 2
3. 3
4. 4

Question Type : **MSQ**
Question ID : **1879801841**
Option 1 ID : **1879807361**
Option 2 ID : **1879807362**
Option 3 ID : **1879807363**
Option 4 ID : **1879807364**
Status : **Not Answered**
Chosen Option : **--**

Q.42

Consider the ordinary differential equation (ODE)

$$\begin{cases} y'(x) + y(x) = 0, & x > 0, \\ y(0) = 1, \end{cases}$$

and the following numerical scheme to solve the ODE

$$\begin{cases} \frac{Y_{n+1} - Y_{n-1}}{2h} + Y_{n-1} = 0, \ n \geq 1, \\ Y_0 = 1, Y_1 = 1. \end{cases}$$

If $0 < h < \frac{1}{2}$, then which of the following statements are true?

(1) $(Y_n) \to \infty$ as $n \to \infty$

(2) $(Y_n) \to 0$ as $n \to \infty$

(3) (Y_n) is bounded

(4) $\max_{nh \in [0,T]} |y(nh) - Y_n| \to \infty$ as $T \to \infty$

Options 1. 1
2. 2
3. 3
4. 4

Question Type :	**MSQ**
Question ID :	**1879801837**
Option 1 ID :	**1879807345**
Option 2 ID :	**1879807346**
Option 3 ID :	**1879807347**
Option 4 ID :	**1879807348**
Status :	**Not Answered**
Chosen Option :	**--**

Q.43 Consider the random effect model $y_{ij} = \mu + b_i + \varepsilon_{ij}, i = 1, \ldots, 5; j = 1, \cdots, 10$ where $b_i \sim$ i.i.d. $N(0, \tau^2)$ and $\varepsilon_{ij} \sim$ i.i.d. $N(0, \sigma^2)$ are all independent of each other. The parameter space for the model is $(\mu, \sigma^2, \tau^2) \in \mathbb{R} \times [0, \infty) \times [0, \infty)$. Let $\hat{\sigma}_u^2$ and $\hat{\tau}_u^2$ be the usual unbiased ANOVA estimators of σ^2 and τ^2 respectively, and $\hat{\sigma}_m^2$ and $\hat{\tau}_m^2$ be the maximum likelihood estimators of σ^2 and τ^2 respectively. Then, which of the following events can happen with positive probability for some parameter values?

(1) $\hat{\sigma}_u^2$ is negative

(2) $\hat{\tau}_u^2$ is negative

(3) $\hat{\sigma}_m^2$ is negative

(4) $\hat{\tau}_m^2$ is negative

Options 1. 1
2. 2

3. 3
4. 4

Question Type : **MSQ**
Question ID : **1879801853**
Option 1 ID : **1879807409**
Option 2 ID : **1879807410**
Option 3 ID : **1879807411**
Option 4 ID : **1879807412**
Status : **Not Answered**
Chosen Option : **--**

Q.44 Let $\{X_n : n \geq 0\}$ be a Markov chain with state space $\mathbb{N} \cup \{0\}$ such that the transition probabilities are given by

$$p_{ij} = \begin{cases} q & \text{for } j = 0 \\ 1-q & \text{for } j = i+1 \\ 0 & \text{otherwise} \end{cases}$$

for $= 0,1,2, \ldots$, where $0 < q < 1$. Then which of the following statements are correct?

(1) The Markov chain is irreducible

(2) The Markov chain is aperiodic

(3) $p_{00}^{(n)} = q$ for all $n \geq 1$

(4) The Markov chain is positive recurrent

Options 1. 1
2. 2
3. 3
4. 4

Question Type : **MSQ**
Question ID : **1879801845**
Option 1 ID : **1879807377**
Option 2 ID : **1879807378**
Option 3 ID : **1879807379**
Option 4 ID : **1879807380**
Status : **Not Answered**
Chosen Option : **--**

Q.45 A random variable T has a symmetric distribution if T and $-T$ have the same distribution. Let X and Y be independent random variables. Then which of the following statements are correct?

(1) If X and Y have the same distribution then $X - Y$ has a symmetric distribution

(2) If $X \sim N(3, 1)$ and $Y \sim N(2, 2)$, then $2X - 3Y$ has a symmetric distribution

(3) If X and Y have the same symmetric distribution, then $X + Y$ has a symmetric distribution

(4) If X has a symmetric distribution, then XY has a symmetric distribution

Options 1. 1
2. 2
3. 3

4. 4

Question Type : **MSQ**
Question ID : **1879801847**
Option 1 ID : **1879807385**
Option 2 ID : **1879807386**
Option 3 ID : **1879807387**
Option 4 ID : **1879807388**
Status : **Not Answered**
Chosen Option : **--**

Q.46 Let $\{(X_n, Y_n): n \geq 1\}$ and (X, Y) be random variables, on $(\Omega, \mathcal{F}, P)$. Then which of the following statements are correct?

(1) If $X_n \to X$ almost surely, $Y_n \to Y$ almost surely, then $X_n + Y_n \to X + Y$ in distribution

(2) If $X_n \to X$ in probability, $Y_n \to Y$ almost surely, then $X_n + Y_n \to X + Y$ in distribution

(3) If $X_n \to X$ in probability, $Y_n \to Y$ in probability, then $X_n + Y_n \to X + Y$ in distribution

(4) If $X_n \to X$ in distribution, $Y_n \to Y$ in distribution, then $X_n + Y_n \to X + Y$ in distribution

Options 1. 1
2. 2
3. 3
4. 4

Question Type : **MSQ**
Question ID : **1879801844**
Option 1 ID : **1879807373**
Option 2 ID : **1879807374**
Option 3 ID : **1879807375**
Option 4 ID : **1879807376**
Status : **Not Answered**
Chosen Option : **--**

Q.47 Consider a Balanced Incomplete Block Design (v, b, r, k, λ) of v treatments and b blocks of k plots each. Let N be the $v \times b$ incidence matrix of the design. Then which of the following statements are correct?

(1) $\lambda(k-1) = r(v-1)$

(2) $b \geq v$

(3) rank $(NN') = v$

(4) trace $(NN') = bk$

Options 1. 1
2. 2
3. 3
4. 4

Question Type : **MSQ**
Question ID : **1879801857**
Option 1 ID : **1879807425**
Option 2 ID : **1879807426**

Option 3 ID : **1879807427**
Option 4 ID : **1879807428**
Status : **Not Answered**
Chosen Option : **--**

Q.48 Suppose in a single service queue, customers arrive at a Poisson rate of one per ten minutes, and the service time is Exponential at a rate of one service per five minutes. Let P_n be the probability that there are n customers in the system in steady state. Then which of the following statements are correct?

(1) $P_{n+1} = \frac{1}{2} P_n$ for all $n \geq 0$

(2) The expected number of customers in the system is 1 in steady state

(3) The expected number of customers in the system is 2 in steady state

(4) The expected amount of time a customer spends in the system in steady state is 10 minutes

Options 1. 1
2. 2
3. 3
4. 4

Question Type : **MSQ**
Question ID : **1879801859**
Option 1 ID : **1879807433**
Option 2 ID : **1879807434**
Option 3 ID : **1879807435**
Option 4 ID : **1879807436**
Status : **Not Answered**
Chosen Option : **--**

Q.49 Suppose the conditional p.d.f. of a random variable X given θ is

$$f(x|\theta) = \begin{cases} \frac{2x}{\theta^2}, & 0 < x < \theta \\ 0, & \text{otherwise} \end{cases}$$

where the prior distribution of θ is Uniform $(0,1)$. Based on a single observation x from X, which of the following statements are correct?

(1) The Bayes estimate for θ under squared error loss function is $-x \log_e x$

(2) The Bayes estimate for θ under squared error loss function is $-\frac{x \log_e x}{1-x}$

(3) The Bayes estimate for θ under absolute error loss function is x

(4) The Bayes estimate for θ under absolute error loss function is $\frac{2x}{1+x}$

Options 1. 1
2. 2
3. 3
4. 4

Question Type : **MSQ**
Question ID : **1879801852**

Option 1 ID : **1879807405**
Option 2 ID : **1879807406**
Option 3 ID : **1879807407**
Option 4 ID : **1879807408**
Status : **Not Answered**
Chosen Option : **--**

Q.50 Let $\{X_i : i \geq 1\}$ be i.i.d. observations with $E(X_i) = 0$ and Var $(X_i) = \sigma^2 > 0$. Then which of the following statements are correct?

(1) $\frac{1}{n}\sum_{i=1}^{n}(X_{2i-1} - X_{2i})^2$ is consistent for σ^2

(2) $\frac{1}{n}\sum_{i=1}^{n}(X_i - \bar{X})^2$ is consistent for σ^2

(3) $\frac{1}{n}\sum_{i=1}^{n}X_i^2$ is consistent for σ^2

(4) $\frac{1}{n-1}\sum_{i=1}^{n}(X_i - \bar{X})^2$ is consistent for σ^2

Options 1. 1
2. 2
3. 3
4. 4

Question Type : **MSQ**
Question ID : **1879801849**
Option 1 ID : **1879807393**
Option 2 ID : **1879807394**
Option 3 ID : **1879807395**
Option 4 ID : **1879807396**
Status : **Not Answered**
Chosen Option : **--**

Q.51 Suppose that $M_{p\times p} \sim \text{Wishart}_p(I, m)$ and $\boldsymbol{Z} \sim N_p(\boldsymbol{0}, \Sigma)$ are independent where Σ is positive definite. Let $\boldsymbol{a} \in \mathbb{R}^p$ be a fixed p-vector such that $\boldsymbol{a} \neq \boldsymbol{0}$ and define $\boldsymbol{d} = \boldsymbol{Z}/\|\boldsymbol{Z}\|$. Then which of the following random variables has a χ^2 distribution, possibly after being scaled by a constant factor?

(1) $\boldsymbol{d}' M^{-1}\boldsymbol{d}$

(2) $(\boldsymbol{d}' M^{-1}\boldsymbol{d})^{-1}$

(3) $\boldsymbol{a}' M \boldsymbol{a}$

(4) $(\boldsymbol{a}' M^{-1}\boldsymbol{a})^{-1}$

Options 1. 1
2. 2
3. 3
4. 4

Question Type : **MSQ**
Question ID : **1879801855**
Option 1 ID : **1879807417**

Option 2 ID : **1879807418**
Option 3 ID : **1879807419**
Option 4 ID : **1879807420**
Status : **Not Answered**
Chosen Option : **--**

Q.52 Let X_1, X_2 and X_3 be i.i.d. Normal random variables with mean θ and variance θ^2 where $\theta \in \mathbb{R}$ is unknown. Then which of the following statements are correct?

(1) $\frac{X_1+2X_2+3X_3}{6}$ is unbiased for θ

(2) $\frac{X_1^2+4X_2^2+9X_3^2}{14}$ is unbiased for θ^2

(3) $\frac{2X_1+X_3^2}{2}$ is unbiased for $\theta(1+\theta)$

(4) $X_2\left(1-\frac{X_2}{2}\right)$ is unbiased for $\theta(1-\theta)$

Options 1. 1
2. 2
3. 3
4. 4

Question Type : **MSQ**
Question ID : **1879801860**
Option 1 ID : **1879807437**
Option 2 ID : **1879807438**
Option 3 ID : **1879807439**
Option 4 ID : **1879807440**
Status : **Not Answered**
Chosen Option : **--**

Q.53 Suppose $X_1, X_2, \dots, X_n$ are i.i.d. Uniform $(\theta, 2\theta), \theta > 0$. Let $X_{(1)} = \min\{X_1, \dots, X_n\}$ and $X_{(n)} = \max\{X_1, \dots, X_n\}$. Then which of the following statements are correct?

(1) $(X_{(1)}, X_{(n)})$ is jointly sufficient and complete for θ

(2) $(X_{(1)}, X_{(n)})$ is jointly sufficient but not complete for θ

(3) $\frac{X_{(n)}}{2}$ is a maximum likelihood estimator for θ

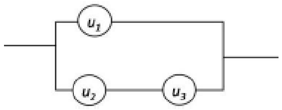
(4) $X_{(1)}$ is a maximum likelihood estimator for θ

Options 1. 1
2. 2
3. 3
4. 4

Question Type : **MSQ**
Question ID : **1879801848**
Option 1 ID : **1879807389**
Option 2 ID : **1879807390**
Option 3 ID : **1879807391**

Option 4 ID : **1879807392**
Status : **Not Answered**
Chosen Option : **--**

Q.54 Consider the following system with three independent components u_1, u_2 and u_3:



Suppose that the failure probability of each component is p, and let $f(p)$ be the probability that the whole system is still functioning. Then which of the following statements are correct?

(1) $f\left(\frac{1}{2}\right) = \frac{5}{8}$

(2) $f\left(\frac{1}{2}\right) = \frac{3}{8}$

(3) $f\left(\frac{1}{3}\right) = \frac{22}{27}$

(4) $f\left(\frac{1}{4}\right) = \frac{50}{64}$

Options 1. 1
2. 2
3. 3
4. 4

Question Type : **MSQ**
Question ID : **1879801858**
Option 1 ID : **1879807429**
Option 2 ID : **1879807430**
Option 3 ID : **1879807431**
Option 4 ID : **1879807432**
Status : **Not Answered**
Chosen Option : **--**

Q.55 Given data $\{(x_i, y_i) : i = 1,2, \dots, n\}$ where $n \geq 2$ and not all x_i's are identical, the simple linear regression model $y = \alpha + \beta x + \varepsilon$ is fit. Let h_{ii} be the i^{th}diagonal element of the Hat matrix $H = X\,(X'X)^{-1}X'$, where $X_{n\times 2}$ is the corresponding model matrix. Then which of the following are possible for some choice of n and $x_1, x_2, \dots, x_n$?

(1) $h_{ii} = -1$ for some i

(2) $h_{ii} = 0$ for some i

(3) $h_{ii} = 1$ for some i

(4) All h_{ii} are equal

Options 1. 1
2. 2
3. 3
4. 4

Question Type : **MSQ**
Question ID : **1879801854**
Option 1 ID : **1879807413**
Option 2 ID : **1879807414**
Option 3 ID : **1879807415**
Option 4 ID : **1879807416**
Status : **Not Answered**
Chosen Option : **--**

Q.56 Consider a Markov chain with state space S. Let $d(k)$ denote the period of state $k \in S$. Which of the following statements are correct?

(1) For $i, j \in S$, if $\exists\, n, m > 0$ such that $p_{ij}^{(n)} > 0$ and $p_{ji}^{(m)} > 0$ and i is recurrent, then j is recurrent

(2) For $i, j \in S$, if $\exists\, n, m > 0$ such that $p_{ij}^{(n)} > 0$ and $p_{ji}^{(m)} > 0$, then $d(i) = d(j)$

(3) For $i, j \in S$, if $\exists\, r > 0$ such that $p_{ij}^{(r)} > 0$ then j cannot be transient

(4) For $i, j \in S$, if $\exists\, r > 0$ such that $p_{ij}^{(r)} > 0$ and i is null recurrent then j is positive recurrent

Options 1. 1
2. 2
3. 3
4. 4

Question Type : **MSQ**
Question ID : **1879801846**
Option 1 ID : **1879807381**
Option 2 ID : **1879807382**
Option 3 ID : **1879807383**
Option 4 ID : **1879807384**
Status : **Not Answered**
Chosen Option : **--**

Q.57 Let X be a discrete random variable with sample space $\mathcal{X} = \{1, 2, \ldots, 10\}$ and probability mass function $p(x), x \in \mathcal{X}$. Consider testing the hypothesis

$H_0 : p(x) = \frac{1}{10}, x \in \mathcal{X}$ against

$H_1 : p(x) \propto x,\ \ x \in \mathcal{X}$

based on a single observation X. Then which of the following statements are correct?

(1) The test with critical region $\{X \geq 2\}$ is most powerful of its size

(2) The test with critical region $\{X < 2\}$ is unbiased at level $\alpha = 0.1$

(3) If $X = 7$ the p-value of the most powerful test is 0.6

(4) There exists a nonrandomized test of size 0.05

Options 1. 1

2. 2
3. 3
4. 4

Question Type : **MSQ**
Question ID : **1879801850**
Option 1 ID : **1879807397**
Option 2 ID : **1879807398**
Option 3 ID : **1879807399**
Option 4 ID : **1879807400**
Status : **Not Answered**
Chosen Option : **--**

Q.58 Let X and Y be real-valued independent random variables on Ω. Then which of the following statements are correct?

(1) $$E[\cos(tX+uY)] = E[\cos(tX)]E[\cos(uY)] - E[\sin(tX)]\,E[\sin(uY)] \text{ for all } t,u \in \mathbb{R}$$

(2) If $X \sim N(2,1)$ and $Y \sim N(0,2)$, then $\text{Var}(X+Y) = 3$ where $N(\mu,\sigma^2)$ represents Normal distribution with mean μ and variance σ^2

(3) $\{X=a\} \cap \{Y=b\} = \phi$ for all $a,b \in \mathbb{R}$

(4) $P(\{X=a\} \cap \{Y=b\}) = P(\{X=a\})P(\{Y=b\})$ for all $a,b \in \mathbb{R}$

Options 1. 1
2. 2
3. 3
4. 4

Question Type : **MSQ**
Question ID : **1879801843**
Option 1 ID : **1879807369**
Option 2 ID : **1879807370**
Option 3 ID : **1879807371**
Option 4 ID : **1879807372**
Status : **Not Answered**
Chosen Option : **--**

Q.59 Let $\{X_n : n \geq 1\}$ be i.i.d. with common unknown continuous distribution function $F(x-\theta)$, where θ is the unique median of F. Define

$$Y_i = \begin{cases} 1 & \text{if } X_i > 1 \\ 0 & \text{if } X_i \leq 1 \end{cases} \quad \text{and } S_n = \sum_{i=1}^{n} Y_i .$$

For testing $H_0 : \theta = 1$ against $H_1 : \theta > 1$, which of the following statements are correct?

(1) $S_n \sim \text{Binomial}\left(n, \frac{1}{2}\right)$ under H_0

(2) Test based on S_n is distribution-free under H_1

(3) Right-tailed test based on S_n is unbiased

(4) The sequence of right-tailed tests based on $S_n, n \geq 1$, is consistent

Options 1. 1
2. 2
3. 3
4. 4

Question Type : **MSQ**
Question ID : **1879801851**
Option 1 ID : **1879807401**
Option 2 ID : **1879807402**
Option 3 ID : **1879807403**
Option 4 ID : **1879807404**
Status : **Not Answered**
Chosen Option : **--**

Q.60 To estimate the population total $Y = \sum_{i=1}^{N} y_i$, where $y_1, y_2, \dots, y_N$ are study variables and N is the size of the finite population, a sample of size n is drawn using $PPSWR(p_1, p_2, \dots, p_N)$ scheme. If $\hat{Y}_{HH}$ is the Hansen-Hurwitz estimator for Y then which of the following are correct?

(1) $\hat{Y}_{HH}$ is unbiased for Y

(2) $\text{Var}(\hat{Y}_{HH}) = \frac{1}{n}\left\{\sum_{i=1}^{N} \frac{y_i^2}{p_i} - Y^2\right\}$

(3) $\text{Var}(\hat{Y}_{HH}) = \frac{1}{n}\sum_{i=1}^{N} \left\{\frac{y_i}{p_i} - E(\hat{Y}_{HH})\right\}^2 p_i$

(4) $\text{Var}(\hat{Y}_{HH}) = \frac{1}{n(n-1)}\sum_{i=1}^{N}\sum_{j=1, j\neq i}^{N} \left(\frac{y_i}{p_i} - \frac{y_j}{p_j}\right)^2 p_i p_j$

Options 1. 1
2. 2
3. 3
4. 4

Question Type : **MSQ**
Question ID : **1879801856**
Option 1 ID : **1879807421**
Option 2 ID : **1879807422**
Option 3 ID : **1879807423**
Option 4 ID : **1879807424**
Status : **Not Answered**
Chosen Option : **--**

Government of India
Ministry of Human Resource Development

JOINT CSIR - UGC NET DECEMBER 2019

Challenges regarding Answer Key

Candidate Details

Claimed Answer Key List

Sno	Subject	QuestionID	Correct Option(s)	Option(s) ID claimed				Remarks
1	Mathematical Sciences	1879801741	1879806962	1879806961	1879806962	1879806963	1879806964	PART-A
2	Mathematical Sciences	1879801742	1879806968	1879806965	1879806966	1879806967	1879806968	PART-A
3	Mathematical Sciences	1879801743	1879806971	1879806969	1879806970	1879806971	1879806972	PART-A
4	Mathematical Sciences	1879801744	1879806974	1879806973	1879806974	1879806975	1879806976	PART-A
5	Mathematical Sciences	1879801745	1879806979	1879806977	1879806978	1879806979	1879806980	PART-A
6	Mathematical Sciences	1879801746	1879806983	1879806981	1879806982	1879806983	1879806984	PART-A
7	Mathematical Sciences	1879801747	1879806985	1879806985	1879806986	1879806987	1879806988	PART-A
8	Mathematical Sciences	1879801748	1879806990	1879806989	1879806990	1879806991	1879806992	PART-A
9	Mathematical Sciences	1879801749	1879806994	1879806993	1879806994	1879806995	1879806996	PART-A
10	Mathematical Sciences	1879801750	1879806998	1879806997	1879806998	1879806999	1879807000	PART-A
11	Mathematical Sciences	1879801751	1879807002	1879807001	1879807002	1879807003	1879807004	PART-A
12	Mathematical Sciences	1879801752	1879807007	1879807005	1879807006	1879807007	1879807008	PART-A
13	Mathematical Sciences	1879801753	1879807009	1879807009	1879807010	1879807011	1879807012	PART-A
14	Mathematical Sciences	1879801754	1879807015	1879807013	1879807014	1879807015	1879807016	PART-A
15	Mathematical Sciences	1879801755	1879807017	1879807017	1879807018	1879807019	1879807020	PART-A
16	Mathematical Sciences	1879801756	1879807024	1879807021	1879807022	1879807023	1879807024	PART-A
17	Mathematical Sciences	1879801757	1879807028	1879807025	1879807026	1879807027	1879807028	PART-A
18	Mathematical Sciences	1879801758	1879807031	1879807029	1879807030	1879807031	1879807032	PART-A
19	Mathematical Sciences	1879801759	1879807035	1879807033	1879807034	1879807035	1879807036	PART-A
20	Mathematical Sciences	1879801760	1879807037	1879807037	1879807038	1879807039	1879807040	PART-A
21	Mathematical Sciences	1879801761	1879807042	1879807041	1879807042	1879807043	1879807044	PART-B

22	Mathematical Sciences	1879801762	1879807047	1879807045	1879807046	1879807047	1879807048	PART-B
23	Mathematical Sciences	1879801763	1879807050	1879807049	1879807050	1879807051	1879807052	PART-B
24	Mathematical Sciences	1879801764	1879807054	1879807053	1879807054	1879807055	1879807056	PART-B
25	Mathematical Sciences	1879801765	1879807059	1879807057	1879807058	1879807059	1879807060	PART-B
26	Mathematical Sciences	1879801766	1879807063	1879807061	1879807062	1879807063	1879807064	PART-B
27	Mathematical Sciences	1879801767	1879807067	1879807065	1879807066	1879807067	1879807068	PART-B
28	Mathematical Sciences	1879801768	1879807072	1879807069	1879807070	1879807071	1879807072	PART-B
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30	Mathematical Sciences	1879801770	1879807079	1879807077	1879807078	1879807079	1879807080	PART-B
31	Mathematical Sciences	1879801771	1879807083	1879807081	1879807082	1879807083	1879807084	PART-B
32	Mathematical Sciences	1879801772	1879807087	1879807085	1879807086	1879807087	1879807088	PART-B
33	Mathematical Sciences	1879801773	1879807091	1879807089	1879807090	1879807091	1879807092	PART-B
34	Mathematical Sciences	1879801774	1879807096	1879807093	1879807094	1879807095	1879807096	PART-B
35	Mathematical Sciences	1879801775	1879807099	1879807097	1879807098	1879807099	1879807100	PART-B
36	Mathematical Sciences	1879801776	1879807103	1879807101	1879807102	1879807103	1879807104	PART-B
37	Mathematical Sciences	1879801777	1879807105	1879807105	1879807106	1879807107	1879807108	PART-B
38	Mathematical Sciences	1879801778	1879807110	1879807109	1879807110	1879807111	1879807112	PART-B
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40	Mathematical Sciences	1879801780	1879807118	1879807117	1879807118	1879807119	1879807120	PART-B
41	Mathematical Sciences	1879801781	1879807123	1879807121	1879807122	1879807123	1879807124	PART-B
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47	Mathematical Sciences	1879801787	1879807147	1879807145	1879807146	1879807147	1879807148	PART-B
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51	Mathematical Sciences	1879801791	1879807161	1879807161	1879807162	1879807163	1879807164	PART-B
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53	Mathematical Sciences	1879801793	1879807171	1879807169	1879807170	1879807171	1879807172	PART-B
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55	Mathematical Sciences	1879801795	1879807180	1879807177	1879807178	1879807179	1879807180	PART-B
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62	Mathematical Sciences	1879801802	1879807208	1879807205	1879807206	1879807207	1879807208	PART-C
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71	Mathematical Sciences	1879801811	1879807243	1879807241	1879807242	1879807243	1879807244	PART-C
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78	Mathematical Sciences	1879801818	1879807270,1879807272	1879807269	1879807270	1879807271	1879807272	PART-C
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81	Mathematical Sciences	1879801821	1879807281	1879807281	1879807282	1879807283	1879807284	PART-C
82	Mathematical Sciences	1879801822	1879807285,1879807286,1879807288	1879807285	1879807286	1879807287	1879807288	PART-C
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91	Mathematical Sciences	1879801831	1879807321,1879807322,1879807323,1879807324	1879807321	1879807322	1879807323	1879807324	PART-C
92	Mathematical Sciences	1879801832	1879807326	1879807325	1879807326	1879807327	1879807328	PART-C
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96	Mathematical Sciences	1879801836	1879807341,1879807344	1879807341	1879807342	1879807343	1879807344	PART-C
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101	Mathematical Sciences	1879801841	1879807361	1879807361	1879807362	1879807363	1879807364	PART-C
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103	Mathematical Sciences	1879801843	1879807369,1879807370,1879807372	1879807369	1879807370	1879807371	1879807372	PART-C
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106	Mathematical Sciences	1879801846	1879807381,1879807382	1879807381	1879807382	1879807383	1879807384	PART-C
107	Mathematical Sciences	1879801847	1879807385,1879807386,1879807387,1879807388	1879807385	1879807386	1879807387	1879807388	PART-C
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