MPSC
Asst. Prof.
Previous Year Paper
(Mathematics)
2014

MPSC

Notations:

1. Options shown in green color are correct.
2. Options shown in red color are incorrect.

Group A

Number of optional sections to be attempted: 0, Group Maximum duration : 0, Group Minimum duration : 60, Revisit allowed for view? : No, Revisit allowed for edit? : No, Break time: 0

Assistant Professor Mathematics

Section type : Online, Number of Questions to be attempted:100, Mandatory or Optional: Mandatory

Subsection : 1, Question Shuffling Allowed : Yes

Question id : 2101 Question Type : MCQ

The set of integers Z with the binary operation * defined by a*b=a+b+1 for a, b $\in$ Z is a group. The identity element of this group is

Options :

1. 0
2. 1
3. -1
4. 2

Question id : 2102 Question Type : MCQ

The group (G,*) is abelin. Which one of the following is true for G. (Question Cancelled)

Options :

1. $G = g^{-1}$ for all g $\in$ G
2. $G = g^{2}$ for all g $\in$ G
3. $(g*h)^{-2} = g^{2}* h^{2}$ for all g, h $\in$ G
4. G is a finite group

Question id : 2103 Question Type : MCQ

Which of the following form a group under multiplication?

Options :

1. Set of all negative rational numbers
2. Set of all nonsingular 2 X 2 matrices
3. Set of all 2 X 2 matrices
4. Set of all rational numbers

Question id : 2104 Question Type : MCQ

The binary operation * is defined as (a, b)*(c, d) = (ad + bc, bd), then 2)*(3, 5)*(3, 4) is equal to (Question Cancelled)

Options :

1. (74, 40)
2. (32, 40)
3. (23, 11)
4. (7, 11)

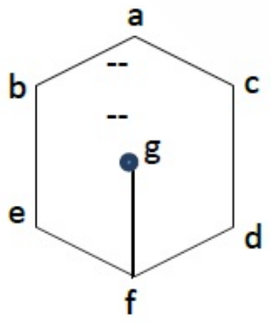
Question id : 2105 Question Type : MCQ

A self- complemented distributed lattice is called

Options :

1. Boolean Algebra
2. Modular Lattice
3. Complete Lattice
4. Self-dual Lattice

Question id : 2106 Question Type : MCQ



The lattice defined by Hasse diagram is given here.

The lattice defined by Hasse diagram is given here.

How many complements the element 'e' has

Options :

1. 2
2. 3
3. 0
4. 1

Question id : 2107 Question Type : MCQ

The Boolean Expression A + BC is equal to

Options :

1. $(\overline{A}+B)(\overline{A}+C)$
2. $(A+B)(A+C)$
3. $(A+B)(\overline{A}+C)$
4. $(A+B)(A+\overline{C})$

Question id : 2108 Question Type : MCQ

The term "sum of product" in Boolean algebra means

Options :

1. AND function of several OR function
2. OR function of several AND function
3. AND function of several AND function
4. OR function of several OR function.

Question id : 2109 Question Type : MCQ

Which of the following represents the sequence 1, 2, 5, 11, 26 … if $t_0 = 1$ and $t_1=2$.

Options :

1. $t_n = t_{n-1} + t_{n-2}$
2. $t_n = 2t_{n-1} + 1$
3. $t_n = 2t_{n-1} + 2$
4. $t_n = t_{n-1} + 3t_{n-2}$

Question id : 2110 Question Type : MCQ

Suppose a coin is tossed until 2 Heads appear and then the experiment is stopped, find a recurrence relation for the number of experiments that end on the n^{th} toss on sooner.

Options :

1. $a_n = a_{n-1} + (n-1)$
2. $a_n = a_{n-1} + n$
3. $a_n = a_{n-1} + 2(n-1)$
4. $a_n = a_{n-1} + (n-2)$

Question id : 2111 Question Type : MCQ

A partial order $\leq$ is defined on the set S= { x, a_1, $a_{2,\ldots}$, a_n, y} as $x \leq a_i$ for all i and $y \leq a_i$ for all i, where n≥1. The number of total orders on the set S which contain partial order ≤ is

Options :

1. 1
2. n
3. n+1
4. n!

Question id : 2112 Question Type : MCQ

The number of different permutations of the word BANANA is

Options :

1. 720
2. 60
3. 120
4. 360

Question id : 2113 Question Type : MCQ

Ramesh has 6 friends. In how many ways he can invite one or more of them at a dinner.

Options :

1. 61
2. 62
3. 63
4. 64

4.

Question id : 2114 Question Type : MCQ

The minimum number of students that can be selected form 50 cities, so that at least 15 students are from one of the city is

Options :

1. 701
2. 749
3. 750
4. 751

Question id : 2115 Question Type : MCQ

If G is a group of order 5, then the number of subgroups of G is

Options :

1. 1
2. 2
3. 3
4. 5

Question id : 2116 Question Type : MCQ

Let G= {1, 2, 3, 4, 5, 6} be a group under multiplication module 7. Then inverse of 2 is

Options :

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

Question id : 2117 Question Type : MCQ

G= {1, 2, 4, 7, 8, 11, 13, 14} under multiplication modulo 15 form a group. The inverse of the element 7 is

Options :

1. 13
2. 7
3. 11
4. 8

4.

Question id : 2118 Question Type : MCQ

G = {1, 2, 3, 4, 5, 6} under modulo 7 is a cyclic group. The generator of this group is (Question Cancelled)

Options :

1. 2
2. 3
3. 4
4. 5

Question id : 2119 Question Type : MCQ

Let R be a ring with identity element 1. We make R into another ring R' by defining a + b = a + b + 1 and a*b = ab + a + b. Then the 0 element and 1 element of R' are respectively (Question Cancelled)

Options :

1. -1 and 1
2. 0 and 1
3. 1 and 0
4. 0 and -1

Question id : 2120 Question Type : MCQ

Taylor's series expansion of $f(x) = \frac{1}{x}$ about x=1 is

Options :

1. $1+(x-1)+(x-1)^2+(x-1)^3+\ldots$
2. $1+(x-1)+\frac{(x-1)^2}{2!}-\frac{(x-1)^3}{3!}+\ldots$
3. $1-(x-1)+(x-1)^2-(x-1)^3+\ldots$
4. $1-(x-1)+(x+1)^2-(x+1)^3+\ldots$

Question id : 2121 Question Type : MCQ

If x = $r\cos\theta$, y = $r\sin\theta$, then $\frac{\partial y}{\partial x}$ is equal to

Options :

1. $\sec\theta$
2. $\sin\theta$

3. $\cos\theta$

4. $\text{cosec}\,\theta$

Question id : 2122 Question Type : MCQ

If $u = a x^2 + 2h xy + by^2$, then $x\frac{\partial u}{\partial x} - y\frac{\partial u}{\partial y}$ is equal to (Question Cancelled)

Options :

1. 0

2. u

3. $2u$

4. $4u$

Question id : 2123 Question Type : MCQ

If $u = f\left(\frac{x}{y}\right)$, then

Options :

1. $x\frac{\partial u}{\partial x} + y\frac{\partial u}{\partial y} = 0$

2. $x\frac{\partial u}{\partial x} - y\frac{\partial u}{\partial y} = 0$

3. $x\frac{\partial u}{\partial x} + y\frac{\partial u}{\partial y} = u$

4. $x\frac{\partial u}{\partial x} + y\frac{\partial u}{\partial y} = 1$

Question id : 2124 Question Type : MCQ

If $u = x^2 \tan^{-1}\frac{y}{x}$, then $x\frac{\partial u}{\partial x} + y\frac{\partial u}{\partial y}$ at x=1, y=1 is

Options :

1. π

2. $-\frac{\pi}{4}$

3. $\frac{\pi}{4}$

4. $\frac{\pi}{2}$

Question id : 2125 Question Type : MCQ

The equation of tangent place to the surface $x^2+y^2+z^2=14$ at (1, 2, 3) is

The equation of tangent plane to the surface ... at (1, 2, 0) is

Options :

1. $2x+4y+6z=14$
2. $x+2y+3z=14$
3. $x+2y+3z=0$
4. $x+2y+3z=1$

Question id : 2126 Question Type : MCQ

If $\vec{F}$ is velocity of a fluid particle then $\int_C \vec{F} \cdot d\vec{r}$ represents

Options :

1. Work done
2. Flux
3. Conservative field
4. Circulation

Question id : 2127 Question Type : MCQ

The value of the line integral $\int$grad $(x+y-z)\, d\vec{r}$ from (0, 1, −1) to (1, 2, 0) is

Options :

1. 3
2. −1
3. 0
4. 1

Question id : 2128 Question Type : MCQ

The necessary and sufficient condition for $\int_C \boldsymbol{A} \cdot d\vec{r} = 0$ for every closed curve C is that

Options :

1. div **A** = 0
2. curl **A** = 0
3. div **A** ≠ 0
4. curl **A** ≠ 0

Question id : 2129 Question Type : MCQ

Let S be a closed orientable surface enclosing a unit volume. Then the magnitude of the

Let S be a closed orientable surface enclosing a unit volume. They the magnitude of the surface integral $\iint \vec{r} \cdot \hat{n}\, ds$, where $\vec{r} = x\hat{i} + y\hat{i} + z\hat{k}$ and $\hat{n}$ is unit normal vector to the surface S is equal to

Options :

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

Question id : 2130 Question Type : MCQ

A vector function $\vec{F}$ is said to solenoidal if

Options :

1. Curl $\vec{F}$ = 0
2. grad$\vec{F}$ = 0
3. div $\vec{F}$ = 0
4. curl (curl$\vec{F}$) = 0

Question id : 2131 Question Type : MCQ

The matrix A has eigen values $\lambda_i \neq 0$, then $A^{-1} - 2I+A$ has eigen values

Options :

1. $\frac{1}{\lambda_i} - 2 + \lambda_i$
2. $1 + 2\lambda_i + \lambda_1^2$
3. $1 - 2\lambda_1 + \lambda_i^2$
4. $1 - \frac{2}{\lambda_i} + \frac{1}{\lambda_i^2}$

Question id : 2132 Question Type : MCQ

If A is singular hermitian matrix, then the least eigen value of A^2 is

Options :

1. -1
2. 1
3. 2

3. -

4. 0

Question id : 2133 Question Type : MCQ

If $f(x)$ =0 is an algebraic equation then Newton- Raphson method is given by $x_{n+1} = x_n - \frac{f(x_n)}{\lambda}$, where λ is

Options :

1. $f(x_{n-1})$

2. $f'(x_n)$

3. $f'(x_{n-2})$

4. $f''(x_n)$

Question id : 2134 Question Type : MCQ

The order of convergence of Newton- Raphson method is

Options :

1. 0

2. 1

3. 2

4. 3

Question id : 2135 Question Type : MCQ

The second divided difference of $y = x^2$ is

Options :

1. $\frac{1}{2}$

2. 1

3. 2

4. $2x$

Question id : 2136 Question Type : MCQ

The divided difference f (x_0, x_1, x_2) is equal to

Options :

1. $\frac{\Delta^2 f_0}{h^2}$
2. $\frac{\Delta f_0}{h}$
3. $\frac{\Delta^2 f_0}{2h^2}$
4. Δf_0

Question id : 2137 Question Type : MCQ

The divided difference $\overset{\Delta}{x_1}(x_0) = f(x_0, x_1)$ is equal to

Options :

1. $f(x_1) - f(x_0)$
2. $x_1 - x_0$
3. $\frac{f(x_1)-f(x_0)}{x_1-x_0}$
4. $\frac{f(x_1)-f(x_0)}{x_0-x_1}$

Question id : 2138 Question Type : MCQ

Simpson's rule is used to evaluate the integral $\int_0^1 \frac{2x}{1+x^2} dx$. If $h = \frac{1}{2}$ is used, then its value is

Options :

1. log 2
2. $\frac{1}{2}$
3. $\frac{7}{10}$
4. $\frac{3}{10}$

Question id : 2139 Question Type : MCQ

Simpson's $\frac{3}{8}$ rule is a special case of Newton-cotes quadrature formula when n is equal to

Options :

1. 6
2. 3

2. -

3. 2

4. 1

Question id : 2140 Question Type : MCQ

If Δ is forward difference operator and ∇ is backward difference operator, then $\Delta\nabla$ is equal to

Options :

1. $\nabla\Delta$

2. $\nabla+\Delta$

3. $\nabla-\Delta$

4. Δ

Question id : 2141 Question Type : MCQ

$\frac{\Delta}{\nabla}-\frac{\nabla}{\Delta}$ is equal to

Options :

1. $\nabla-\Delta$

2. ∇

3. Δ

4. $\nabla+\Delta$

Question id : 2142 Question Type : MCQ

Runge-Kutta fourth order method is

Options :

1. a single step method

2. double step method

3. multiple step method

4. predicator-corrector method

Question id : 2143 Question Type : MCQ

If $u=\frac{x^{\frac{1}{4}}+y^{\frac{1}{4}}}{x^{\frac{1}{5}}+y^{\frac{1}{5}}}$, then $x\frac{\partial u}{\partial x}+y\frac{\partial u}{\partial y}$ is equal to

Options :

Options :

1. $4u$
2. $5u$
3. $20u$
4. $\frac{1}{20}u$

Question id : 2144 Question Type : MCQ

$\int_c \frac{dz}{z+2}$; C: |z| =1 is

Options :

1. $2\pi i$
2. $-2\pi i$
3. 0
4. $4\pi i$

Question id : 2145 Question Type : MCQ

$\int_c \frac{dz}{z^2-2z}$, C: $|z-2| = 1$ is

Options :

1. $-\pi i$
2. πi
3. $2\pi i$
4. 0

Question id : 2146 Question Type : MCQ

The function $(z-1)\sin\frac{1}{z}$ at z-= 0 has

Options :

1. A removable singularity
2. A simple pole
3. An essential singularity
4. A multiple pole

Question id : 2147 Question Type : MCQ

The residue at $z = 0$ of the function $f(z) = z^2 \sin\frac{1}{z}$ is

Options :

1. $-\frac{2}{3}$
2. $\frac{2}{3}$
3. $\frac{1}{6}$
4. $-\frac{1}{6}$

Question id : 2148 Question Type : MCQ

For the function $f(z) = \frac{z - \sin z}{z^3}$, $z = 0$ is

Options :

1. removable singularity
2. simple pole
3. pole of order 3
4. essential singularity

Question id : 2149 Question Type : MCQ

Let $f(z)$ be an analytic function. Then the value of the integral $\int_0^{2\pi} f(e^{it}) \cos t \, dt$ equals

Options :

1. 0
2. $2\pi f(0)$
3. $2\pi f'(0)$
4. $\pi f'(0)$

Question id : 2150 Question Type : MCQ

Which of the following mappings are not conformal at $z = 0$

Options :

1. e^z
2. $\cos z$

2.

3. $\sin z$

4. $z^2 + z$

Question id : 2151 Question Type : MCQ

Let $\{e_1, e_2, \ldots, e_n\}$ be a finite orthonormal set in a Hilbert space H. If x is any vector in H then

Options :

1. $\sum_{i=1}^{n} |(x, e_i)|^2 \leq \| x \|^2$ and $x - \sum_{i=1}^{n} (x, e_i) e_i \perp e_j$

2. $\sum_{i=1}^{n} |(x, e_i)|^2 \geq \| x \|^2$ and $x - \sum_{i=1}^{n} (x, e_i) e_i \perp e_j$

3. $\sum_{i=1}^{n} |(x, e_i)|^2 \leq \| x \|^2$ and $x + \sum_{i=1}^{n} (x, e_i) e_i \perp e_j$

4. $\sum_{i=1}^{n} |(x, e_i)|^2 \leq \| x \|^2$ and $\sum_{i=1}^{n} (x, e_i) e_i \perp e_j$

Question id : 2152 Question Type : MCQ

Laplace transform of $t^n e^{-at}$ is

Options :

1. $\frac{n!}{(s+a)^n}$

2. $\frac{(n+1)!}{(s+a)^n}$

3. $\frac{n!}{(s+a)^{n+1}}$

4. $\frac{(n+1)!}{(s+a)^{n+1}}$

Question id : 2153 Question Type : MCQ

Laplace transform of $u(t-a)$, where u is a unit step function is

Options :

1. $\frac{e^{as}}{s}$

2. $\frac{e^{as}}{s^2}$

3. $\frac{e^{-as}}{s}$

4. $\frac{e^{-as}}{s^2}$

Question id : 2154 Question Type : MCQ

Inverse Laplace transform of $\frac{1}{s(s^2+1)}$ is equal to

Options :

1. 1+cos t
2. 1 − cos t
3. 1− sin t
4. 1 + sin t

Question id : 2155 Question Type : MCQ

Inverse Laplace transform of 1 is

Options :

1. δ(t)
2. u(t)
3. δ (t-1)
4. u(t-1)

Question id : 2156 Question Type : MCQ

If $L^{-1}\{f(s)\} = F(t),\ L^{-1}\{g(s)\} = G(t)$, then $L^{-1}\{f(s).g(s)\}$ is given by

Options :

1. $\int_0^t F(u)G(t-u)du$
2. $\int_0^\infty F(u)G(t-u)du$
3. $\int_0^\infty F(t)G(u-t)dt$
4. $\int_0^t F(u)G(u)du$

Question id : 2157 Question Type : MCQ

If Laplace transform of $J_0(t)$is

Options :

1. $\frac{1}{s(s+1)}$
2. $\frac{1}{\sqrt{1+s^2}}$
3. $1-\frac{1}{\sqrt{1+s^2}}$
4. $\frac{s}{s^2-1}$

Question id : 2158 Question Type : MCQ

The Laplace transform of the function f (t) $=\begin{cases}1, & 0\le t<2\\ -1, & 2\le t<4\end{cases}$; f(t+4) =f (t) is given by

Options :

1. $\frac{1-e^{-2s}}{s(1+e^{-2s})}$
2. $\frac{1+e^{-2s}}{s(1+e^{-2s})}$
3. 0
4. $\frac{s+1}{s-1}$

Question id : 2159 Question Type : MCQ

The sum of the series $\frac{1}{1^2}+\frac{1}{3^2}+\frac{1}{5^2}+\cdots$ is equal to

Options :

1. $\frac{\pi^2}{6}$
2. $\frac{\pi^2}{8}$
3. $\frac{\pi^2}{12}$
4. $\frac{\pi^2}{4}$

Question id : 2160 Question Type : MCQ

The equation $\frac{\partial^2 z}{\partial x^2}=\frac{\partial^2 z}{\partial y^2}$ is

Options :

1. Parabolic

2. Elliptic
3. Hyperbolic
4. Both Parabolic and Hyperbolic

Question id : 2161 Question Type : MCQ

One dimensional wave equation is

Options :

1. $\frac{\partial^2 y}{\partial t^2} = \frac{\partial y}{\partial x}$
2. $\frac{\partial^2 y}{\partial t^2} = c^2 \frac{\partial^2 y}{\partial x^2}$
3. $\frac{\partial y}{dt} = c^2 \frac{\partial^2 y}{\partial x^2}$
4. $\frac{\partial y}{\partial t} = c^2 \frac{\partial y}{\partial x}$

Question id : 2162 Question Type : MCQ

Two dimensional heat flow equation is

Options :

1. $\frac{\partial u}{\partial t} = c^2\left(\frac{\partial^2 u}{\partial x^2} + \frac{\partial^2 u}{\partial y^2}\right)$
2. $\frac{\partial^2 u}{\partial t^2} = c^2\left(\frac{\partial^2 u}{\partial x^2} + \frac{\partial^2 u}{\partial y^2}\right)$
3. $\frac{\partial^2 u}{\partial t^2} = c^2\left(\frac{\partial^2 u}{\partial x^2} + \frac{\partial^2 u}{\partial y^2} + \frac{\partial^2 u}{\partial z^2}\right)$
4. $\frac{\partial^2 u}{\partial t^2} = c^2\left(\frac{\partial^2 u}{\partial x^2} - \frac{\partial^2 u}{\partial y^2}\right)$

Question id : 2163 Question Type : MCQ

The solution of heat equation $\frac{\partial u}{\partial t} = \frac{\partial^2 u}{\partial x^2}$ is

Options :

1. $(c_1 e^{px} + c_2 e^{-px}) e^{-p^2 t}$
2. $u = (c_1 + c_2 x) e^{-p^2 t}$
3. $u = (c_1 \cos px + c_2 \sin px)\, e^{-p^2 t}$

4. $u = (c_1 e^{px} + c_2 e^{-px}) e^{p^2 t}$

Question id : 2164 Question Type : MCQ

Assume a single channel service system of a library in a school. From past experience, it is known that on an average every hour 8 students come for issue of books at an average rate of 10 per hour. The probability that there are at least 3 students in system is

Options :

1. 0.64
2. 0.512
3. 0.4096
4. 0.8

Question id : 2165 Question Type : MCQ

At a garage, car owners arrive at the rate of 6 per hour and are served at the rate of 8 per hour. If the arrival follow Poisson's distribution and the service pattern is exponentially distributed, the average waiting time is

Options :

1. 25 min
2. 30 min
3. 20 min
4. 40 min

Question id : 2166 Question Type : MCQ

In a quadratic programming which one is correct?

Options :

1. All constraints are quadratic
2. At least one constraint is quadratic
3. Objective function and at least one constraint is quadratic
4. Objective function is quadratic and all constraints are linear

Question id : 2167 Question Type : MCQ

The flow of heat in a temperature field is given by $\frac{x}{y}$. Then the direction of flow of heat at the point $(8, -1)$ is

Options :

$\hat{\imath} + 8\hat{\imath}$

1.

2. $-\hat{\imath} - 8\hat{\jmath}$

3. $\hat{\imath} - 8\hat{\jmath}$

4. $-\hat{\imath} + 8\hat{\jmath}$

Question id : 2168 Question Type : MCQ

If $\vec{v} = e^x(\cos\ y\,\hat{\imath} + \sin y\,\hat{\jmath})$, then div $\vec{v}$ is

Options :

1. $e^x \cos\ y$

2. $e^x \sin y$

3. $2e^x \cos\ y$

4. 0

Question id : 2169 Question Type : MCQ

The velocity field of a rigid body is given by $\vec{v} = y\,\hat{\imath} - x\,\hat{\jmath}$. The angular velocity of the body is

Options :

1. $2\,\hat{k}$

2. $-2\,\hat{k}$

3. $\hat{k}$

4. $-\hat{k}$

Question id : 2170 Question Type : MCQ

If $\vec{v} = 2y\vec{\imath} + 5x\vec{\jmath}$, then curl $\vec{v}$ is equal to

Options :

1. $2\vec{k}$

2. $3\vec{k}$

3. $5\vec{k}$

4. $7\vec{k}$

Question id : 2171 Question Type : MCQ

Let $4\frac{\partial u}{\partial x}+\frac{\partial u}{\partial y}=3u\,,u(0,y)=e^{-5y}$, then the value of $u(x,y)$ is

Options :

1. e^{2x-5y}
2. e^{-2x-5y}
3. e^{3x-5y}
4. e^{-3x-5y}

Question id : 2172 Question Type : MCQ

The polar form of the Laplace equation $\frac{\partial^2 u}{\partial x^2}+\frac{\partial^2 u}{\partial y^2}=0$ is

Options :

1. $\frac{\partial^2 u}{\partial r^2}+\frac{1}{r}\frac{\partial u}{\partial r}+\frac{1}{r^2}\frac{\partial^2 u}{\partial \theta^2}=0$
2. $\frac{\partial^2 u}{\partial r^2}+\frac{1}{r}\frac{\partial^2 u}{\partial \theta^2}+\frac{1}{r^2}\frac{\partial u}{\partial r}=0$
3. $\frac{\partial^2 u}{\partial r^2}+\frac{1}{r}\frac{\partial u}{\partial r}+\frac{1}{r}\frac{\partial^2 u}{\partial \theta^2}=0$
4. $\frac{\partial^2 u}{\partial \theta^2}+\frac{1}{r}\frac{\partial u}{\partial r}+\frac{1}{r^2}\frac{\partial^2 u}{\partial \theta^2}=0$

Question id : 2173 Question Type : MCQ

The torsion of the curve $r(t)=a\cos t\ \hat{\imath}+b\sin t\,\hat{\jmath}$ is

Options :

1. 0
2. a
3. b
4. $\sqrt{a^2+b^2}$

Question id : 2174 Question Type : MCQ

The directional derivative of $f(x,y,z)=2x^2+3y^2+z^2$ at P (2, 1, 3) in the direction of the vector $\vec{a}=\hat{\imath}-2\hat{k}$ is

Options :

1. $\frac{20}{\sqrt{5}}$

1.

2. $\frac{4}{\sqrt{5}}$

3. $-\frac{4}{\sqrt{5}}$

4. $-\frac{20}{\sqrt{5}}$

Question id : 2175 Question Type : MCQ

The unit normal vector of the cone of revolution $z^2 = 4(x^2 + y^2)$at the point P (1, 0, 2) is

Options :

1. $-\frac{2}{\sqrt{5}}\hat{\imath} - \frac{1}{\sqrt{5}}\hat{\jmath}$

2. $\frac{2}{\sqrt{5}}\hat{\imath} - \frac{1}{\sqrt{5}}\hat{\jmath}$

3. $\frac{3}{\sqrt{5}}\hat{\imath} + \frac{3}{\sqrt{5}}\hat{\jmath}$

4. $\frac{3}{\sqrt{5}}\hat{\imath} - \frac{3}{\sqrt{5}}\hat{\jmath}$

Question id : 2176 Question Type : MCQ

The radius of convergence of the power series $\sum_{n=0}^{\infty} \frac{(2n)!}{(n!)^2}(z - 3i)^n$ is

Options :

1. $\frac{1}{3}$

2. 3

3. $\frac{1}{4}$

4. 4

Question id : 2177 Question Type : MCQ

Tangential acceleration and normal acceleration of a particle whose motion is given by $r(t) = 5t^2\hat{k}$ are respectively

Options :

1. $10\hat{k}, 0$

2. $-10\hat{k}, 0$

2.

3. $0, 10\hat{k}$

4. $0, -10\hat{k}$

Question id : 2178 Question Type : MCQ

The curvature of the curve $\vec{r}(t) = a\cos t\,\hat{\imath} + a\,sint\,\hat{\jmath} + ct\,\hat{k}$ is

Options :

1. $\frac{a}{a^2+c^2}$

2. $\frac{c}{a^2+c^2}$

3. $\frac{a}{\sqrt{a^2+c^2}}$

4. $\frac{c}{\sqrt{a^2+c^2}}$

Question id : 2179 Question Type : MCQ

A steel bar of 10 mm diameter and 1 m long was subjected to an axial load of 10 KN. Its diameter was found to decrease by 0.002 mm. Its lateral strain is

Options :

1. 0.02

2. − 0.02

3. 0.0002

4. − 0.0002

Question id : 2180 Question Type : MCQ

A steel wire of length 1 m is kept vertically by putting a load of 1 N. Its length increases by 3 mm. The longitudinal strain of wire is

Options :

1. 0.0003

2. 0.003

3. 0.3

4. 0.0015

Question id : 2181 Question Type : MCQ

Which one of the following is not correct for Laplace transformation of $f'''(t)$ where Laplace transformation of *f* (t) is F(S). (Question Cancelled)

Options :

1. $s^3F(s) + s^2f(0) + sf'(0) + f''(0)$
2. $s^3F(s) + s^2f''(0) + sf'(0) + f(0)$
3. $s^3F(s) - s^2f''(0) - sf'(0) - f(0)$
4. $s^3F(s) - s^2f(0) - sf'(0) - f''(0)$

Question id : 2182 Question Type : MCQ

Let the set (P,≤) is partially ordered set. Which of the following is not a criterion for partially ordered relation?

Options :

1. Reflexivity
2. Symmetry
3. Anti symmetry
4. Transitivity

Question id : 2183 Question Type : MCQ

Let P be a projection on a Banach space B and M, N are its range and null space. Which of the following is true?

Options :

1. M and N are open sub spaces of B
2. M is open and N is closed sub space of B
3. M and N are closed sub spaces of B
4. M is closed and N is open sub space of B.

Question id : 2184 Question Type : MCQ

If $\{e_i\}$ is an orthonormal set in a Hilbert space H_o. If x is any vector in H then the set S=$\{e_i : (x, e_i) \neq 0\}$ is

Options :

1. always empty set
2. always finite set
3. either empty or finite set
4. either empty or countable set

Question id : 2185 Question Type : MCQ

A metric space is compact if and only if it is

Options :

1. complete
2. totally bounded
3. complete and totally bounded
4. complete and bounded

Question id : 2186 Question Type : MCQ

A wrong decision about null hypothesis H_o leads to

Options :

1. one kind of error
2. two kinds of error
3. three kinds of error
4. four kinds of error

Question id : 2187 Question Type : MCQ

For testing H_o: $\mu=\mu_o$ against H_1:$\mu<\mu_o$, the critical region for $\propto = 0.05$ is (sample size being large)

Options :

1. $|Z| \leq 1.96$
2. $|Z| > 1.96$
3. $Z < -1.645$
4. $Z > 1.645$

Question id : 2188 Question Type : MCQ

If there are r rows and s columns in a two-way analysis of variance, then the number of degrees of freedom between rows is

Options :

1. $(s-1)$
2. $(r-1)$
3. r
4. s

Question id : 2189 Question Type : MCQ

In a two way analysis of variance, the total variation is decomposed into

Options :

1. two components
2. three components
3. four components
4. eight components

Question id : 2190 Question Type : MCQ

Let X is a normal variable with mean 100 and variance 25. If X is converted into standard normal variable then P(30 < X < 80) is same as

Options :

1. $P(-14 < Z < -4)$
2. $P(-1\ 4Z < 4)$
3. $P(-2.8 < Z < -0.8)$
4. $P(-2.8 < Z < 0.8)$

Question id : 2191 Question Type : MCQ

The standard deviation of the binomial distribution is

Options :

1. np
2. npq
3. $\sqrt{np}$
4. $\sqrt{npq}$

Question id : 2192 Question Type : MCQ

A and B start a game of throwing a die. The one who first gets Head wins the game. If A starts the game, what is probability of winning of B.

Options :

1. $\frac{1}{3}$
2. $\frac{1}{2}$
3. $\frac{2}{}$

3. 3
4. $\frac{1}{4}$

Question id : 2193 Question Type : MCQ

The upper control limit and lower control limit for drawing a mean chart are

Options :

1. $\bar{\bar{x}} + \sigma_{\bar{x}}, \bar{\bar{x}} - \sigma_{\bar{x}}$
2. $\bar{\bar{x}} + 2\sigma_{\bar{x}}, \bar{\bar{x}} - 2\sigma_{\bar{x}}$
3. $\bar{\bar{x}} + 3\sigma_{\bar{x}}, \bar{\bar{x}} - 3\sigma_{\bar{x}}$
4. $\bar{\bar{x}} + 4\sigma_{\bar{x}}, \bar{\bar{x}} - 4\sigma_{\bar{x}}$

Question id : 2194 Question Type : MCQ

The upper and lower control limits of R-chart are given by

Options :

1. $\bar{X} + 2A_2\bar{R}, \ \bar{X} - 2A_2\bar{R}$
2. $\bar{X} + A_2\bar{R}, \ \bar{X} - A_2\bar{R}$
3. $\bar{R} + 2A_2\bar{X}, \ \bar{R} - 2A_2\bar{X}$
4. $\bar{R} + A_2\bar{X}, \ \bar{R} - A_2\bar{X}$

Question id : 2195 Question Type : MCQ

15 samples with size 100 each taken at an interval of 45 minutes form a manufacturing process. The average fraction defective was 0.05. The upper and lower control limits are.

Options :

1. $\frac{10+3\sqrt{19}}{200}, \frac{10-3\sqrt{19}}{200}$
2. $\frac{10+2\sqrt{19}}{200}, \frac{10-2\sqrt{19}}{200}$
3. $\frac{5+3\sqrt{19}}{200}, \frac{5-3\sqrt{19}}{200}$
4. $\frac{5+2\sqrt{19}}{200}, \frac{5-2\sqrt{19}}{200}$

Question id : 2196 Question Type : MCQ

If $\frac{dy}{dx} = 1 + xy$, when $x_0 = 0, y_0 = 1$, using Picard method, its solution up to second

approximation is (Question Cancelled)

Options :

1. $1+x$
2. $x+\frac{x^2}{2}$
3. $x+\frac{x^3}{2}$
4. $x+\frac{x^3}{3}$

Question id : 2197 Question Type : MCQ

If P(A) = 0.7, P (B) = 0.6, P(A∩B) = 0.5, the value of P(B/A) is

Options :

1. $\frac{5}{7}$
2. $\frac{5}{6}$
3. $\frac{6}{7}$
4. $\frac{5}{13}$

Question id : 2198 Question Type : MCQ

For the given joint probability distribution, the Expected value of X i.e., E(X) Is

X \ Y	−4	2	7
1	$\frac{1}{8}$	$\frac{1}{4}$	$\frac{1}{8}$
5	$\frac{1}{4}$	$\frac{1}{8}$	$\frac{1}{8}$

Options :

1. $\frac{1}{2}$
2. 2
3. 3
4. 1

Question id : 2199 Question Type : MCQ

Question id : 2199 Question Type : MCQ

For the given joint probability distribution, the expected value of Y i.e., E(Y) is

X \ Y	−4	2	7
1	$\frac{1}{8}$	$\frac{1}{4}$	$\frac{1}{8}$
5	$\frac{1}{4}$	$\frac{1}{8}$	$\frac{1}{8}$

Options :

1. 1
2. 2
3. 4
4. 6.5

Question id : 2200 Question Type : MCQ

Let $f(x)$ have the respective Fourier cosine and sine transforms as $F_c(w)$ and $F_s(w)$. Then which of the following is not true? (Question Cancelled)

Options :

1. $\mathfrak{F}_c\{\cos(ax)\,f(x)\} = \frac{1}{2}[F_c(w+a) + F_c(w-a)]$
2. $\mathfrak{F}_c\{\sin(ax)\,f(x)\} = \frac{1}{2}[F_s(w+a) + F_s(a-w)]$
3. $\mathfrak{F}_s\{\cos(ax)\,f(x)\} = \frac{1}{2}[F_s(w+a) + F_s(w-a)]$
4. $\mathfrak{F}_s\{\sin(ax)\,f(x)\} = \frac{1}{2}[F_c(w-a) - F_c(w+a)]$