# National Testing Agency

| | |
|---|---|
| **Question Paper Name:** | A Refresher Course on Calculus 30th March 2019 Shift 1 |
| **Subject Name:** | A Refresher Course on Calculus |
| **Creation Date:** | 2019-03-30 13:12:41 |
| **Duration:** | 180 |
| **Total Marks:** | 100 |
| **Display Marks:** | Yes |

A Refresher Course on Calculus

| | |
|---|---|
| **Group Number :** | 1 |
| **Group Id :** | 9095823 |
| **Group Maximum Duration :** | 0 |
| **Group Minimum Duration :** | 120 |
| **Revisit allowed for view? :** | No |
| **Revisit allowed for edit? :** | No |
| **Break time:** | 0 |
| **Group Marks:** | 100 |

A Refresher Course on Calculus

| | |
|---|---|
| **Section Id :** | 9095823 |
| **Section Number :** | 1 |
| **Section type :** | Online |
| **Mandatory or Optional:** | Mandatory |
| **Number of Questions:** | 100 |
| **Number of Questions to be attempted:** | 100 |
| **Section Marks:** | 100 |
| **Display Number Panel:** | Yes |
| **Group All Questions:** | No |

| | |
|---|---|
| **Sub-Section Number:** | 1 |
| **Sub-Section Id:** | 9095823 |
| **Question Shuffling Allowed :** | Yes |

**Question Number : 1 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical**

**Correct Marks : 1 Wrong Marks : 0**

Title of the book written by Euclid is

a) axiomatic geometry

b) philosophy of geometry

c) plane geometry

d) elements

**Options :**

1. A
2. B
3. C
4. D

**Question Number : 2 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical**

**Correct Marks : 1 Wrong Marks : 0**

Non-Euclian geometry contradicts Euclids'

a) $2^{nd}$ axiom

b) $3^{rd}$ axiom

c) $4^{th}$ axiom

d) $5^{th}$ axiom

**Options :**

1. A
2. B
3. C
4. D

**Question Number : 3 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical**

**Correct Marks : 1 Wrong Marks : 0**

Gauss was famous due to his method of least squares in successfully finding

a) position of a planet

b) distance to sun

c) mass of earth

d) temperature on Saturn

**Options :**

1. A
2. B
3. C
4. D

**Question Number : 4 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical**

**Correct Marks : 1 Wrong Marks : 0**

Brahma sputa Siddhantawas written by

a) Bhaskara

b) Varahamihira

c) Brahmaguptha

d) Mahaveera

**Options :**

1. A
2. B
3. C
4. D

**Question Number : 5 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical**

**Correct Marks : 1 Wrong Marks : 0**

Let $f(x) = [1 + x]$, where $[x]$ denotes the greatest integer function. Then

a) $\lim_{x \to 0^+} f(x) = 2$

b) $\lim_{x \to 0^-} f(x) = 1$

c) $\lim_{x \to 0^+} f(x) = 1$

d) $\lim_{x \to 0} f(x)$ exists

**Options :**

1. A
2. B
3. C
4. D

**Question Number : 6 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical**

**Correct Marks : 1 Wrong Marks : 0**

Let $f(x) = x$ if $x$ is rational and $f(x) = -x$ if $x$ is irrational. Then

a) $f(x)$ is continuous at $x$ if $x \neq 0$

b) $f(x)$ is differentiable at $x$ if $x \neq 0$

c) $f(x)$ is continuous at $x$ if $x = 0$

d) $f(x)$ is differentiable at $x$ if $x = 0$

**Options :**

1. A
2. B
3. C
4. D

**Question Number : 7 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical**

**Correct Marks : 1 Wrong Marks : 0**

The derivative of $\sin x^2$ with respect to $x^2$ is

a) $2x \cos x^2$

b) $2x \sin x^2$

c) $-\sin x^2$

d) $\cos x^2$

**Options :**

1. A
2. B
3. C
4. D

**Question Number : 8 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical**

**Correct Marks : 1 Wrong Marks : 0**

If $y = x^3 e^{2x}$ then $\frac{d^n y}{dx^n}$ at $x = 0$ is

a) $n(n-1)(n-2)2^{n-3}$

b) $n(n+1)(n+2)2^{n+3}$

c) $n(n-1)(n-2)2^{n-2}$

d) $n(n+1)(n+2)2^{n+2}$

**Options :**

1. A
2. B
3. C
4. D

**Question Number : 9 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical**

**Correct Marks : 1 Wrong Marks : 0**

It is given that Rolle's theorem holds for the function $f(x) = x^3 + bx^2 + cx, 1 \leq x \leq 2$ at the point $x = \frac{4}{3}$. Then the values of $b$ and $c$ are

a) 5,-8

b) -5, 8

c) 5,8

d) -5,-8

**Options :**

1. A
2. B
3. C
4. D

**Question Number : 10 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical**

**Correct Marks : 1 Wrong Marks : 0**

The functions $f(x)$ and $g(x)$ are continuous on $[a, b]$ and differentiable in $(a, b)$ such that $f(a) = 4$ $f(b) = 12, g(a) = 1, g(b) = 3$ where $a < c < b$. Then $f'(c)$ is equal to

a) $3\, g'(c)$

b) $-2\, g'(c)$

c) $-3\, g'(c)$

d) $4\, g'(c)$

**Options :**

1. A
2. B
3. C
4. D

**Question Number : 11 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical**

**Correct Marks : 1  Wrong Marks : 0**

Which of the following is vertical asymptote of the curve $y = cosec\ x$ ?

a) $x = \frac{\pi}{2}$

b) $x = \pi$

c) $x = \frac{3\pi}{2}$

d) $x = \frac{\pi}{4}$

**Options :**

1. A
2. B
3. C
4. D

**Question Number : 12  Question Type : MCQ  Option Shuffling : No  Display Question Number : Yes  Single Line Question Option : No  Option Orientation : Vertical**

**Correct Marks : 1  Wrong Marks : 0**

If $P_4(x)$ is the fourth degree Taylor's polynomial approximation to the $f(x) = x \sin x$ about the point $x = 0$ then $P_4(x)$ is

a) $x^2 - \frac{1}{6}x^4$

b) $x - \frac{1}{6}x^3$

c) $x^2 - \frac{1}{3}x^4$

d) $x - x^2 - \frac{1}{6}x^4$

**Options :**

1. A
2. B
3. C
4. D

**Question Number : 13 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical**

**Correct Marks : 1 Wrong Marks : 0**

If $\log u = \frac{x^3+y^3}{3x+4y}$, then $x\frac{\partial u}{\partial x} + y\frac{\partial u}{\partial y} =$ _____

a) $2u^2 \log u$

b) $2u \log u$

c) $u \log u$

d) $u^2 \log u$

**Options :**

1. A
2. B
3. C
4. D

**Question Number : 14 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical**

**Correct Marks : 1 Wrong Marks : 0**

Suppose $w = x^3yz + xy + z + 3$ and $x = 3\ cost, y = 3\ sint, z = 2t$. Compute $dw/dt$ at $t = \pi/2$.

a) 7

b) -7

c) 5

d) -5

**Options :**

1. A
2. B
3. C
4. D

**Question Number : 15 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical**

**Correct Marks : 1  Wrong Marks : 0**

Find the total differential of $w = ze^{(x+y)}$ at (0, 0, 1).

a) $dw = dx\text{-}dy\text{-}dz.$

b) $dw = dx+dy\text{-}dz.$

c) $dw = dx\text{-}dy+dz.$

d) $dw = dx+dy+dz.$

**Options :**

1. A
2. B
3. C
4. D

**Question Number : 16  Question Type : MCQ  Option Shuffling : No  Display Question Number : Yes  Single Line Question Option : No  Option Orientation : Vertical**

**Correct Marks : 1  Wrong Marks : 0**

Compute the Jacobian of the following transformation: $x = v/u$; $y = u^2 - 4v^2$

a) $-2+8v^2/u^2$

b) $2+8v^2/u^2$

c) $-2-8v^2/u^2$

d) $-2+8v/u$

**Options :**

1. A
2. B
3. C
4. D

**Question Number : 17  Question Type : MCQ  Option Shuffling : No  Display Question Number : Yes  Single Line Question Option : No  Option Orientation : Vertical**

**Correct Marks : 1  Wrong Marks : 0**

If $R$ is the parallelogram with vertices (1,0), (4,3), (1,6) and (−2,3) determine the region we would get applying the transformation $x=12(v-u)$, $y=12(v+u)$ to $R$.

a) $-1\leq u \leq 5$ & $1\leq v\leq 7$

b) $1\leq u \leq 5$ & $1\leq v\leq 7$

c) $-1\leq u \leq 5$ & $-1\leq v\leq 7$

d) $-5\leq u \leq 1$ & $1\leq v\leq 7$

**Options :**

1. A
2. B
3. C
4. D

**Question Number : 18 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical**

**Correct Marks : 1 Wrong Marks : 0**

For the function $f(x,y) = x^4 + y^4 - 2x^2 + 4xy - 2y^2$, What can be said about the point $(\sqrt{2}, -\sqrt{2})$

a) Gives a Maximum

b) Gives a Minimum

c) Needs further investigation

d) Not an extremum

**Options :**

1. A
2. B
3. C
4. D

**Question Number : 19 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical**

**Correct Marks : 1 Wrong Marks : 0**

The minimum value of $x^2 + y^2 + z^2$ given that $x + y + z = 3$ is

a) 1

b) 2

c) 3

d) 9

**Options :**

1. A
2. B
3. C
4. D

**Question Number : 20 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical**

**Correct Marks : 1 Wrong Marks : 0**

The maximum distance from origin to the curve $5x^2 + 6xy + 5y^2 - 8 = 0$ is

a) 16

b) 12

c) 8

d) 4

**Options :**

1. A
2. B
3. C
4. D

**Question Number : 21 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical**

**Correct Marks : 1 Wrong Marks : 0**

The value of the double integral $\int_0^3 \int_y^3 e^{x^2}\, dx\, dy$ is

a) $\frac{17e^9}{36}$

b) $\frac{e^9-1}{2}$

c) $\frac{2-e^9}{2}$

d) does not exist

**Options :**

1. A
2. B
3. C
4. D

**Question Number : 22 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical**

**Correct Marks : 1 Wrong Marks : 0**

Half of the area of the circle $x^2 + y^2 = 2x$ is given by

a) $\int_{-1}^{1} \int_{1-\sqrt{1-y^2}}^{1+\sqrt{1-y^2}} dx\, dy$

b) $2 \times \int_0^1 \int_1^{\sqrt{1-y^2}} dx\, dy$

c) $\frac{1}{2} \times \int_{-1}^{1} \int_{-\sqrt{1-y^2}}^{\sqrt{1-y^2}} dx\, dy$

d) $\int_0^1 \int_{1-\sqrt{1-y^2}}^{1+\sqrt{1-y^2}} dx\, dy$

**Options :**

1. A

2. B
3. C
4. D

**Question Number : 23 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical**
**Correct Marks : 1 Wrong Marks : 0**

Let $f(x,y)$ be a continuous function in a region $R$on the $XY$-plane for which $\iint_R f(x,y)\,dx\,dy = 5$. Then, the total volume enclosed between the surface $z = f(x,y)$ and the region $R$ on the $XY$-plane

a) must be equal to 5

b) must be greater than 5

c) must be less than 5

d) cannot be less than 5

**Options :**
1. A
2. B
3. C
4. D

**Question Number : 24 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical**
**Correct Marks : 1 Wrong Marks : 0**

The area of the oval-shaped playing field described by the region $R: -1 - \sqrt{4-y^2} \le x \le 1 + \sqrt{4-y^2}\,, -2 \le y \le 2$ is

a) $4\pi + 2$

b) $8\pi + 2$

c) $8\pi + 4$

d) $4\pi + 8$

**Options :**
1. A
2. B

3. C
4. D

**Question Number : 25 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical**
**Correct Marks : 1 Wrong Marks : 0**

By changing the order of integration, the double integral $\int_0^1 \int_{\sqrt{x}}^{2-x} f(x,y)\,dy\,dx$ becomes

a) $\int_0^1 \int_0^{y^2} f(x,y)\,dx\,dy + \int_1^2 \int_0^{2-y} f(x,y)\,dx\,dy$

b) $\int_0^1 \int_{y^2}^{2-y} f(x,y)\,dx\,dy$

c) $\int_{-2}^0 \int_{y^2}^2 f(x,y)\,dx\,dy + \int_{-2}^0 \int_2^{2-y} f(x,y)\,dx\,dy$

d) $\int_0^1 \int_{\sqrt{y}}^{2-y} f(x,y)\,dx\,dy$

**Options :**
1. A
2. B
3. C
4. D

**Question Number : 26 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical**
**Correct Marks : 1 Wrong Marks : 0**

The value of $\int_0^1 \int_0^1 \frac{dx\,dy}{\sqrt{1-x^2-y^2}}$ is

a) $\pi$

b) $\frac{\pi}{2}$

c) $\frac{\pi^2}{2}$

d) $\frac{\pi^2}{4}$

**Options :**

1. A
2. B
3. C
4. D

**Question Number : 27 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical**

**Correct Marks : 1 Wrong Marks : 0**

If $x = \frac{1}{3}(u + 2v)$ and $y = \frac{1}{3}(u - v)$, then the Jacobian $\frac{\partial (x,y)}{\partial (u,v)}$ is

a) 1/3

b) 1/2

c) 1/4

d) -1/3

**Options :**

1. A
2. B
3. C

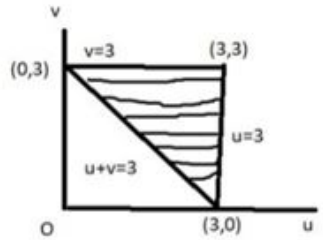
4. D

**Question Number : 28 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical**

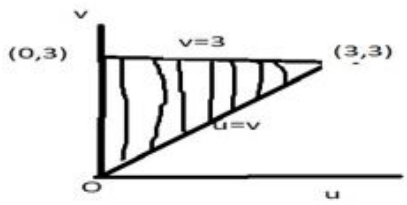
**Correct Marks : 1 Wrong Marks : 0**

Consider the image under the transformation $u = x - y$ and $v = 2x + y$ of the triangular region with vertices (0, 0), (1, 1) and (1, -2) in the xy-plane. If we sketch the transformed region in the uv-plane, then which one of the following is correct ?

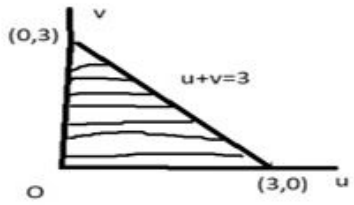
a)



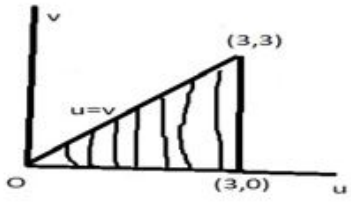

b)




c)




d)




**Options :**

1. A
2. B
3. C
4. D

**Question Number : 29 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical**

**Correct Marks : 1 Wrong Marks : 0**

The Jacobian $\frac{\partial (x,y,z)}{\partial (u,v,w)}$ of the transformations $x = u\cos(v)$, y= $u\sin(v)$ and $z = w$, is

a) $v$

b) $u$

c) $-u$

d) $-v$

**Options :**

1. A
2. B
3. C
4. D

**Question Number : 30 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical**

**Correct Marks : 1 Wrong Marks : 0**

The value of the double integral $\int_0^1 \int_0^{1-x} \frac{y}{x+y}\, dy\, dx$, using the transformation, $x + y = u$ and y= $u\, v$, is

a) 1/2

b) 1/4

c) 1/8

d) 1

**Options :**

1. A
2. B
3. C
4. D

**Question Number : 31 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical**

**Correct Marks : 1 Wrong Marks : 0**

The typical volume element $dx\,dy\,dz$ in the Cartesian coordinates $(x, y, z)$ is changed to cylindrical polar coordinates $(r, \Theta, z)$ as

a) $r\,dr\,d\Theta\,dz$

b) $dr\,d\Theta\,dz$

c) $r\sin\Theta\;dr\,d\Theta\,dz$

d) $r^2\sin\Theta\;dr\,d\Theta\,dz$

**Options :**

1. A
2. B
3. C
4. D

**Question Number : 32 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical**

**Correct Marks : 1 Wrong Marks : 0**

The area of the portion cut from the plane: $x + y + z = 1$ by the cylinder $x^2 + y^2 = 2$ is:

a) $\pi\sqrt{3}$ Sq. units

b) $2\pi\sqrt{3}$ Sq. units

c) $3\pi\sqrt{3}$ Sq. units

d) $\pi\sqrt{3}/2$ Sq. units

**Options :**

1. A
2. B
3. C
4. D

**Question Number : 33 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical**

**Correct Marks : 1 Wrong Marks : 0**

The area of the surface (plane) $x + y + z = 1$ which lies above the region bounded by the lines $y = x$ , $y = -x$ and $x = 1$ in the xy-plane is:

a) $\sqrt{3}$ Sq. units

b) $2\sqrt{3}$ Sq. units

c) $3\sqrt{3}$ Sq. units

d) $\sqrt{3}/2$ Sq. units

**Options :**

1. A
2. B
3. C
4. D

**Question Number : 34 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical**

**Correct Marks : 1 Wrong Marks : 0**

Which of the following integrals represent the volume of a right circular cylinder of height 5 and radius 2?

a) $\int_0^5 \int_0^2 \int_0^{2\pi} r \, dz \, dr \, d\theta$

b) $\int_0^{2\pi} \int_0^2 \int_0^5 1 \, dz \, dr \, d\theta$

c) $\int_0^{2\pi} \int_0^2 \int_0^5 r \, dz \, dr \, d\theta$

d) $\int_0^5 \int_0^2 \int_0^{2\pi} 1 \, dz \, dr \, d\theta$

**Options :**

1. A
2. B
3. C
4. D

**Question Number : 35 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical**

**Correct Marks : 1  Wrong Marks : 0**

The value of the triple integral $\int_{-2}^{0}\int_{0}^{\sqrt{4-x^2}}\int_{0}^{5} x\,dz\,dy\,dx$ is

a) $\frac{-40}{3}$

b) $\frac{40}{3}$

c) $\frac{-8}{3}$

d) $\frac{8}{3}$

**Options :**

1. A
2. B
3. C
4. D

**Question Number : 36  Question Type : MCQ  Option Shuffling : No  Display Question Number : Yes  Single Line Question Option : No  Option Orientation : Vertical**

**Correct Marks : 1  Wrong Marks : 0**

The value of the triple integral $\int_{0}^{1}\int_{-1}^{1}\int_{0}^{|xy|} 2\,dz\,dx\,dy$ is

a) 0

b) 1

c) 2

d) cannot evaluate

**Options :**

1. A
2. B
3. C
4. D

**Question Number : 37 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical**

**Correct Marks : 1 Wrong Marks : 0**

The limits of integration in cylindrical coordinates for integrating a function $f(r, \theta, z)$ over the region $R$ bounded below by the plane $z = 0$, laterally by the circular cylinder $x^2 + (y-1)^2 = 1$, and above by the paraboloid $z = x^2 + y^2$, are

a) $0 \leq \theta \leq \frac{\pi}{2}, 0 \leq r \leq 2\sin\theta, \ 0 \leq z \leq r^2$

b) $0 \leq \theta \leq \pi, 0 \leq r \leq \sin\theta, \ 0 \leq z \leq r^2$

c) $0 \leq \theta \leq \frac{\pi}{2}, 0 \leq r \leq \sin\theta, \ 0 \leq z \leq r^2$

d) $0 \leq \theta \leq \pi, 0 \leq r \leq 2\sin\theta, \ 0 \leq z \leq r^2$

**Options :**

1. A
2. B
3. C
4. D

**Question Number : 38 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical**

**Correct Marks : 1 Wrong Marks : 0**

The value of the triple integral $\iiint \frac{z}{\sqrt{x^2+y^2}}\, dV$ over the solid bounded above by the plane $z = 2$ and below by the surface $x^2 + y^2 - 2z = 0$, is

a) $\frac{8\pi}{5}$

b) $\frac{16\pi}{5}$

c) $\frac{4\pi}{5}$

d) $\frac{2\pi}{5}$

**Options :**

1. A
2. B
3. C
4. D

**Question Number : 39 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical**

**Correct Marks : 1 Wrong Marks : 0**

$$\nabla(\log\ r) =$$

a) $\frac{-\bar{R}}{r^2}$

b) $\frac{\bar{R}}{r^2}$

c) $\frac{-\bar{R}}{r^3}$

d) $\frac{\bar{R}}{r^3}$

**Options :**

1. A
2. B
3. C
4. D

**Question Number : 40 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical**

**Correct Marks : 1 Wrong Marks : 0**

If $\bar{a}$ is a constant vector, then $\nabla\left(\bar{a}\bullet\nabla\frac{1}{r}\right)=$

a) $-\frac{\bar{a}}{r^3}+\frac{3\left(\bar{a}\bullet\bar{R}\right)\bar{R}}{r^5}$

b) $\frac{\bar{a}}{r^3}+\frac{3\left(\bar{a}\bullet\bar{R}\right)\bar{R}}{r^5}$

c) $\frac{\bar{a}}{r^3}-\frac{3\left(\bar{a}\bullet\bar{R}\right)\bar{R}}{r^5}$

d) $-\frac{\bar{a}}{r^3}-\frac{3\left(\bar{a}\bullet\bar{R}\right)\bar{R}}{r^5}$

**Options :**

1. A
2. B
3. C
4. D

**Question Number : 41 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical**

**Correct Marks : 1 Wrong Marks : 0**

If $f = \tan^{-1}\frac{y}{x}$, then $div.(grad\, f) =$

a) 1

b) -1

c) 2

d) 0

**Options :**

1. A
2. B
3. C
4. D

**Question Number : 42 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical**

**Correct Marks : 1 Wrong Marks : 0**

Work done by a particle along the square formed by the lines $x = \pm 1$ and $y = \pm 1$ under the force $\bar{F} = \left(x^2 + 2xy\right)\bar{i} + \left(x^2 + y^2\right)\bar{j}$ is

a) 0

b) 1

c) 2

d) 3

**Options :**

1. A
2. B
3. C
4. D

**Question Number : 43 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical**

**Correct Marks : 1 Wrong Marks : 0**

$$\nabla \bullet \left( \left( x^2 + y^2 + z^2 \right)^{3/2} \left( x\bar{i} + y\bar{j} + z\bar{k} \right) \right) =$$

a) $3\left( x^2 + y^2 + z^2 \right)^{3/2}$

b) $3\left( x^2 + y^2 + z^2 \right)^{2}$

c) $6\left( x^2 + y^2 + z^2 \right)^{2}$

d) $6\left( x^2 + y^2 + z^2 \right)^{3/2}$

**Options :**

1. A
2. B
3. C
4. D

**Question Number : 44 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical**

**Correct Marks : 1 Wrong Marks : 0**

If $\overline{v}_1$ and $\overline{v}_2$ are the vectors joining the fixed points $(x_1, y_1, z_1)$ and $(x_2, y_2, z_2)$ respectively to a variable point $(x, y, z)$, then $curl(\overline{v}_1 \times \overline{v}_2) =$

a) $\overline{v}_1 - \overline{v}_2$

b) $\overline{v}_1 + \overline{v}_2$

c) $2(\overline{v}_2 - \overline{v}_1)$

d) $2(\overline{v}_1 + \overline{v}_2)$

**Options :**

1. A
2. B
3. C
4. D

**Question Number : 45 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical**

**Correct Marks : 1 Wrong Marks : 0**

Which of the following is not an application of Green's theorem?

a) Solving two dimensional flow integrals

b) Area surveying

c) Volume of plane figures.

d) Centroid of plane figures

**Options :**

1. A
2. B
3. C
4. D

**Question Number : 46 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical**

**Correct Marks : 1 Wrong Marks : 0**

Using Green's theorem, the value of $\oint_C [(x^2 - xy^3)dx + (y^2 - 2xy)dy]$, where $C$ is the square with the vertices (0, 0), (2, 0), (2, 2) and (0, 2).

a) 0

b) 8

c) −8

d) 1

**Options :**

1. A
2. B
3. C
4. D

**Question Number : 47 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical**

**Correct Marks : 1 Wrong Marks : 0**

Using Stokes' theorem, the value of $\iint_S curlF.d\vec{s}$ where $F = yi - xj + yx^3k$ and $S$ is the portion of the sphere of radius 4 with $z \geq 0$ and the upwards orientation.

a) $-32$

b) $32\pi$

c) $-16\pi$

d) $-32\pi$

**Options :**

1. A
2. B
3. C
4. D

**Question Number : 48 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical**

**Correct Marks : 1 Wrong Marks : 0**

Using the divergence theorem, the value of $\iint_S F.d\bar{s}$

where $F = xyi - \frac{1}{2}y^2 j + zk$ and the surface $S$ consists of three surfaces, $z = 4 - 3x^2 - 3y^2,\ 1 \le z \le 4$ on the top, $x^2 + y^2 = 1, 0 \le z \le 1$ on the sides and $z = 0$ on the bottom.

a) $5\pi / 4$

b) $5 / 2$

c) $5\pi / 2$

d) $5 / 4$

**Options :**

1. A
2. B
3. C
4. D

**Question Number : 49 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical**

**Correct Marks : 1 Wrong Marks : 0**

Compute $\int_C x^2 z ds$ where $C$ is the line segment from(0, 6, -1) to (4, 1, 5).

a) $56\sqrt{77} / 3$

b) $56\sqrt{77}$

c) $\sqrt{77}$

d) $37\sqrt{77} / 3$

**Options :**

1. A

2. B
3. C
4. D

**Question Number : 50 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical**
**Correct Marks : 1 Wrong Marks : 0**

Find the work done in moving a particle in the force field $F = 3x^2 i + (2xz - y) j + zk$ along a straight line from (0, 0, 0) to (2, 1, 3).

a) 16

b) 16/3

c) 8/3

d) 15/4

**Options :**
1. A
2. B
3. C
4. D

**Question Number : 51 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical**
**Correct Marks : 1 Wrong Marks : 0**

Evaluate the surface integral $\int\int_S (3xi + 2yj).d\bar{S}$, where S is the sphere given by $x^2 + y^2 + z^2 = 9$.

a) $120\pi$

b) $180\pi$

c) $240\pi$

d) $300\pi$

**Options :**
1. A

2. B
3. C
4. D

**Question Number : 52 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical**
**Correct Marks : 1 Wrong Marks : 0**

A conservative vector field is given by $F = (x^2 - y^2 + x)i - (2xy + y)j$. Evaluate the line integral from (1, 2) to (2, 1).

a) $22/3$

b) $-22/3$

c) $22/5$

d) $-22/5$

**Options :**
1. A
2. B
3. C
4. D

**Question Number : 53 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical**
**Correct Marks : 1 Wrong Marks : 0**

Consider the cylinder $\bar{r} = (\cos u, \sin u, v), 0 \le u \le 2\pi, 0 \le v \le 2,$ oriented outward, and $F = (y, zx, xy)$. Compute $\int\int_S \nabla \times F . d\bar{S}$.

a) $-2\pi$

b) $2\pi$

c) $\pi$

d) $-\pi$

**Options :**

1. A
2. B
3. C
4. D

**Question Number : 54 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical**
**Correct Marks : 1 Wrong Marks : 0**

A necessary and sufficient condition that the line integral $\int_C F.d\bar{r}$ for every closed C vanishes is

a) $curlF = 0$

b) $curlF \neq 0$

c) $divF = 0$

d) $divF \neq 0$

**Options :**
1. A
2. B
3. C
4. D

**Question Number : 55 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical**
**Correct Marks : 1 Wrong Marks : 0**

Solve the general form of the differential equation $y'' + (a+b)y' + aby = 0$ is

a) $y = c_1 e^{-ax} + c_2 e^{bx}$

b) $y = c_1 e^{ax} + c_2 e^{-bx}$

c) $y = c_1 e^{-ax} + c_2 e^{-bx}$

d) $y = c_1 e^{-ax} + c_2 e^{-bx}$

**Options :**

1. A
2. B
3. C
4. D

**Question Number : 56 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical**

**Correct Marks : 1 Wrong Marks : 0**

The particular integral of the differential equation $\frac{d^3y}{dx^3} + y = \sin(2x+3)$ is

a) $\frac{1}{25}[\cos(3x+2) + \sin(3x+2)]$

b) $\frac{1}{65}[\cos(2x+3) + \sin(2x+3)]$

c) $\frac{1}{25}[\cos(3x+2) + \sin(3x+2)]$

d) $\frac{1}{65}[\cos(3x+2) + \sin(3x+2)]$

**Options :**

1. A
2. B
3. C
4. D

**Question Number : 57 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical**

**Correct Marks : 1 Wrong Marks : 0**

The value of $\frac{1}{D^2} x \sin x$ is

a) $-x\cos x + \sin x$

b) $x\cos x + \sin x$

c) $-x\sin x + \cos x$

d) $x\sin x + \cos x$

**Options :**

1. A
2. B
3. C
4. D

**Question Number : 58 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical**

**Correct Marks : 1 Wrong Marks : 0**

The equation $(a+bx)^2 \frac{d^2y}{dx^2} + P_1(a+bx)\frac{dy}{dx} + P_2 y = R(x)$ reduces to a homogenous linear form if

a) $a + bx = e^z$

b) $a + bx = e^{z-1}$

c) $a + bx = e^{z+1}$

d) $a + bx = e^{z+2}$

**Options :**

1. A
2. B
3. C
4. D

**Question Number : 59 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical**

**Correct Marks : 1 Wrong Marks : 0**

Solve for a particular integral of the differential equation $y'' - 2y' + 5y = 4e^{3t}$,

a) $\frac{e^{3t}}{3}$

b) $2e^{3t}$

c) $3e^{3t}$

d) $\frac{e^{3t}}{2}$

**Options :**

1. A
2. B
3. C
4. D

**Question Number : 60 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical**

**Correct Marks : 1 Wrong Marks : 0**

The complementary function of $x^3\frac{d^3y}{dx^3} + 2x^2\frac{d^2y}{dx^2} + 2y = 10\left(x + \frac{1}{x}\right)$ is

a) $\frac{a}{x} - x\left[b\cos(\log x) + c\sin(\log x)\right]$

b) $\frac{a}{x} + x\left[b\cos(\log x) + c\sin(\log x)\right]$

c) $\frac{a}{x} + x\left[b\cos(\log x) - c\sin(\log x)\right]$

d) $\frac{a}{x} + x\left[-b\cos(\log x) + c\sin(\log x)\right]$

**Options :**

1. A
2. B

3. C
4. D

**Question Number : 61 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical**
**Correct Marks : 1 Wrong Marks : 0**

The complementary function of $\frac{d^2y}{dx^2}+\frac{1}{x}\frac{dy}{dx}=\frac{12\log x}{x^2}$ is

a) $ax+b$

b) $a\log x+b$

c) $ax-b$

d) $a\log x-b$

**Options :**
1. A
2. B
3. C
4. D

**Question Number : 62 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical**
**Correct Marks : 1 Wrong Marks : 0**

$$\frac{1}{D-a}X=$$

a) $e^{-ax}\int Xe^{ax}dx$

b) $e^{ax}\int Xe^{-ax}dx$

c) $e^{-ax}\int Xe^{-ax}dx$

d) $e^{ax}\int Xe^{ax}dx$

**Options :**
1. A

2. B
3. C
4. D

**Question Number : 63 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical**
**Correct Marks : 1 Wrong Marks : 0**

If $(x, y)$ satisfies the system of differential equations $\frac{dy}{dt} - y = 0$ and $\frac{dx}{dt} - x - 2y = 0$, then the point $(x, y)$ _____ as $t \to -\infty$

a) touches the x-axis only at $(-\infty, 0)$

b) passes through the origin

c) touches the y-axis only at $(0, \infty)$

d) None of these

**Options :**
1. A
2. B
3. C
4. D

**Question Number : 64 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical**
**Correct Marks : 1 Wrong Marks : 0**

The value of $y(t)$ for the system of differential equations $\frac{dx}{dt} - 2y = 0 \quad \frac{dy}{dt} = 2z \quad \frac{dz}{dt} = 2x$ is _____

a) $c_1 e^{2t} + e^{-t}\left(c_2 \cos\sqrt{3}\,t + c_3 \sin\sqrt{3}\,t\right)$

b) $c_1 e^{2t} + e^{t}\left(c_2 \cos\sqrt{3}\,t + c_3 \sin\sqrt{3}\,t\right)$

c) $c_1 e^{2t} + e^{-t}\left(c_2 \cos t + c_3 \sin t\right)$

d) None of these

**Options :**

1. A
2. B
3. C
4. D

**Question Number : 65 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical**

**Correct Marks : 1 Wrong Marks : 0**

Water is flowing at a steady rate through a homogeneous and saturated horizontal soil strip of 10m length. The strip is being subjected to a constant water head ($H$) of 5m at the beginning and 1m at the end. Further, $x$ is used to indicate the distance along the soil strip. If the governing equation of flow in the soil strip is $\frac{d^2H}{dx^2} = 0$, then the value of $H$ (in meter) at the middle of the strip is

a) 3

b) 5

c) 2

d) None of these

**Options :**

1. A
2. B
3. C
4. D

**Question Number : 66 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical**

**Correct Marks : 1 Wrong Marks : 0**

The solution of the differential equation is $k^2 \frac{d^2y}{dx^2} = y - y_2$ under the boundary conditions (i) $y = y_1$ at $x = 0$ and (ii) $y = y_2$ at $x \to \infty$, where k, $y_1$ and $y_2$ are constants, is

a) $y = (y_1 - y_2)\sinh\left(\frac{x}{k}\right) + y_1$

b) $y = (y_2 - y_1)e^{-\frac{x}{k}} + y_1$

c) $y = (y_1 - y_2)e^{-\frac{x}{k}} + y_2$

d) None of these

**Options :**

1. A
2. B
3. C
4. D

**Question Number : 67 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical**

**Correct Marks : 1 Wrong Marks : 0**

If we use the quasilinearization technique to linearize the nonlinear differential equation y $y'(y'-2y)-y''=y^4$, then the sequence of linearized equations are given by _____

a)

$$y''_{n+1}+2(y_n-y'_n)y'_{n+1}+2\left(y'_n+2y_n^3\right)y_{n+1}=(y'_n)^2-2y_ny'_n-3y_n^4$$

b)

$$y''_{n+1}+2(y_n-y'_n)y'_{n+1}+2\left(y'_n+2y_n^3\right)y_{n+1}=2y_ny'_n-(y'_n)^2+3y_n^4$$

c) $$y''_{n+1}+(2y_n-y'_n)y'_{n+1}+2\left(y'_n+2y_n^3\right)y_{n+1}=2y_ny'_n-(y'_n)^2+3y_n^4$$

d) None of these

**Options :**

1. A
2. B
3. C
4. D

**Question Number : 68 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical**

**Correct Marks : 1 Wrong Marks : 0**

A 12 Volt battery is connected to a simple series circuit in which the inductance is ½ *Henry* and the resistance is 10 *Ohm*. If *i(0)=0*, then the value of current _____

a) $i=\frac{6}{5}\left(1-e^{-20t}\right)$

b) $i=\frac{12}{5}\left(1-e^{-20t}\right)$

c) $i=-\frac{6}{5}\left(1-e^{-20t}\right)$

d) None of these

**Options :**

1. A
2. B
3. C
4. D

**Question Number : 69 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical**

**Correct Marks : 1 Wrong Marks : 0**

An electric circuit contains an electromotive force given by $E = 100\sin 60t$ *volt* along with an inductor of 0.1 *Henry*, and a capacitor of $\frac{1}{260}$ *Farads* in series. If the initial current and initial charge on the capacitor are both zero, and assuming that resistance is negligible, then the charge on the capacitor at any time $t > 0$ is_____

a) $Q(t) = \frac{6}{\sqrt{13}}\sin 10\sqrt{26}\,t - \sin 60t$

b) $Q(t) = \frac{\sqrt{26}}{13}\sin 10\sqrt{26}\,t - \sin 60t$

c) $Q(t) = \frac{3\sqrt{26}}{13}\sin 10\sqrt{26}\,t - \sin 60t$

d) None of these

**Options :**

1. A
2. B
3. C
4. D

**Question Number : 70 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical**

**Correct Marks : 1 Wrong Marks : 0**

A tank initially contains 50 *gallons* of pure water. Starting at $t = 0$, a brine containing $2lb$ of dissolved salt per *gallon* flows into the tank at the rate of 3 *gal/min*. If the mixture is kept uniform by stirring and well stirred mixture simultaneously flows out of the tank at the same rate, then the salt content which is present after a long time is given by _____

a) 100 *lb*

b) 50 *lb*

c) 78 *lb*

d) None of these

**Options :**

1. A
2. B
3. C
4. D

**Question Number : 71 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical**

**Correct Marks : 1 Wrong Marks : 0**

A 16 *pound* weight is attached to a 5 *feet* long spring. At equilibrium the spring measures 8.2 *feet*. If the weight is pushed up and released from rest at a point 2 *feet* above the equilibrium position, and if it is further known that surrounding medium offers a resistance numerically equal to the instantaneous velocity, then the displacement _____

a) $x(t) = \frac{2}{3}e^{-t}(3\cos 3t + \sin 3t)$

b) $x(t) = -\frac{2}{3}e^{-t}(3\cos 3t + \sin 3t)$

c) $x(t) = -\frac{4}{3}e^{-t}(3\cos 3t + \sin 3t)$

d) None of these

**Options :**

1. A
2. B
3. C
4. D

**Question Number : 72 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical**

**Correct Marks : 1 Wrong Marks : 0**

If $\frac{1}{N}\left(\frac{\partial M}{\partial y}-\frac{\partial N}{\partial x}\right)=-\frac{1000}{X}$ then integrating factor is

a). $X^{-1000}$

b). $X^{1000}$

c). $X^{100}$

d). $X^{10}$

**Options :**

1. A
2. B
3. C
4. D

**Question Number : 73 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical**

**Correct Marks : 1 Wrong Marks : 0**

The order and degree of the differential equation $\frac{d^4y}{dx^4}=\cos\left(\frac{d^3y}{dx^3}\right)$ is

a). 4,1

b). 4,3

c). 4, undefined

d) . 2,3

**Options :**

1. A

2. B
3. C
4. D

**Question Number : 74 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical**
**Correct Marks : 1 Wrong Marks : 0**

If $\frac{dy}{dx} = \frac{ax+by+c}{kx+py+\lambda}$, where $\frac{a}{k} = \frac{b}{p}$ then is reducible to

a). Homogeneous form

b). Variable seperable form

c). Exact form

d). None

**Options :**
1. A
2. B
3. C
4. D

**Question Number : 75 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical**
**Correct Marks : 1 Wrong Marks : 0**

The differential equation $\left(1+(y')^2\right)^3 = r^2\frac{d^2y}{dx^2}$ represents

a). Family of circle of radius "$r$"

b). Family of sphere of radius "$r$"

c). Family of ellipse

d). None

**Options :**

1. A
2. B
3. C
4. D

**Question Number : 76 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical**
**Correct Marks : 1 Wrong Marks : 0**

The differential equation $2\frac{dy}{dx} + x^2 y = 2x + 3,\ y(0) = 5$ is

a). Nonlinear

b). Linear

c). Both

d). None

**Options :**
1. A
2. B
3. C
4. D

**Question Number : 77 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical**
**Correct Marks : 1 Wrong Marks : 0**

Integrating factor of $y\frac{dx}{dy} = -2x + 10y^3$

a). $y$

b). $y+1$

c). $y+3$

d). None

**Options :**
1. A

2. B
3. C
4. D

**Question Number : 78 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical**
**Correct Marks : 1 Wrong Marks : 0**

Let $R: |x - x_0| \leq a \& |y - y_0| \leq b$. For the local existence of solution to the IVP $y' = f(x, y)$ with $y(x_0) = y_0$,

a) Satisfying Lipschitz condition and continuity by $f$ are essential.

b) Continuity of $f$ on $R$ is enough.

c) Satisfying Lipschitz condition is enough.

d) Boundedness of $f$ on $R$ is enough.

**Options :**
1. A
2. B
3. C
4. D

**Question Number : 79 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical**
**Correct Marks : 1 Wrong Marks : 0**

The initial value problem $|y'| + |y| = 0\,, y(2) = 4$ has

a) No solution

b) Unique solution

c) Exactly two solutions

d) Infinitely many solutions

**Options :**
1. A
2. B

3. C

4. D

**Question Number : 80 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical**

**Correct Marks : 1 Wrong Marks : 0**

The initial value problem $xy' = 4y, y(0) = 1$ has

a) Unique solution

b) Exactly three solutions

c) No solution

d) Infinitely many solutions

**Options :**

1. A

2. B

3. C

4. D

**Question Number : 81 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical**

**Correct Marks : 1 Wrong Marks : 0**

Using (Picard's) successive approximations, the second approximation $(\varphi_2(x))$to the IVP $y' = 1 + y^2, y(0) = 0$ is [here $\varphi_0(x) = 0$]

a) $x - \frac{x^3}{3}$

b) $x + \frac{x^3}{3}$

c) $-x + \frac{x^3}{3}$

d) $-x - \frac{x^3}{3}$

**Options :**

1. A
2. B
3. C
4. D

**Question Number : 82 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical**

**Correct Marks : 1 Wrong Marks : 0**

Using (Picard's) successive approximations, the second approximation $\varphi_2(x)$ to the IVP $y' = y, y(0) = 1$ is [here $\varphi_0(x) = 1$]

a) $1 + x - \frac{x^2}{2}$

b) $1 - x + \frac{x^2}{2}$

c) $1 - x - \frac{x^2}{2}$

d) $1 + x + \frac{x^2}{2}$

**Options :**

1. A
2. B
3. C
4. D

**Question Number : 83 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical**

**Correct Marks : 1 Wrong Marks : 0**

If $y=vx^m$, then the equation $(x^7y^2+3y)dx + (3x^8y - x)dy = 0$ reduces to separable type. m=

a) 2

b) – 7

c) 6

d) – 3

**Options :**

1. A
2. B
3. C

4. D

**Question Number : 84 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical**

**Correct Marks : 1 Wrong Marks : 0**

Integrating factor for the eqution $(1 + xy)ydx + (1 – xy)xdy = 0$ is

a) $1/xy$

b) $xy$

c) $x^2y^2$

d) $1/x^2y^2$

**Options :**

1. A
2. B
3. C
4. D

**Question Number : 85 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical**

**Correct Marks : 1 Wrong Marks : 0**

If $x^n$ is integrating factor for $(y – 2x^3)dx – x1 – xy)dy = 0$, then n=

a) $– 1$

b) $2$

c) $– 2$

d) $3$

**Options :**

1. A
2. B
3. C
4. D

**Question Number : 86 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical**

**Correct Marks : 1 Wrong Marks : 0**

The equation $(1+\sin y)dx + (x\sec y + x\tan y - 2y\cos y)dy = 0$ is linear in x, then integrating factor is

a) $\sec x + \tan x$

b) $\sec y + \tan y$

c) $\sec y - \tan y$

d) $1/(\sec x - \tan x)$

**Options :**

1. A
2. B
3. C
4. D

**Question Number : 87 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical**

**Correct Marks : 1 Wrong Marks : 0**

The differential equation $(1 - x^2)y'' - 2x\,y' + n(n+1)y = 0$ has a singular point at

a) x=0 regular

b) x =1 irregular

c) x=1 regular

d) x=0 irregular

**Options :**

1. A
2. B
3. C
4. D

**Question Number : 88 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical**

**Correct Marks : 1 Wrong Marks : 0**

For the differential $x^2y'' + xy' + y=0$, $x=1$ is a

a) regular point

b) regular singular point

c) irregular singular point

d) essential regular point

**Options :**

1. A
2. B
3. C
4. D

**Question Number : 89 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical**

**Correct Marks : 1 Wrong Marks : 0**

For the equation $x^4(x^2+1)(x-1)^2y'' +3x^2(x-1)y' + (x-2)y=0$, regular singular point is

a) $x=0$

b) $x=-1$

c) $x= i$

d) $x=2$

**Options :**

1. A
2. B
3. C
4. D

**Question Number : 90 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical**

**Correct Marks : 1 Wrong Marks : 0**

If $x^2y'' + xp(x)y' + q(x)y = 0$ with $p(x)=p_0 + p_1x + p_2x^2 + \ldots$ and $q(x) = q_0 + q_1x + q_2x^2 + \ldots$, indicial equation is given by

a) $m(m-1) + mp_0 + q_0 = 0$

b) $m^2 + p_0m + q_0 = 0$

c) $m^2 - mp_0 + q_0 = 0$

d) $m^2 + mp_0 - q_0 = 0$

**Options :**

1. A
2. B
3. C
4. D

**Question Number : 91 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical**

**Correct Marks : 1 Wrong Marks : 0**

The indicial equation for $3xy'' + 2y' + y = 0$ is

a) $m(3m-1)=0$

b) $m(m-2/3)=0$

c) $(m-1/3)(m-1)=0$

d) $3m^2 + m - 1 = 0$

**Options :**

1. A
2. B
3. C
4. D

**Question Number : 92 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical**

**Correct Marks : 1 Wrong Marks : 0**

The value of $P_n(-1)$ is

a) $(-1)^n$

b) 0

c) 1

d) -1

**Options :**

1. A
2. B
3. C
4. D

**Question Number : 93 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical**

**Correct Marks : 1 Wrong Marks : 0**

The value of $P_{n+1}'(x) - P_{n-1}'(x)$ is

a) $( 2 n - 1 ) P_n(x)$

b) $( 2 n + 1 ) P_n(x)$

c) $( 2n + 1 ) P_{n-1}(x)$

d) $( 2 n + 1 ) P_{n+1}(x)$

**Options :**

1. A
2. B
3. C
4. D

**Question Number : 94 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical**

**Correct Marks : 1 Wrong Marks : 0**

$J_{-n}(x)$

a) $J_n(-x)$

b) $(-1\ ) J_n(x)$

c) $(-1)^n J_n(x)$

d) $(-1)^n J_n(x)$

**Options :**

1. A
2. B
3. C
4. D

**Question Number : 95 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical**

**Correct Marks : 1 Wrong Marks : 0**

$e^{\left(\frac{1}{2}x\left(t-\frac{1}{t}\right)\right)} =$

a) $\sum_0^{+\infty} t^n J_n(x)$

b) $\sum_{-\infty}^{+\infty} t^{n+1} J_n(x)$

c) $\sum_{-\infty}^{+\infty} t^n J_n(x)$

d) $\sum_0^{+\infty} t^{n+1} J_n(x)$

**Options :**

1. A
2. B
3. C
4. D

**Question Number : 96 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical**

**Correct Marks : 1 Wrong Marks : 0**

The solution of $4\,y'' + 9\,xy = 0$ is

a) $y = [c_1\, J_{\frac{1}{3}}(x^{-3/2}) + c_2\, J_{-\frac{1}{3}}(x^{-3/2})]$

b) $y = [c_1\, J_{\frac{1}{3}}(x^{3/2}) + c_2\, J_{-\frac{1}{3}}(x^{3/2})]$

c) $y = \sqrt{x}[c_1\, J_{\frac{1}{3}}(x^{3/2}) + c_2\, J_{-\frac{1}{3}}(x^{3/2})]$

d) $y = \sqrt{x}[c_1\, J_{\frac{1}{3}}(x^{-3/2}) + c_2\, J_{-\frac{1}{3}}(x^{-3/2})]$

**Options :**

1. A
2. B
3. C
4. D

**Question Number : 97 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical**

**Correct Marks : 1 Wrong Marks : 0**

If $y' = -y$ , $y(0) = 1$, the by Eulers method, the value of $y(1)$ is Ans A

a) 0.99

b) 0.999

c) 0.981

d) 0.897

**Options :**

1. A
2. B
3. C
4. D

**Question Number : 98 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical**

**Correct Marks : 1 Wrong Marks : 0**

If $y' = x$ , $y(0) = 1$, the by Picards method, the value of $y(1)$ is
Ans D

a) 0.915

b) 0.905

c) 0.981

d) None of the above

**Options :**

1. A
2. B
3. C
4. D

**Question Number : 99 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical**

**Correct Marks : 1 Wrong Marks : 0**

In Eulers method if h is small, the method

a) gives inaccurate results

b) is too slow

c) is fast and gives accurate results

d) None of the above

**Options :**

1. A
2. B
3. C
4. D

**Question Number : 100 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical**

**Correct Marks : 1 Wrong Marks : 0**

The modified Eulers method is given by

a) $$y_{n+1} = y_n + \frac{1}{2}h[f(x_n, y_n) + f(x_{n+1}, y_{n+1})]$$

b) $$y^*_{n+1} = y_n + hf(x_n, y_n), y_{n+1} = y_n + h[f(x_n, y_n) + f(x_{n+1}, y^*_{n+1})]$$

c) $$y^*_{n+1} = y_n + hf(x_n, y_n), y_{n+1} = y_n + \frac{1}{2}h[f(x_n, y_n) + f(x_{n+1}, y^*_{n+1})]$$

d) $$y^*_{n+1} = y_n + f(x_n, y_n), y_{n+1} = y_n + [f(x_n, y_n) + f(x_{n+1}, y^*_{n+1})]$$

**Options :**

1. A
2. B
3. C
4. D