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All Dearz fellows
ALL IN ONE MTH301
Final term PAPERS & MCQz

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FINALTERM EXAMINATION

Spring 2010
MTH301- Calculus II

Time: 90 min
Marks: 60

Student Info	
Student ID:	
Center:	
Exam Date:	

For Teacher's Use Only

Q No.	1	2	3	4	5	6	7	8	Total
Marks									
Q No.	9	10	11	12	13	14	15	16	
Marks									
Q No.	17	18	19	20	21	22	23	24	
Marks									
Q No.	25	26	27	28	29	30	31	32	
Marks									
Q No.	33	34	35	36	37	38	39		
Marks									

Question No: 1 (Marks: 1) - Please choose one

Intersection of two straight lines is ----------

- Surface
- Curve
- Plane
- ***Point***

Question No: 2 (Marks: 1) - Please choose one

Plane is a ---------- surface.

- One-dimensional
- ***Two-dimensional***
- Three-dimensional
- Dimensionless

Question No: 3 (Marks: 1) - Please choose one

Let w = f(x, y, z) and x = g(r, s), y = h(r, s), z = t(r, s) then by chain rule

$\frac{\partial w}{\partial r} =$

- $\frac{\partial w}{\partial x}\frac{\partial x}{\partial r}+\frac{\partial w}{\partial y}\frac{\partial y}{\partial r}+\frac{\partial w}{\partial z}\frac{\partial z}{\partial r}$

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- $\frac{\partial w}{\partial r}\frac{\partial x}{\partial r}+\frac{\partial w}{\partial r}\frac{\partial y}{\partial r}+\frac{\partial w}{\partial r}\frac{\partial z}{\partial r}$
- $\frac{\partial w}{\partial x}\frac{\partial x}{\partial r}\frac{\partial x}{\partial s}+\frac{\partial w}{\partial y}\frac{\partial y}{\partial r}\frac{\partial y}{\partial s}+\frac{\partial w}{\partial z}\frac{\partial z}{\partial r}\frac{\partial z}{\partial s}$
- $\frac{\partial w}{\partial r}\frac{\partial r}{\partial x}+\frac{\partial w}{\partial r}\frac{\partial r}{\partial y}+\frac{\partial w}{\partial r}\frac{\partial r}{\partial z}$

Question No: 4 (Marks: 1) - Please choose one

What are the parametric equations that correspond to the following vector equation?

$\vec{r}(t)=\sin^2 t\,\hat{i}+(1-\cos 2t)\,\hat{j}$

- $x=\sin^2 t \quad , \quad y=1-\cos 2t \quad , \quad z=0$
- $y=\sin^2 t \quad , \quad x=1-\cos 2t \quad , \quad z=0$

▶ $x = \sin^2 t \quad , \quad y = 1 - \cos 2t \quad , \quad z = 1$

▶ $x = \sin^2 t \quad , \quad y = \cos 2t \quad , \quad z = 1$

Question No: 5 (Marks: 1) - Please choose one

What are the parametric equations that correspond to the following vector equation?

$r(t) = (2t - 1)\hat{i} - 3\sqrt{t}\,\hat{j} + \sin 3t\,\hat{k}$

▶ $z = 2t - 1 \quad , \quad x = -3\sqrt{t} \quad , \quad y = \sin 3t$

▶ $y = 2t - 1 \quad , \quad x = -3\sqrt{t} \quad , \quad z = \sin 3t$

▶ $x = 2t - 1 \quad , \quad z = -3\sqrt{t} \quad , \quad y = \sin 3t$

▶ $x = 2t - 1 \quad , \quad y = -3\sqrt{t} \quad , \quad z = \sin 3t$

Question No: 6 (Marks: 1) - Please choose one

What is the derivative of following vector-valued function?

$\vec{r}(t) = (\cos 5t,\ \tan t\ ,\ 6\sin t)$

▶ $\vec{r}'(t) = \left(\frac{\sin 5t}{5},\ \sec t\ ,\ 6\cos t \right)$

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- $\vec{r}'(t) = (\frac{-\sin 5t}{5}, \sec t\ , 6\cos t)$

- $\vec{r}'(t) = (-5\sin 5t, \sec^2 t\ , 6\cos t)$

- $\vec{r}'(t) = (\sin 5t, \sec^2 t\ , -6\cos t)$

Question No: 7 (Marks: 1) - Please choose one

What is the derivative of following vector-valued function?

$\vec{r}(t) = \left(t^4, \sqrt{t+1}\ , \frac{3}{t^2}\right)$

- $\vec{r}'(t) = \left(4t^3, \frac{1}{\sqrt{t+1}}, \frac{-6}{t^3}\right)$

- $\vec{r}'(t) = \left(4t^3, \frac{1}{2\sqrt{t+1}}, \frac{6}{t^3}\right)$

- $\vec{r}'(t) = \left(4t^4, \frac{1}{2\sqrt{t+1}}, \frac{-6}{t^3}\right)$

- $\vec{r}'(t) = \left(4t^3, \frac{1}{2\sqrt{t+1}}, \frac{-6}{t^3}\right)$

Question No: 8 (Marks: 1) - Please choose one

The following differential is exact

$dz = (x^2 y + y)\ dx - x\ dy$

- True
- **False**

Question No: 9 (Marks: 1) - Please choose one

Which one of the following is correct Wallis Sine formula when n is even and $n \geq 2$?

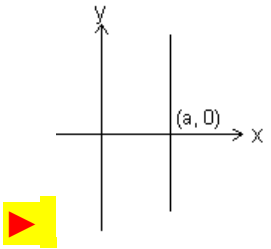
- $\int_0^{\frac{\pi}{2}} \sin^n x\, dx = \frac{\pi}{2} \frac{(n-1)}{n} \frac{(n-3)}{(n-2)} \frac{(n-5)}{(n-4)} \cdots\cdots\cdots \frac{5}{6} \frac{3}{4} \frac{1}{2}$ page #182
- $\int_0^{\frac{\pi}{2}} \sin^n x\, dx = \frac{(n-1)}{n} \frac{(n-3)}{(n-2)} \frac{(n-5)}{(n-4)} \cdots\cdots\cdots \frac{6}{7} \frac{4}{5} \frac{2}{3}$
- $\int_0^{\frac{\pi}{2}} \sin^n x\, dx = \frac{\pi}{2} \frac{(n)}{(n-1)} \frac{(n-2)}{(n-3)} \frac{(n-4)}{(n-5)} \cdots\cdots\cdots \frac{6}{5} \frac{4}{3} \frac{2}{1}$
- $\int_0^{\frac{\pi}{2}} \sin^n x\, dx = \frac{(n)}{(n-1)} \frac{(n-2)}{(n-3)} \frac{(n-4)}{(n-5)} \cdots\cdots\cdots \frac{6}{5} \frac{4}{3} \frac{2}{1}$

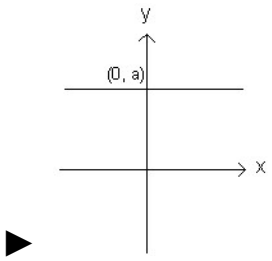
Question No: 10 (Marks: 1) - Please choose one

Match the following equation in polar co-ordinates with its graph.

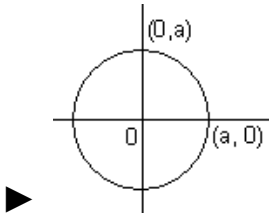
$r\cos\theta = a$

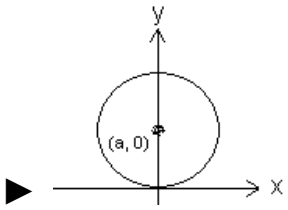
where a is an arbitrary cons tan*t*





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Question No: 11 (Marks: 1) - Please choose one

If the equation of a curve, in polar co-ordinates, remains unchanged after replacing (r, θ) by $(r, \pi - \theta)$ then the curve is said to be symmetric about which of the following?

► Initial line

► Y-axis

► Pole

Question No: 12 (Marks: 1) - Please choose one

If the equation of a curve, in polar co-ordinates, remains unchanged after replacing (r, θ) by $(-r, \theta)$ then the curve is said to be symmetric about which of the following?

► Initial line

► y-axis

► *Pole*

Question No: 13 (Marks: 1) - Please choose one

What is the amplitude of a periodic function defined by $f(x) = \sin\frac{x}{3}$?

► 0

► 1

- $\frac{1}{3}$
- Does not exist

Question No: 14 (Marks: 1) - Please choose one

What is the period of a periodic function defined by $f(x) = 4\cos 3x$?

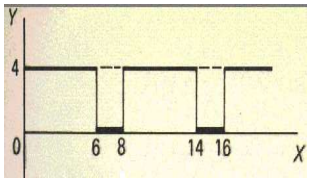
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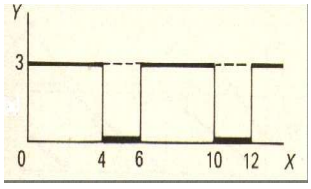
- $\frac{\pi}{4}$
- $\frac{\pi}{3}$
- $\frac{2\pi}{3}$
- π

Question No: 15 (Marks: 1) - Please choose one

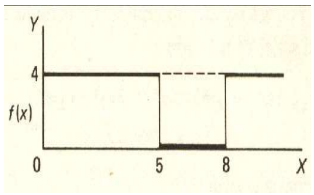
Match the following periodic function with its graph.

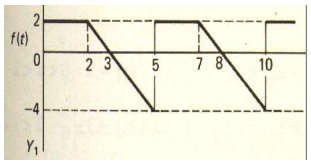
$$f(x) = \begin{cases} 3 & 0 < x < 4 \\ 0 & 4 < x < 6 \end{cases}$$

- 

► 

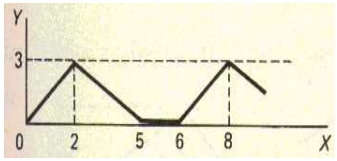
Page #198

► 

► 

Question No: 16 (Marks: 1) - Please choose one

What is the period of periodic function whose graph is as below?



► 2

► 5

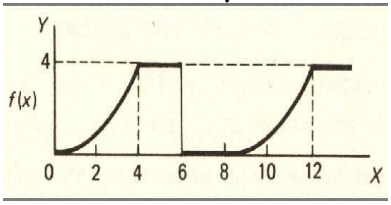
► 6

► 8

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Question No: 17 (Marks: 1) - Please choose one

What is the period of periodic function whose graph is as below?



- 0
- 4
- 6
- **8**

Question No: 18 (Marks: 1) - Please choose one

Let L denotes the Laplace Transform.

If $L\{F(t)\} = f(s)$ where s is a constant.and $\lim_{t\to 0}\left(\frac{F(t)}{t}\right)$ exists then which of the following equation holds?

- $L\left(\frac{F(t)}{t}\right) = f(s+a)$
- $L\left(\frac{F(t)}{t}\right) = f(s-a)$

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- $L\left(\frac{F(t)}{t}\right)=\int_{s}^{\infty} f(s)\,ds$

- $L\left(\frac{F(t)}{t}\right)=-\frac{d}{ds}\{f(s)\}$

Question No: 19 (Marks: 1) - Please choose one

Which of the following is Laplace inverse transform of the function $f(s)$ defined by $f(s)=\frac{3}{s-2}-\frac{2}{s}$?

- $3te^{2t}-2$
- $3e^{2t}-2t$
- $3e^{2t}-2$
- None of these.

Question No: 20 (Marks: 1) - Please choose one

Let (x_1, y_1, z_1) and (x_2, y_2, z_2) be any two points in three dimensional space. What does the formula $\sqrt{(x_2-x_1)^2+(y_2-y_1)^2+(z_2-z_1)^2}$ calculates?

- Distance between these two points

► **Midpoint of the line joining these two points**

► Ratio between these two points

Question No: 21 (Marks: 1) - Please choose one

Let the functions $P(x, y)$ and $Q(x, y)$ are finite and continuous inside and at the boundary of a closed curve C in the xy-plane. If $(P\,dx + Q\,dy)$ is an exact differential then

$\oint_C (P\,dx + Q\,dy) =$

► **Zero**

► One

► Infinite

Question No: 22 (Marks: 1) - Please choose one

What is Laplace transform of the function $F(t)$ if $F(t) = t$?

► $L\{t\} = \frac{1}{s}$

► $L\{t\} = \frac{1}{s^2}$

- $L\{t\} = e^{-s}$
- $L\{t\} = s$

Question No: 23 (Marks: 1) - Please choose one

What is the value of $L\{e^{5t}\}$ if L denotes laplace transform?

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- $L\{e^{5t}\} = \frac{1}{s-5}$
- $L\{e^{5t}\} = \frac{s}{s^2+25}$
- $L\{e^{5t}\} = \frac{5}{s^2+25}$
- $L\{e^{5t}\} = \frac{5!}{s^6}$

Question No: 24 (Marks: 1) - Please choose one

Evaluate the line integral $\int_C (3x+2y)\,dx + (2x-y)\,dy$ where C is the line segment from (0, 0) to (0, 2).

- 1
- 0

► 2

► -2

Question No: 25 (Marks: 1) - Please choose one

Evaluate the line integral $\int_C (2x+y)\,dx+(x^2-y)\,dy$ where C is the line segment from (0, 0) to (2, 0).

► 0

► -4

► 4

► Do not exist

Question No: 26 (Marks: 1) - Please choose one

Which of the following are direction ratios for the line joining the points $(1, 3, 5)$ and $(2, -1, 4)$?

► 3, 2 and 9

► 1, -4 and -1

► 2, -3 and 20

► 0.5, -3 and 5/4

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Question No: 27 (Marks: 1) - Please choose one

$If\ R = \{(x, y) / 0 \le x \le 2\ and\ 1 \le y \le 4\}, then$
$\iint_R (6x^2 + 4xy^3)dA =$

► $\int_1^4 \int_0^2 (6x^2 + 4xy^3)dydx$

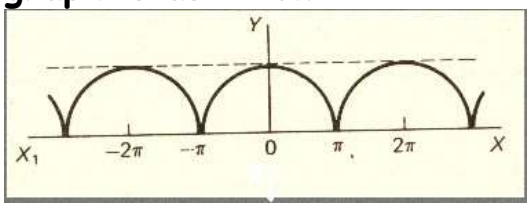
► $\int_0^2 \int_1^4 (6x^2 + 4xy^3)dxdy$

► $\int_1^4 \int_0^2 (6x^2 + 4xy^3)dxdy$

► $\int_2^4 \int_0^1 (6x^2 + 4xy^3)dxdy$

Question No: 28 (Marks: 1) - Please choose one

Which of the following is true for a periodic function whose graph is as below?



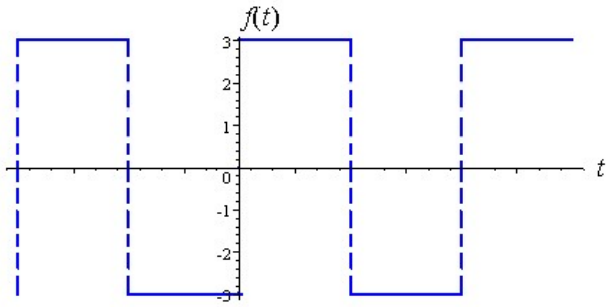
► **Even function**

► Odd function

► Neither even nor odd function

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Question No: 29 (Marks: 1) - Please choose one



Which of the following is true for a function whose graph is given above.

► **An odd function**

► An even function

► Neither even nor odd

Question No: 30 (Marks: 1) - Please choose one

At each point of domain, the function ----------

► **Is defined**

► Is continuous

► Is infinite

► Has a limit

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Question No: 31 (Marks: 2)

Determine whether the following differential is exact or not.

$dz = 4x^3y^3\ dx + 3x^4y^2\ dy$

Solution:

$$dz = 4x^3y^3\ dx + 3x^4y^2\ dy$$

$$\frac{\partial p}{\partial y} = 12x^3y^2$$

$$\frac{\partial Q}{\partial X} = 12x^3y^2$$

$$\frac{\partial p}{\partial y} = \frac{\partial Q}{\partial X}$$

yes

Question No: 32 (Marks: 2)

Evaluate

$$\int_{-\pi}^{\pi} \sin\ nx\ dx$$

where n is an integer other than zero.

Solution:

$$\int_{-\pi}^{\pi} \sin\ nx\ dx$$

$$= \left[\frac{-\cos nx}{n}\right]_{-\pi}^{\pi}$$

$$= \left[\frac{-\cos n\pi}{n} + \frac{\cos n\pi}{n}\right]$$

$$= \frac{1}{n}(-\cos n\pi + \cos n\pi)$$

$$= 0$$

Question No: 33 (Marks: 2)

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Find Laplce transform of the function $f(t)$ if $f(t) = e^{3t}$

Solution:

$$L(e^{3t}) = \int_0^{\infty} e^{3t} - e^{-st}$$

$$= \int_0^{\infty} e^{-(s-3)t}.dt$$

$$= \{\frac{e^{-(s-3)t}}{-(s-3)}\} \lim 0 - \infty$$

$$= \frac{-1}{s-3}(\frac{1}{e^{(s-3)t}})$$

$$= \frac{-1}{s-3}(0-1)$$

$$= \frac{1}{s-3} \text{.....Ans}$$

Question No: 34 (Marks: 3)

Determine the Fourier co-efficient a_0 of the periodic function defined below:

$f(x) = 2x+1 \qquad 0 < x < 2$

Solution:

$a_\circ = \frac{1}{\pi}\int_{-\pi}^{\pi} f(x)dx$

$f(x) = (2x+1)$

$(0,2)$

$= \int_0^2 (2x+1)dx$

$= \left[x^2 + x\right]_0^2$

$= 6$

Question No: 35 (Marks: 3)

Determine whether the following differential is exact or not.

$dz = (3x^2e^{2y} - 2y^2e^{3x})\,dx + (2x^3e^{2y} - 2ye^{3x})\,dy$

Solution:

dz = Pdx + Qdy

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Therefore,

For dz to be an exact differential it must satisfy $\frac{\partial P}{\partial y} = \frac{\partial Q}{\partial x}$

But this test fails becuase $\frac{\partial P}{\partial y} \neq \frac{\partial Q}{\partial x}$

Not Exact

Question No: 36 (Marks: 3)

Use Wallis sine formula to evaluate $\int_0^{\frac{\pi}{2}} \left(\sin^3 x + \sin^5 x\right) dx$

Solution:

$$\int_0^{\frac{\pi}{2}} \sin^3 x dx$$

$$= \frac{n-1}{n}.$$

$$= \frac{3-1}{3}$$

$$= \frac{2}{3}$$

$$\int_0^{\frac{\pi}{2}} \sin^5 x dx$$

$$= \frac{n-1}{n}.\frac{n-3}{n-2}$$

$$= \frac{5-1}{5}.\frac{5-3}{5-2}$$

$$= \frac{4}{5}.\frac{2}{3}$$

$$\int_0^{\frac{\pi}{2}} \left(\sin^3 x + \sin^5 x\right) dx$$

$$= \frac{2}{3} + \frac{4}{5}.\frac{2}{3}$$

Question No: 37 (Marks: 5)

Evaluate the following line integral which is independent of path.

$$\int_{(0,0)}^{(3,2)} (2xe^y)\, dx + (x^2e^y)\, dy$$

Solution:

$$p = \frac{\partial z}{\partial x} = 2e^y \qquad \int 2e^y dx$$

$$Q = \frac{\partial z}{\partial y} = x^2 e^y \qquad \int x^2 e^y dy$$

$$z = \int_{(0,0)}^{(3,2)} 2xe^y + x^2 ye^y$$

$$z = 6e^2 + 18e^2$$

$$z = 24e^2$$

Question No: 38 (Marks: 5)

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Determine the Fourier coefficients b_n for a periodic function $f(t)$ of period 2 defined by

$$f(t) = \begin{cases} 4\ (1 + t) & -1 < t < 0 \\ 0 & 0 < t < 1 \end{cases}$$

Solution:

$$bn = \frac{1}{\pi}\int_{-\pi}^{\pi} f(x)\sin nx dx$$

$$= \frac{1}{\pi}\int_{-1}^{1} 4(1+t)\sin nx dx$$

$$= \frac{1}{\pi}\left[\frac{-4(1+t)\cos nx}{n}\right]_{-1}^{1}$$

$$= \frac{-4(1+t)}{\pi n}\left[\cos n(1) - \cos n(-1)\right]$$

$$= \frac{-4(1+t)}{\pi n}(\cos n + \cos n)$$

Question No: 39 (Marks: 5)

Determine whether the following vector field $\vec{F}$ is conservative or not.

$$\vec{F}(x,\ y,\ z) = (4x - z)\hat{i} + (3y + z)\hat{j} + (y - x)\hat{k}$$

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FINALTERM EXAMINATION
Spring 2010
MTH301- Calculus II (Session - 2)
Time: 90 min
Marks: 60

Student Info	
StudentID:	$$
Center:	OPKST
ExamDate:	19 Aug 2010

For Teacher's Use Only									
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Marks									
Q No.	33	34	35	36	37	38	39		
Marks									

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Question No: 1 (Marks: 1) - Please choose one

---------- planes intersect at right angle to form three dimensional space.

- **Three**
- Four
- Eight
- Twelve

Question No: 2 (Marks: 1) - Please choose one

If the positive direction of x, y axes are known then ---------- the positive direction of z-axis.

- Horizontal rightward direction is
- Vertical upward direction is
- **Left hand rule tells**
- Right hand rule tells

Question No: 3 (Marks: 1) - Please choose one

What is the distance between points (3, 2, 4) and (6, 10, -1)?

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- $7\sqrt{2}$
- $2\sqrt{6}$
- $\sqrt{34}$
- $7\sqrt{3}$

Question No: 4 (Marks: 1) - Please choose one

The equation $ax+by+cz+d=0$, where a,b,c,d are real numbers, is the general equation of which of the following?

► **Plane**

► Line

► Curve

► Circle

Question No: 5 (Marks: 1) - Please choose one

The spherical co-ordinates of a point are $\left(\sqrt{3}, \frac{\pi}{3}, \frac{\pi}{2}\right)$. What are its cylinderical co-ordinates?

► $\left(\frac{\sqrt{3}}{2}, \frac{3}{2}, 0\right)$

► $\left(\sqrt{3}\cos\frac{\pi}{3}, \sqrt{3}\sin\frac{\pi}{3}, 0\right)$

► $\left(\sqrt{3}\sin\frac{\pi}{3}, \frac{\pi}{2}, \sqrt{3}\cos\frac{\pi}{3}\right)$

► $\left(\sqrt{3}, \frac{\pi}{3}, 0\right)$

Question No: 6 (Marks: 1) - Please choose one

Domain of the function $f(x, y)=\sqrt{y-x^2}$ is

► $y < x^2$

► $y \geq x^2$

► $y \neq x^2$

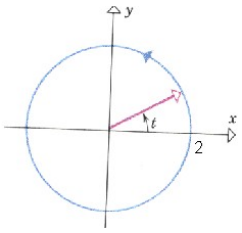
► Entire space

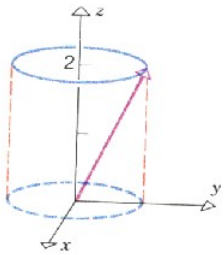
Question No: 7 (Marks: 1) - Please choose one

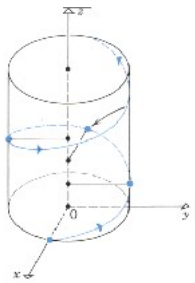
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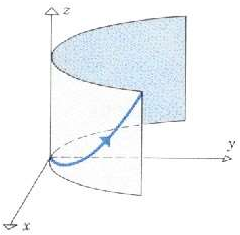
Match the following vector-valued function with its graph.

$r(t) = \cos t\,\hat{i} + \sin t\,\hat{j} + 2\hat{k}$ and $0 \le t \le 2\pi$

▶ 

▶ 

▶ 

▶ 

Question No: 8 (Marks: 1) - Please choose one

What are the parametric equations that correspond to the following vector equation?

$\vec{r}(t) = \sin^2 t\,\hat{i} + (1 - \cos 2t)\,\hat{j}$

▶ $x = \sin^2 t \quad , \quad y = 1 - \cos 2t \quad , \; z = 0$

▶ $y = \sin^2 t \quad , \quad x = 1 - \cos 2t \quad , \; z = 0$

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- $x = \sin^2 t \quad , \quad y = 1 - \cos 2t \quad , \quad z = 1$
- $x = \sin^2 t \quad , \quad y = \cos 2t \quad , \quad z = 1$

Question No: 9 (Marks: 1) - Please choose one

What are the parametric equations that correspond to the following vector equation?

$r(t) = (2t - 1)\hat{i} - 3\sqrt{t}\,\hat{j} + \sin 3t\,\hat{k}$

- $z = 2t - 1 \quad , \quad x = -3\sqrt{t} \quad , \quad y = \sin 3t$
- $y = 2t - 1 \quad , \quad x = -3\sqrt{t} \quad , \quad z = \sin 3t$
- $x = 2t - 1 \quad , \quad z = -3\sqrt{t} \quad , \quad y = \sin 3t$
- $x = 2t - 1 \quad , \quad y = -3\sqrt{t} \quad , \quad z = \sin 3t$

Question No: 10 (Marks: 1) - Please choose one

Is the following vector-valued function $\vec{r}(t)$ continuous at $t = 1$? If not, why?

$\vec{r}(t) = \left(\frac{t+1}{t-1}, t^2, 2t \right)$

- $\vec{r}(t)$ is continuous at $t = 1$
- $\vec{r}(1)$ is not defined
- $\vec{r}(1)$ is defined but $\lim_{t \to 1} \vec{r}(t)$ does not exist
- **$\vec{r}(1)$ is defined and $\lim_{t \to 1} \vec{r}(t)$ exists but these two numbers are not equal.**

Question No: 11 (Marks: 1) - Please choose one

Which one of the following is correct Wallis Sine formula when n is even and $n \geq 2$?

- $\int_0^{\frac{\pi}{2}} \sin^n x\, dx = \frac{\pi}{2}\frac{(n-1)}{n}\frac{(n-3)}{(n-2)}\frac{(n-5)}{(n-4)}\cdots\cdots\cdots\frac{5}{6}\frac{3}{4}\frac{1}{2}$
- $\int_0^{\frac{\pi}{2}} \sin^n x\, dx = \frac{(n-1)}{n}\frac{(n-3)}{(n-2)}\frac{(n-5)}{(n-4)}\cdots\cdots\cdots\frac{6}{7}\frac{4}{5}\frac{2}{3}$
- $\int_0^{\frac{\pi}{2}} \sin^n x\, dx = \frac{\pi}{2}\frac{(n)}{(n-1)}\frac{(n-2)}{(n-3)}\frac{(n-4)}{(n-5)}\cdots\cdots\cdots\frac{6}{5}\frac{4}{3}\frac{2}{1}$
- $\int_0^{\frac{\pi}{2}} \sin^n x\, dx = \frac{(n)}{(n-1)}\frac{(n-2)}{(n-3)}\frac{(n-4)}{(n-5)}\cdots\cdots\cdots\frac{6}{5}\frac{4}{3}\frac{2}{1}$

Question No: 12 (Marks: 1) - Please choose one

Which one of the following is correct Wallis Cosine formula when n is odd and $n \geq 3$?

- $\int_0^{\frac{\pi}{2}} \cos^n x\, dx = \frac{\pi}{2}\frac{(n-1)}{n}\frac{(n-3)}{(n-2)}\frac{(n-5)}{(n-4)}\cdots\cdots\cdots\frac{5}{6}\frac{3}{4}\frac{1}{2}$
- $\int_0^{\frac{\pi}{2}} \cos^n x\, dx = \frac{\pi}{2}\frac{(n)}{(n-1)}\frac{(n-2)}{(n-3)}\frac{(n-4)}{(n-5)}\cdots\cdots\cdots\frac{6}{5}\frac{4}{3}\frac{2}{1}$
- $\int_0^{\frac{\pi}{2}} \cos^n x\, dx = \frac{(n)}{(n-1)}\frac{(n-2)}{(n-3)}\frac{(n-4)}{(n-5)}\cdots\cdots\cdots\frac{6}{5}\frac{4}{3}\frac{2}{1}$
- $\int_0^{\frac{\pi}{2}} \cos^n x\, dx = \frac{(n-1)}{n}\frac{(n-3)}{(n-2)}\frac{(n-5)}{(n-4)}\cdots\cdots\cdots\frac{6}{7}\frac{4}{5}\frac{2}{3}$

Question No: 13 (Marks: 1) - Please choose one

If the equation of a curve, in polar co-ordinates, remains unchanged after replacing (r, θ) by $(r, \pi - \theta)$ then the curve is said to be symmetric about which of the following?

- Initial line
- **y-axis**
- Pole

Question No: 14 (Marks: 1) - Please choose one

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If $a > 0$, then the equation, in polar coordinates, of the form $r^2 = a^2 \cos 2\theta$ represent which of the following family of curves?

► **Leminscate**

► Cardiods

► Rose curves

► Spiral

Question No: 15 (Marks: 1) - Please choose one

What is the period of a periodic function defined by $f(x) = \sin\frac{x}{2}$?

► $\frac{\pi}{2}$

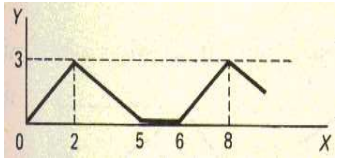
► π

► $\frac{3\pi}{2}$

► 4π

Question No: 16 (Marks: 1) - Please choose one

What is the period of periodic function whose graph is as below?



► 2

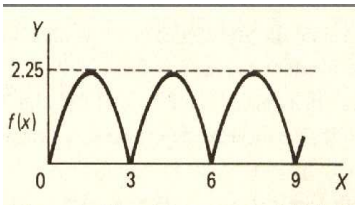
► 5

► **6**

► 8

Question No: 17 (Marks: 1) - Please choose one

What is the period of periodic function whose graph is as below?



► 0

► 2.25

► 3

► 6

Question No: 18 (Marks: 1) - Please choose one

Let L denotes the Laplace Transform.
If $L\{F(t)\} = f(s)$ where s is a constant, then which of the following equation holds?

► $L\{t\ F(t)\} = -\frac{d}{ds}\{f(s)\}$

► $L\{t\ F(t)\} = f(s+t)$

► $L\{t\ F(t)\} = f(s)$

► $L\{t F(t)\} = \int_{s}^{\infty} f(s)\ ds$

Question No: 19 (Marks: 1) - Please choose one

The graph of an odd function is symmetrical about ----------

► x-axis

► y-axis

► **origin**

Question No: 20 (Marks: 1) - Please choose one

Consider the function $f(x, y, z) = \sqrt{1 - x^2 - y^2 - z^2}$. What is the value of $f\left(0, \frac{1}{2}, \frac{1}{2}\right)$?

► $f\left(0, \frac{1}{2}, \frac{1}{2}\right) = \sqrt{\frac{1}{2}}$

► $f\left(0, \frac{1}{2}, \frac{1}{2}\right) = 2$

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- ► $f\left(0, \frac{1}{2}, \frac{1}{2}\right) = \frac{1}{2}$
- ► $f\left(0, \frac{1}{2}, \frac{1}{2}\right) = 0$

Question No: 21 (Marks: 1) - Please choose one

The path of integration of a line integral must be ----------

- ► straight and single-valued
- ► **continuous and single-valued**
- ► straight and multiple-valued
- ► continuous and multiple-valued

Question No: 22 (Marks: 1) - Please choose one

Sign of line integral is reversed when ----------

- ► path of integration is divided into parts.
- ► path of integration is parallel to y-axis.
- ► **direction of path of integration is reversed.**
- ► path of integration is parallel to x-axis.

Question No: 23 (Marks: 1) - Please choose one

Let the functions $P(x, y)$ and $Q(x, y)$ are finite and continuous inside and at the boundary of a closed curve C in the xy-plane.

If $(P\,dx + Q\,dy)$ is an exact differential then

$\oint_C (P\,dx + Q\,dy) =$

- ► Zero
- ► **One**
- ► Infinite

Question No: 24 (Marks: 1) - Please choose one

What is the value of $L\{e^{5t}\}$ if L denotes laplace transform?

- $L\{e^{5t}\} = \frac{1}{s-5}$
- $L\{e^{5t}\} = \frac{s}{s^2+25}$
- $L\{e^{5t}\} = \frac{5}{s^2+25}$
- $L\{e^{5t}\} = \frac{5!}{s^6}$

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Question No: 25 (Marks: 1) - Please choose one

What is laplace transform of the function $F(t)$ if $F(t) = \sin 3t$?

- $L\{\sin 3t\} = \frac{3}{s^2+9}$
- $L\{\sin 3t\} = \frac{s}{s^2+9}$
- $L\{\sin 3t\} = \frac{1}{s-3}$
- $L\{\sin 3t\} = \frac{3!}{s^4}$

Question No: 26 (Marks: 1) - Please choose one

If L denotes laplace transform then

$L\{te^{5t}\} =$

- $L\{te^{5t}\} = \frac{1}{s^2-5}$
- $L\{te^{5t}\} = \frac{1}{s^2+5}$
- $L\{te^{5t}\} = \frac{1}{(s+5)^2}$
- $L\{te^{5t}\} = \frac{1}{(s-5)^2}$

Question No: 27 (Marks: 1) - Please choose one

Evaluate the line integral $\int_C (3x+2y)\,dx+(2x-y)\,dy$ where C is the line segment from (0, 0) to (0, 2).

- ► 1
- ► 0
- ► 2
- ► **-2**

Question No: 28 (Marks: 1) - Please choose one

Evaluate the line integral $\int_C (2x+y)\,dx+(x^2-y)\,dy$ where C is the line segment from (0, 0) to (0, 2).

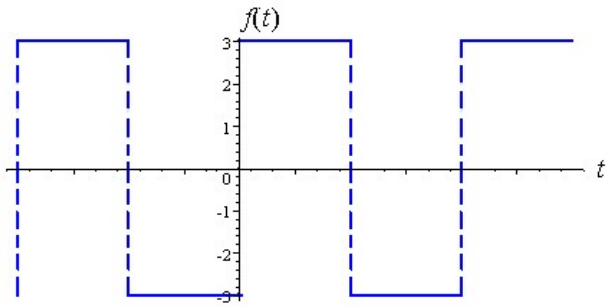
- ► -4
- ► **-2**
- ► 0
- ► 2

Question No: 29 (Marks: 1) - Please choose one

Divergence of a vector function is always a ----------

- ► Scalar
- ► **Vector**

Question No: 30 (Marks: 1) - Please choose one



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Which of the following is true for a function whose graph is given above

► **An odd function**

► An even function

► Neither even nor odd

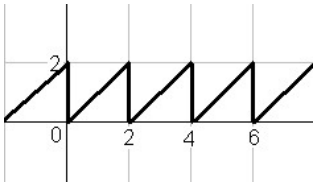
Question No: 31 (Marks: 2)

Does the following limit exist? If yes find its value, if no give reason

$$\lim_{t\to 0}\left[(e^{2t}+5)\hat{i}+(t^2+2t-3)\hat{j}+\left(\frac{1}{t}\right)\hat{k}\right]$$

Question No: 32 (Marks: 2)

Define the periodic function whose graph is shown below.



Question No: 33 (Marks: 2)

Find Laplace Transform of the function $F(t)$ if $F(t)=t^4$

Solution:

The Laplace transform of the given function will be:

$f(t) = t^4$

$L\{t^4\} = \frac{4!}{s^5}$

Question No: 34 (Marks: 3)

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Determine whether the following differential is exact or not.

$dz = (4x^3y + 2xy^3)\,dx + (x^4 + 3x^2y^2)\,dy$

Question No: 35 (Marks: 3)

Use Wallis sine formula to evaluate $\int_0^{\frac{\pi}{2}} \left(\sin^3 x + \sin^5 x\right) dx$

Solution:

$\int_0^{\frac{\pi}{2}} \sin^8 x dx = \frac{7}{8}.\frac{5}{6}.\frac{3}{4}.\frac{1}{2}---------\frac{\pi}{2}$

Question No: 36 (Marks: 3)

Find Laplace transform of the function $F(t)$ if

$F(t) = e^{2t} \sin 3t$

Solution:

Laplace transform will be

$L(t) = e^{2t}$.....1

$= \frac{1}{s-2}$

$L(t) = \sin 3t$.....2

$L(t) = \frac{a}{s^2+3^2}$

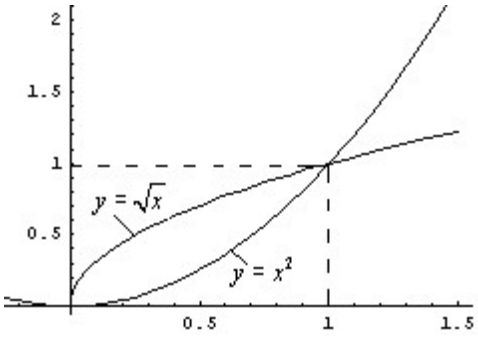
$L(t) = \frac{a}{s^2+9}$

Combining,

$L(t) = (\frac{1}{s-2})(\frac{a}{s^2+9})$

Question No: 37 (Marks: 5)

Using definite integral, find area of the region that is enclosed between the curves $y = x^2$ *and* $y = \sqrt{x}$



Question No: 38 (Marks: 5)

Determine the fourier co-efficient b_n of the following function.

$f(x) = x^2$ $0 < x < 2\pi$

Question No: 39 (Marks: 5)

Determine whether the following vector field is conservative or not.

$$\vec{F}(x, y, z) = (4x - z)\hat{i} + (3y + z)\hat{j} + (y - x)\hat{k}$$

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ASSALAM O ALAIKUM

All Dearz fellows

ALL IN ONE MTH301

Final term PAPERS & MCQz

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FINALTERM EXAMINATION

Fall 2009

MTH301- Calculus II

Time: 120 min
Marks: 80

Question No: 1 (Marks: 1) - Please choose one

π is an example of ----------

► Irrational numbers

► Rational numbers

► Integers

► Natural numbers

Question No: 2 (Marks: 1) - Please choose one

Straight line is a special kind of ----------

► Surface

► Curve

► Plane

► Parabola

Question No: 3 (Marks: 1) - Please choose one

An ordered triple corresponds to ---------- in three dimensional space.

► A unique point

► A point in each octant

► Three points

► Infinite number of points

Question No: 4 (Marks: 1) - Please choose one

The angles which a line makes with positive x ,y and z-axis are known as ----------

► Direction cosines

► Direction ratios

► Direction angles

Question No: 5 (Marks: 1) - Please choose one

Is the function $f(x, y)$ continuous at origin? If not, why?

$f(x, y) = 4xy + \sin 3x^2 y$

► $f(x, y)$ is continuous at origin

► $f(0, 0)$ is not defined

► $f(0, 0)$ is defined but $\lim_{(x,y)\to(0, 0)} f(x, y)$ does not exist

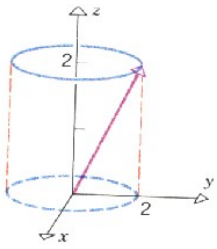
► $f(0, 0)$ is defined and $\lim_{(x,y)\to(0, 0)} f(x, y)$ exists but these two numbers are not equal.

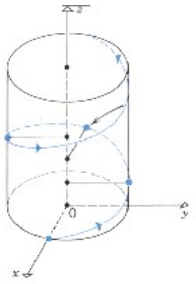
Question No: 6 (Marks: 1) - Please choose one

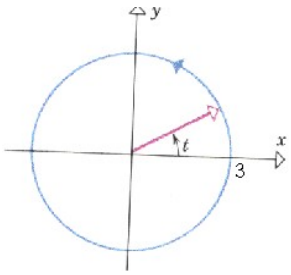
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$r(t) = 3\cos t \hat{i} + 3\sin t \hat{j}$ and $0 \le t \le 2\pi$

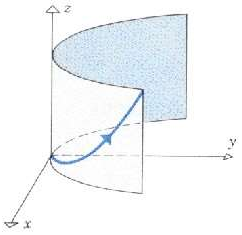
►



▶ 

▶ 

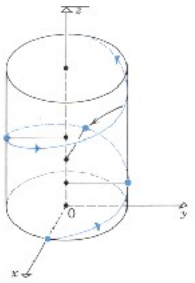
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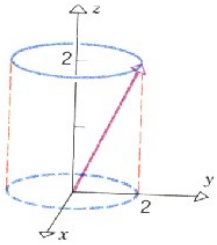
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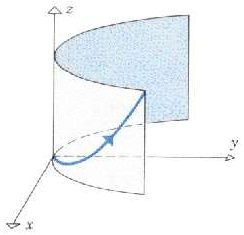
Question No: 7 (Marks: 1) - Please choose one

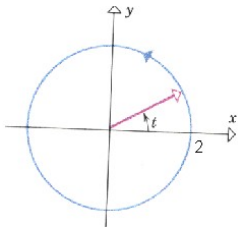
Match the following vector-valued function with its graph.

$r(t) = t\,\hat{i} + t^2\,\hat{j} + t^3\,\hat{k}$ and $t \geq 0$

▶ 

▶ 

▶ 

▶ 

Question No: 8 (Marks: 1) - Please choose one

What are the parametric equations that correspond to the following vector equation?

$\vec{r}(t) = \sin^2 t\,\hat{i} + (1-\cos 2t)\,\hat{j}$

▶ $x = \sin^2 t \quad , \quad y = 1 - \cos 2t \quad , \quad z = 0$

▶ $y = \sin^2 t \quad , \quad x = 1 - \cos 2t \quad , \quad z = 0$

▶ $x = \sin^2 t \quad , \quad y = 1 - \cos 2t \quad , \quad z = 1$

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▶ $x = \sin^2 t \quad , \quad y = \cos 2t \quad , \quad z = 1$

Question No: 9 (Marks: 1) - Please choose one

Is the following vector-valued function $\vec{r}(t)$ continuous at $t = 0$? If not, why?

$\vec{r}(t) = (4\cos t, \sqrt{t}\ , 4\sin t)$

▶ $\vec{r}(0)$ is not defined

▶ $\vec{r}(0)$ is defined but $\lim_{t \to 0} \vec{r}(t)$ does not exist

▶ $\vec{r}(0)$ is defined and $\lim_{t \to 0} \vec{r}(t)$ exists but these two numbers are not equal.

▶ $\vec{r}(t)$ is continuous at $t = 0$

Question No: 10 (Marks: 1) - Please choose one

What is the derivative of following vector-valued function?

$\vec{r}(t) = (\cos 5t,\ \tan t\ ,\ 6\sin t)$

- $\vec{r}'(t) = \left(\frac{\sin 5t}{5},\ \sec t\ ,\ 6\cos t\right)$
- $\vec{r}'(t) = (\frac{-\sin 5t}{5},\ \sec t\ ,\ 6\cos t)$
- $\vec{r}'(t) = (-5\sin 5t,\ \sec^2 t\ ,\ 6\cos t)$
- $\vec{r}'(t) = (\sin 5t,\ \sec^2 t\ ,\ -6\cos t)$

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Question No: 11 (Marks: 1) - Please choose one

The following differential is exact

$dz = (3x^2y + 2)\ dx + (x^3 + y)\ dy$

- True
- False

Question No: 12 (Marks: 1) - Please choose one

The following differential is exact

$dz = (3x^2 + 4xy)\ dx + (2x^2 + 2y)\ dy$

► True

► False

Question No: 13 (Marks: 1) - Please choose one

Which one of the following is correct Wallis Sine formula when n is odd and $n \geq 3$?

► $\int_0^{\frac{\pi}{2}} \sin^n x\, dx = \frac{\pi}{2} \frac{(n-1)}{n} \frac{(n-3)}{(n-2)} \frac{(n-5)}{(n-4)} \cdots\cdots\cdots \frac{5}{6} \frac{3}{4} \frac{1}{2}$

► $\int_0^{\frac{\pi}{2}} \sin^n x\, dx = \frac{\pi}{2} \frac{(n)}{(n-1)} \frac{(n-2)}{(n-3)} \frac{(n-4)}{(n-5)} \cdots\cdots\cdots \frac{6}{5} \frac{4}{3} \frac{2}{1}$

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► $\int_0^{\frac{\pi}{2}} \sin^n x\, dx = \frac{(n-1)}{n} \frac{(n-3)}{(n-2)} \frac{(n-5)}{(n-4)} \cdots\cdots\cdots \frac{6}{7} \frac{4}{5} \frac{2}{3}$

► $\int_0^{\frac{\pi}{2}} \sin^n x\, dx = \frac{(n)}{(n-1)} \frac{(n-2)}{(n-3)} \frac{(n-4)}{(n-5)} \cdots\cdots\cdots \frac{6}{5} \frac{4}{3} \frac{2}{1}$

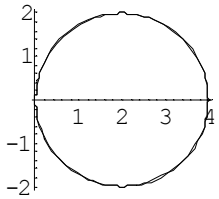
Question No: 14 (Marks: 1) - Please choose one

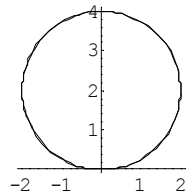
Which of the following is correct?

- $\int_0^{\frac{\pi}{2}} \sin^4 x \, dx = \frac{3}{16}$
- $\int_0^{\frac{\pi}{2}} \sin^4 x \, dx = \frac{3\pi}{16}$
- $\int_0^{\frac{\pi}{2}} \sin^4 x \, dx = \frac{3}{8}$
- $\int_0^{\frac{\pi}{2}} \sin^4 x \, dx = \frac{2\pi}{3}$

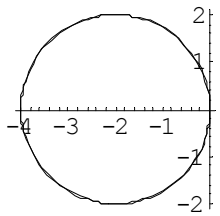
Question No: 15 (Marks: 1) - Please choose one

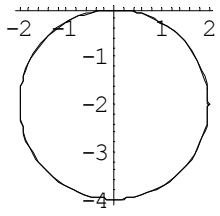
Match the following equation in polar co-ordinates with its graph.
$r = 4\sin\theta$

- 

- 

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▶ 

▶ 

Question No: 16 (Marks: 1) - Please choose one

If the equation of a curve, in polar co-ordinates, remains unchanged after replacing (r, θ) by $(r, \pi - \theta)$ then the curve is said to be symmetric about which of the following?

- ▶ Initial line
- ▶ y-axis
- ▶ Pole

Question No: 17 (Marks: 1) - Please choose one

What is the period of a periodic function defined by $f(x) = \sin\frac{x}{2}$?

- ▶ $\frac{\pi}{2}$

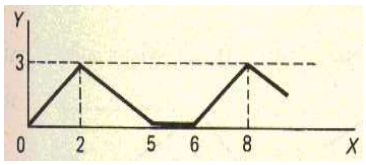
- π
- $\frac{3\pi}{2}$
- 4π

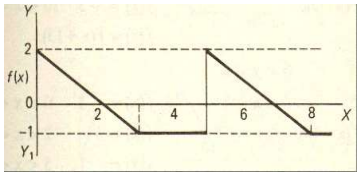
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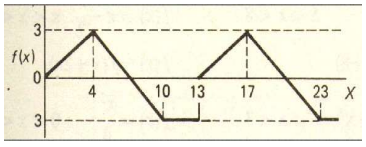
Question No: 18 (Marks: 1) - Please choose one

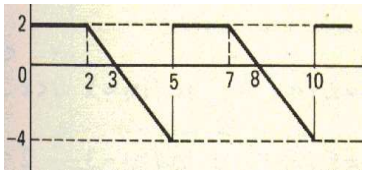
Match the following periodic function with its graph.

$$f(x)=\begin{cases}\frac{3}{4}x & 0<x<4\\ 7-x & 4<x<10\\ -3 & 10<x<13\end{cases}$$

- 

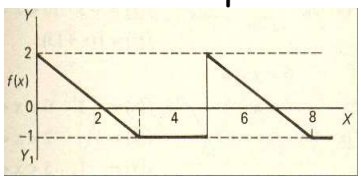
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Question No: 19 (Marks: 1) - Please choose one

What is the period of periodic function whose graph is as below?

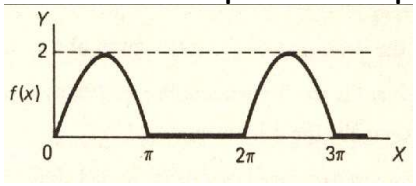


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- ► 2
- ► 3
- ► 4
- ► 5

Question No: 20 (Marks: 1) - Please choose one

What is the period of periodic function whose graph is as below?



- ► 0
- ► 2
- ► π

► 2π

Question No: 21 (Marks: 1) - Please choose one

Polar co-ordinates of a point are $\left(-2, \frac{-3\pi}{2}\right)$. Which of the following is another possible polar co-ordinates representation of this point?

► $\left(2, \frac{-\pi}{4}\right)$

► $\left(2, \frac{-\pi}{2}\right)$

► $\left(2, \frac{-\pi}{3}\right)$

► $\left(2, \frac{3\pi}{4}\right)$

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Question No: 22 (Marks: 1) - Please choose one

The function $f(x) = x^3 e^x$ is ----------

► Even function

► Odd function

- Neither even nor odd

Question No: 23 (Marks: 1) - Please choose one

The graph of an even function is symmetrical about ----------

- x-axis
- y-axis
- origin

Question No: 24 (Marks: 1) - Please choose one

At which point the vertex of parabola, represented by the equation $y = x^2 - 4x + 3$, occurs?

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- $(0, 3)$
- $(2, -1)$
- $(-2, 15)$
- $(1, 0)$

Question No: 25 (Marks: 1) - Please choose one

The equation $y = x^2 - 4x + 2$ represents a parabola. Find a point at which the vertex of given parabola occurs?

- ▶ $(2, -2)$
- ▶ $(-4, 34)$
- ▶ $(0, 0)$
- ▶ $(-2, 14)$

Question No: 26 (Marks: 1) - Please choose one

Is the function $f(x, y)$ continuous at origin? If not, why?

$f(x, y) = \dfrac{xy}{x^2 + y^2}$

- ▶ $f(x, y)$ is continuous at origin
- ▶ $\lim_{(x,y)\to(0,0)} f(x, y)$ does not exist
- ▶ $f(0, 0)$ is defined and $\lim_{(x,y)\to(0,0)} f(x, y)$ exists but these two numbers are not equal.

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Question No: 27 (Marks: 1) - Please choose one

Sign of line integral is reversed when ----------

- ▶ path of integration is divided into parts.

► path of integration is parallel to y-axis.

► direction of path of integration is reversed.

► path of integration is parallel to x-axis.

Question No: 28 (Marks: 1) - Please choose one

What is Laplace transform of a function F(t)?

(s is a constant)

► $\int_0^s e^{-st} F(t)\, dt$

► $\int_0^\infty e^{st} F(t)\, dt$

► $\int_{-\infty}^\infty e^{-st} F(t)\, dt$

► $\int_0^\infty e^{-st} F(t)\, dt$

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Question No: 29 (Marks: 1) - Please choose one

What is the value of $L\{e^{5t}\}$ if L denotes laplace transform?

► $L\{e^{5t}\} = \frac{1}{s-5}$

► $L\{e^{5t}\} = \frac{s}{s^2+25}$

► $L\{e^{5t}\} = \frac{5}{s^2+25}$

► $L\{e^{5t}\} = \frac{5!}{s^6}$

Question No: 30 (Marks: 1) - Please choose one

What is the Laplace Inverse Transform of $\frac{1}{s+1}$

► $L^{-1}\left\{\frac{1}{s+1}\right\} = t+1$

► $L^{-1}\left\{\frac{1}{s+1}\right\} = e^{-t}+e^{t}$

► $L^{-1}\left\{\frac{1}{s+1}\right\} = e^{t}$

► $L^{-1}\left\{\frac{1}{s+1}\right\} = e^{-t}$

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Question No: 31 (Marks: 1) - Please choose one

What is Laplace Inverse Transform of $\frac{5}{s^2+25}$

- ► $L^{-1}\left\{\frac{5}{s^2+25}\right\} = \sin 5t$
- ► $L^{-1}\left\{\frac{5}{s^2+25}\right\} = \cos 5t$
- ► $L^{-1}\left\{\frac{5}{s^2+25}\right\} = \sin 25t$
- ► $L^{-1}\left\{\frac{5}{s^2+25}\right\} = \cos 25t$

Question No: 32 (Marks: 1) - Please choose one

What is $L\{-6\}$ if L denotes Laplace Transform?

- ► $L\{-6\} = \frac{1}{s+6}$
- ► $L\{-6\} = \frac{-6}{s}$
- ► $L\{-6\} = \frac{s}{s^2+36}$
- ► $L\{-6\} = \frac{-6}{s^2+36}$

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Question No: 33 (Marks: 1) - Please choose one

Evaluate the line integral $\int_C (3x+2y)\,dx+(2x-y)\,dy$ where C is the line segment from (0, 0) to (2, 0).

- 6
- -6
- 0
- Do not exist

Question No: 34 (Marks: 1) - Please choose one

Evaluate the line integral $\int_C (2x+y)\,dx+(x^2-y)\,dy$ where C is the line segment from (0, 0) to (0, 2).

- -4
- -2
- 0
- 2

Question No: 35 (Marks: 1) - Please choose one

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Plane is an example of ----------

- Curve
- Surface
- Sphere
- Cone

Question No: 36 (Marks: 1) - Please choose one

$If\ R = \{(x, y) / 0 \le x \le 2\ and\ -1 \le y \le 1\}, then$

$\iint_R (x + 2y^2) dA =$

- $\int_{-1}^{1} \int_{0}^{2} (x + 2y^2) dy dx$
- $\int_{0}^{2} \int_{1}^{-1} (x + 2y^2) dx dy$

▶ $\int_{-1}^{1}\int_{0}^{2}(x+2y^2)dxdy$

▶ $\int_{1}^{2}\int_{-1}^{0}(x+2y^2)dxdy$

Question No: 37 (Marks: 1) - Please choose one

To evaluate the line integral, the integrand is expressed in terms of x, y, z with

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▶ $dr = dx\,\hat{i} + dy\,\hat{j}$

▶ $dr = dx\,\hat{i} + dy\,\hat{j} + dy\,\hat{k}$

▶ $dr = dx + dy + dz$

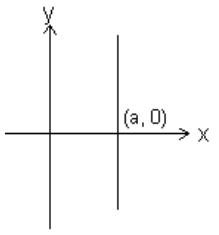
▶ $dr = dx + dy$

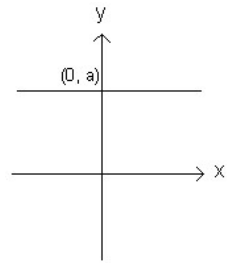
Question No: 38 (Marks: 1) - Please choose one

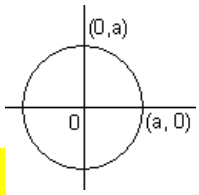
Match the following equation in polar co-ordinates with its graph.

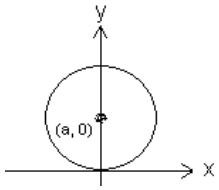
$r = a$

where a is an arbitrary constant.





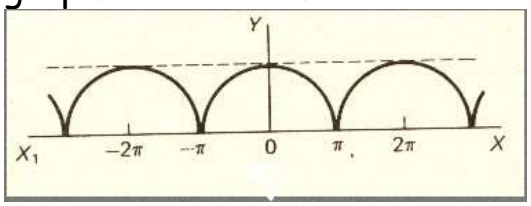




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Question No: 39 (Marks: 1) - Please choose one

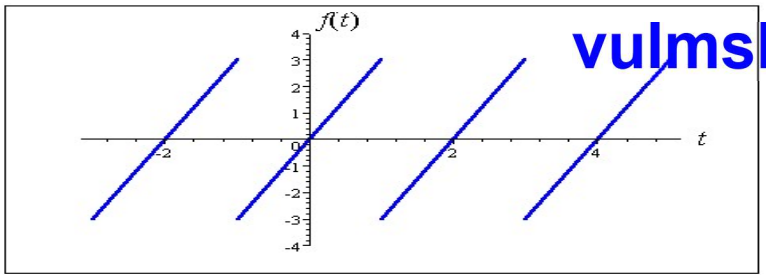
Which of the following is true for a periodic function whose graph is as below?



- Even function

- Odd function
- Neither even nor odd function

Question No: 40 (Marks: 1) - Please choose one



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The graph of "saw tooth wave" given above is ----------

- An odd function
- An even function
- Neither even nor odd

Question No: 1 (Marks: 2) - Please choose one

Laplace transform of 't ' is

- $\frac{1}{s}$
- $\frac{1}{s^2}$
- e^{-s}
- s

Question No: 2 (Marks: 2) - Please choose one

Symmetric equation for the line through (1,3,5) and (2,-2,3) is

- $x-2=-\frac{y+2}{3}=-\frac{z-3}{5}$
- $x+2=-\frac{y+3}{5}=-\frac{z+5}{2}$
- $x-1=-\frac{y-3}{5}=-\frac{z-5}{2}$
- $x+1=\frac{y+3}{5}=\frac{z-5}{5}$

Question No: 3 (Marks: 1) - Please choose one

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The level curves of f(x, y) = y Csc x are parallel to

- True.
- False.

Question No: 4 (Marks: 1) - Please choose one

The equation $z = r$ is written in

- Rectangular coordinates
- Cylindrical coordinates
- Spherical coordinates
- None of the above

FINALTERM EXAMINATION
Spring 2010
MTH301- Calculus II (Session - 4)
Ref No: Time: 90 min
Marks: 60

Student Info	
StudentID:	
Center:	OPKST
ExamDate:	07 Aug 2010

For Teacher's Use Only									
Q No.	1	2	3	4	5	6	7	8	Total
Marks									
Q No.	9	10	11	12	13	14	15	16	
Marks									
Q No.	17	18	19	20	21	22	23	24	
Marks									
Q No.	25	26	27	28	29	30	31	32	
Marks									
Q No.	33	34	35	36	37	38	39		
Marks									

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Question No: 1 (Marks: 1) - Please choose one

There is one-to-one correspondence between the set of points on co-ordinate line and ----------

- ► Set of real numbers
- ► Set of integers
- ► Set of natural numbers
- ► Set of rational numbers

Question No: 2 (Marks: 1) - Please choose one

Straight line is a special kind of ----------

- ► Surface
- ► Curve
- ► Plane
- ► Parabola

Question No: 3 (Marks: 1) - Please choose one

$\lim_{(x, y)\to(0, 0)} \frac{xy^2}{x^2 + y^2} =$

- ► ∞
- ► 0
- ► 1
- ► 0.5

Question No: 4 (Marks: 1) - Please choose one

If $f(x, y) = x^2y - y^3 + \ln x$

then $\frac{\partial^2 f}{\partial x^2}$ =

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▶ $2xy+\frac{1}{x^2}$

▶ $2y+\frac{1}{x^2}$

▶ $2xy-\frac{1}{x^2}$

▶ $2y-\frac{1}{x^2}$

Question No: 5 (Marks: 1) - Please choose one

Suppose $f(x,\,y)=xy-2y^2$ *where* $x=3t+1$ *and* $y=2t$. Which one of the following is true?

□□□□□□□▶□ $\frac{df}{dt}=-4t+2$

□□□□□□□▶□ $\frac{df}{dt}=-16t-t$

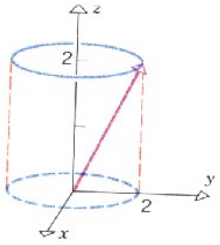
□□□□□□□▶□ $\frac{df}{dt}=18t+2$

□□□□□□□▶□ $\frac{df}{dt}=-10t^2+8t+1$

Question No: 6 (Marks: 1) - Please choose one

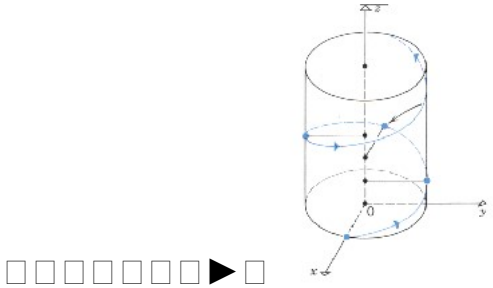
Match the following vector-valued function with its graph.

$r(t)=3\cos t\,\hat{i}+3\sin t\,\hat{j}$ and $0\le t\le 2\pi$

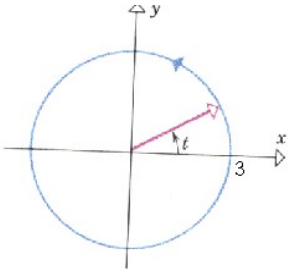


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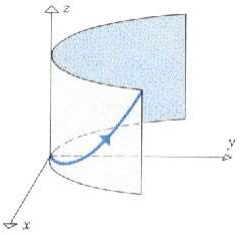
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□□□□□□□▶□

Question No: 7 (Marks: 1) - Please choose one

What are the parametric equations that correspond to the following vector equation?

$\vec{r}(t) = \sin^2 t\,\hat{i} + (1-\cos 2t)\,\hat{j}$

- ▶ $x = \sin^2 t \quad , \quad y = 1-\cos 2t \quad , \; z = 0$
- ▶ $y = \sin^2 t \quad , \quad x = 1-\cos 2t \quad , \; z = 0$
- ▶ $x = \sin^2 t \quad , \quad y = 1-\cos 2t \quad , \; z = 1$
- ▶ $x = \sin^2 t \quad , \quad y = \cos 2t \quad , \; z = 1$

Question No: 8 (Marks: 1) - Please choose one

Is the following vector-valued function $\vec{r}(t)$ continuous at $t = \frac{\pi}{2}$? If not, why?

$\vec{r}(t) = (\tan t,\ \sin t^2\ ,\ \cos t)$

□□□□□□□▶□ $\vec{r}(t)$ is continuous at $t = \frac{\pi}{2}$

□□□□□□□▶□ $\vec{r}\left(\frac{\pi}{2}\right)$ is not defined

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□□□□□□□▶□ $\vec{r}\left(\frac{\pi}{2}\right)$ is defined but $\lim_{t\to\frac{\pi}{2}} \vec{r}(t)$ does not exist

□□□□□□□▶□ $\vec{r}\left(\frac{\pi}{2}\right)$ is defined and $\lim_{t\to\frac{\pi}{2}} \vec{r}(t)$ exists but these two numbers are not equal.

Question No: 9 (Marks: 1) - Please choose one

What is the derivative of following vector-valued function?

$\vec{r}(t) = \left(t^4,\ \sqrt{t+1}\ ,\ \frac{3}{t^2}\right)$

□□□□□□□▶□ $\vec{r}'(t) = \left(4t^3,\ \frac{1}{\sqrt{t+1}}\ ,\ \frac{-6}{t^3}\right)$

□□□□□□□▶□ $\vec{r}'(t) = \left(4t^3,\ \frac{1}{2\sqrt{t+1}}\ ,\ \frac{6}{t^3}\right)$

□□□□□□□▶□ $\vec{r}'(t) = \left(4t^4,\ \frac{1}{2\sqrt{t+1}}\ ,\ \frac{-6}{t^3}\right)$

□□□□□□□▶□ $\vec{r}'(t) = \left(4t^3,\ \frac{1}{2\sqrt{t+1}}\ ,\ \frac{-6}{t^3}\right)$

Question No: 10 (Marks: 1) - Please choose one

The following differential is exact

$dz = (6xy + 2y^2 - 5)\ dx + (3x^2 + 4xy - 6)\ dy$

□□□□□□□▶True

□□□□□□□▶False

Question No: 11 (Marks: 1) - Please choose one

The following differential is exact

$dz = (x^2 y + y)\ dx - x\ dy$

□□□□□□□►True

□□□□□□□►False

Question No: 12 (Marks: 1) - Please choose one

Which one of the following is correct Wallis Sine formula when n is even and $n \geq 2$?

□□□□□□□► $\int_0^{\frac{\pi}{2}} \sin^n x\, dx = \frac{\pi}{2} \frac{(n-1)}{n} \frac{(n-3)}{(n-2)} \frac{(n-5)}{(n-4)} \cdots\cdots\cdots \frac{5}{6} \frac{3}{4} \frac{1}{2}$

□□□□□□□► $\int_0^{\frac{\pi}{2}} \sin^n x\, dx = \frac{(n-1)}{n} \frac{(n-3)}{(n-2)} \frac{(n-5)}{(n-4)} \cdots\cdots\cdots \frac{6}{5} \frac{4}{3} \frac{2}{1}$

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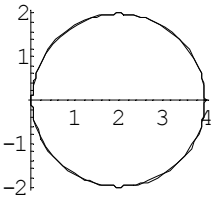
□□□□□□□► $\int_0^{\frac{\pi}{2}} \sin^n x\, dx = \frac{\pi}{2} \frac{(n)}{(n-1)} \frac{(n-2)}{(n-3)} \frac{(n-4)}{(n-5)} \cdots\cdots\cdots \frac{6}{5} \frac{4}{3} \frac{2}{1}$

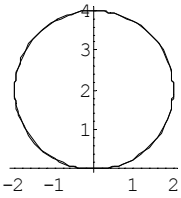
□□□□□□□► $\int_0^{\frac{\pi}{2}} \sin^n x\, dx = \frac{(n)}{(n-1)} \frac{(n-2)}{(n-3)} \frac{(n-4)}{(n-5)} \cdots\cdots\cdots \frac{6}{5} \frac{4}{3} \frac{2}{1}$

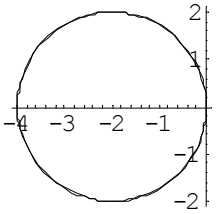
Question No: 13 (Marks: 1) - Please choose one

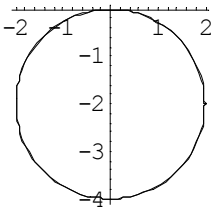
Match the following equation in polar co-ordinates with its graph.

$r = 4 \sin \theta$

□□□□□□□► 

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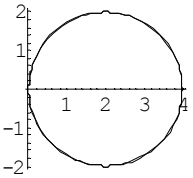


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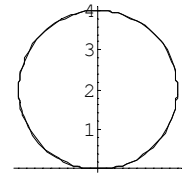
Question No: 14 (Marks: 1) - Please choose one

Match the following equation in polar co-ordinates with its graph.

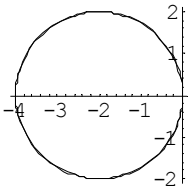
$r = -4\sin\theta$



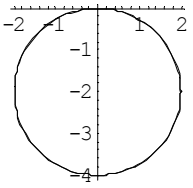
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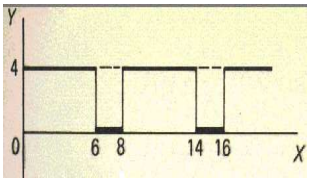
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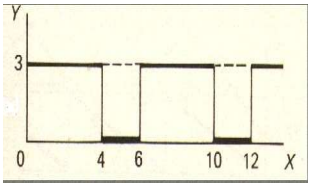
Question No: 15 (Marks: 1) - Please choose one

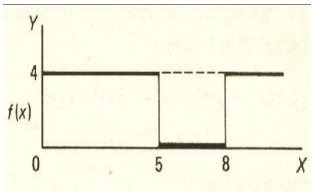
Match the following periodic function with its graph.

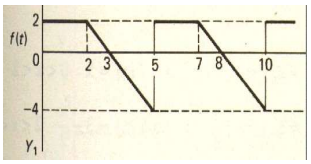
$$f(x) = \begin{cases} 3 & 0 < x < 4 \\ 0 & 4 < x < 6 \end{cases}$$



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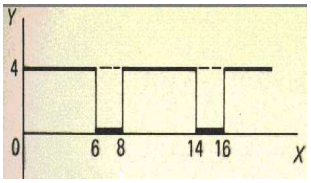
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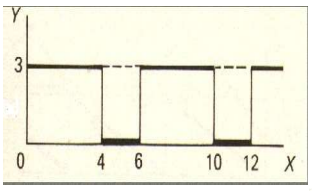
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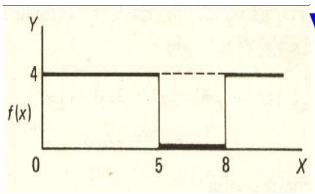
Question No: 16 (Marks: 1) - Please choose one

Match the following periodic function with its graph.

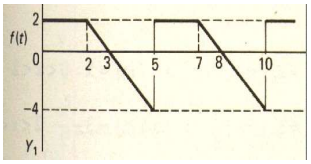
$$f(x)=\begin{cases}4 & 0<x<5\\ 0 & 5<x<8\end{cases}$$

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Question No: 17 (Marks: 1) - Please choose one

Which of the following condition must be satisfied for a vector field $\vec{F}$ to be a conservative vector field?

□□□□□□□►□Line integral of $\vec{F}$ along a curve, depends only on the endpoints of that curve, not on the particular route taken.

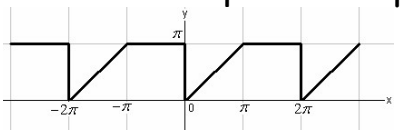
□□□□□□□►□Divergence of $\vec{F}$ should be zero

□□□□□□□►□Gradient of $\vec{F}$ should be zero.

□□□□□□□►□ $\vec{F} = 0$

Question No: 18 (Marks: 1) - Please choose one

What is the period of periodic function whose graph is as below?



□□□□□□□►□ π

□□□□□□□►□ $-\pi$

□□□□□□□►□ 2π

□□□□□□□►□ -2π

Question No: 19 (Marks: 1) - Please choose one

Let L denotes the Laplace Transform.

According to First Shift Theorem, if $L\{F(t)\} = f(s)$ then which of the following equation holds?

s *and* a are constants.

□□□□□□□►□ $L\{e^{-at}F(t)\} = f(s-a)$

□□□□□□□►□ $L\{e^{-at}F(t)\} = f(s+a)$

□□□□□□□►□ $L\{e^{-at}F(t)\} = f(s)$

□□□□□□□►□ $L\{e^{-at}F(t)\} = f(a)$

Question No: 20 (Marks: 1) - Please choose one

Polar co-ordinates of a point are $\left(7, \frac{-\pi}{4}\right)$. Which of the following is another possible polar co-ordinates representation of this point?

□□□□□□□►□ $\left(7, \frac{3\pi}{4}\right)$

□□□□□□□▶□$\left(-7, \frac{3\pi}{4}\right)$

□□□□□□□▶□$\left(-7, \frac{-\pi}{4}\right)$

□□□□□□□▶□$\left(7, \frac{-3\pi}{4}\right)$

Question No: 21 (Marks: 1) - Please choose one

The graph of an even function is symmetrical about ----------

□□□□□□□▶□x-axis

□□□□□□□▶□y-axis

□□□□□□□▶□origin

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Question No: 22 (Marks: 1) - Please choose one

Is the function $f(x, y)$ continuous at origin? If not, why?

$f(x, y) = \frac{xy}{x^2 + y^2}$

□□□□□□□▶□$f(x, y)$ is continuous at origin

□□□□□□□▶□$\lim_{(x,y)\to(0, 0)} f(x, y)$ does not exist

□□□□□□□▶□$f(0, 0)$ is defined and $\lim_{(x,y)\to(0, 0)} f(x, y)$ exists but these two numbers are not equal.

Question No: 23 (Marks: 1) - Please choose one

Consider the function $f(x, y, z) = \sqrt{1 - x^2 - y^2 - z^2}$. What is the value of $f\left(0, \frac{1}{2}, \frac{1}{2}\right)$?

□□□□□□□▶□$f\left(0, \frac{1}{2}, \frac{1}{2}\right) = \sqrt{\frac{1}{2}}$

□□□□□□□▶□$f\left(0, \frac{1}{2}, \frac{1}{2}\right) = 2$

□□□□□□□▶□$f\left(0, \frac{1}{2}, \frac{1}{2}\right) = \frac{1}{2}$

□□□□□□□▶□$f\left(0, \frac{1}{2}, \frac{1}{2}\right) = 0$

Question No: 24 (Marks: 1) - Please choose one

Sign of line integral is reversed when ----------

□□□□□□□►□path of integration is divided into parts.

□□□□□□□►□path of integration is parallel to y-axis.

□□□□□□□►□direction of path of integration is reversed.

□□□□□□□►□path of integration is parallel to x-axis.

Question No: 25 (Marks: 1) - Please choose one

Let the functions $P(x, y)$ and $Q(x, y)$ are finite and continuous inside and at the boundary of a closed curve C in the xy-plane.

If $(P\,dx + Q\,dy)$ is an exact differential then

$\oint_C (P\,dx + Q\,dy) =$

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► Zero

► One

► Infinite

Question No: 26 (Marks: 1) - Please choose one

What is laplace transform of the function $F(t)$ if $F(t) = \cos 2t$?

► $L\{\cos 2t\} = \frac{2}{s^2+4}$

► $L\{\cos 2t\} = \frac{1}{s-2}$

► $L\{\cos 2t\} = \frac{s}{s^2+4}$

► $L\{\cos 2t\} = \frac{2!}{s^3}$

Question No: 27 (Marks: 1) - Please choose one

What is $L\{-6\}$ if L denotes Laplace Transform?

- $L\{-6\} = \frac{1}{s+6}$
- $L\{-6\} = \frac{-6}{s}$
- $L\{-6\} = \frac{s}{s^2+36}$
- $L\{-6\} = \frac{-6}{s^2+36}$

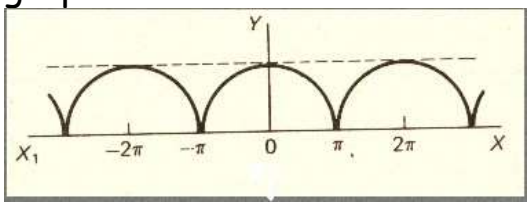
Question No: 28 (Marks: 1) - Please choose one

Curl of vector function is always a ----------

- Scalar
- Vector

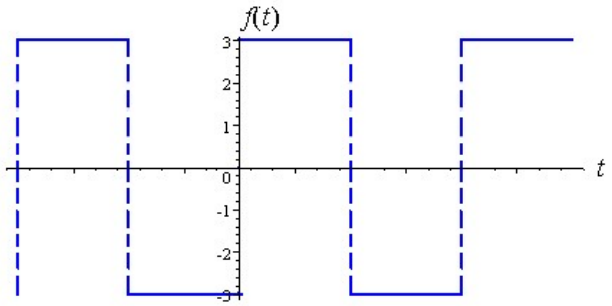
Question No: 29 (Marks: 1) - Please choose one

Which of the following is true for a periodic function whose graph is as below?



- Even function
- Odd function
- Neither even nor odd function

Question No: 30 (Marks: 1) - Please choose one



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Which of the following is true for a function whose graph is given above

- An odd function
- An even function
- Neither even nor odd

Question No: 31 (Marks: 2)

Evaluate the line integral $\int_C 2x\,dx$ where C is the line segment from $(0, 2)$ to $(2, 6)$

Question No: 32 (Marks: 2)

Use Wallis sine formula to evaluate $\int_0^{\frac{\pi}{2}} \sin^5 x\,dx$

Question No: 33 (Marks: 2)

Find Laplace Transform of the function $F(t)$ if $F(t) = \sin 2t$.

Question No: 34 (Marks: 3)

Find $div\ \vec{F}$, if $\vec{F} = (3x+y)\hat{i} + xy^2z\,\hat{j} + (xz^2)\hat{k}$

Question No: 35 (Marks: 3)

Determine whether the following differential is exact or not.

$dz = (4x^3y + 2xy^3)\,dx + (x^4 + 3x^2y^2)\,dy$

Question No: 36 (Marks: 3)

Prove whether the following function is even, odd or neither.

$f(x) = x^3 e^x$

Question No: 37 (Marks: 5)

Evaluate the following line integral which is independent of path.

$$\int_{(2,-2)}^{(-1,0)} (2xy^3)\,dx + (3y^2x^2)\,dy$$

Question No: 38 (Marks: 5)

Determine the fourier co-efficient b_n of the following function.

$f(x) = x^2 \qquad 0 < x < 2\pi$

Question No: 39 (Marks: 5)

Determine whether the following vector field $\vec{F}$ is conservative or not.

$\vec{F}(x, y, z) = (3x + y)\hat{i} + xy^2z\,\hat{j} + xz^2\,\hat{k}$

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