

# Final term mcq calculus (Mth301) Solved By

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## FINALTERM EXAMINATION

### MTH301- Calculus II

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

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Q 1. Intersection of two straight lines is -----

▶Surface

▶Curve

a. ▶Plane pg 13

• ▶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

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

►  $\frac{\partial w}{\partial x} \frac{\partial x}{\partial r} + \frac{\partial w}{\partial y} \frac{\partial y}{\partial r} + \frac{\partial w}{\partial z} \frac{\partial z}{\partial r}$  pg 50

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

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

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

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

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

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

►  $x = \sin^2 t$  ,  $y = 1 - \cos 2t$  ,  $z = 0$  pg 140

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

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

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

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

---

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

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

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

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

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

▶  $x = 2t-1$  ,  $y = -3\sqrt{t}$  ,  $z = \sin 3t$  pg 140

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

---

What is the derivative of following vector-valued function?

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

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

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

▶  $\vec{r}'(t) = (-5 \sin 5t, \sec^2 t, 6 \cos t)$  According to formula at pg 145

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

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

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What is the derivative of following vector-valued function?

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

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

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

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

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

Correct answer according to derivative property

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

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The following differential is exact

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

▶ True

▶ False formula at pg 155

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

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

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

pg 182

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

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

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

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

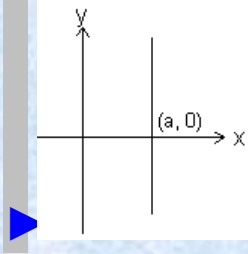
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Match the following equation in polar co-ordinates with its graph.

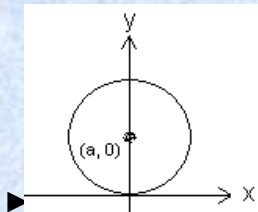
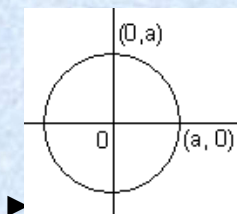
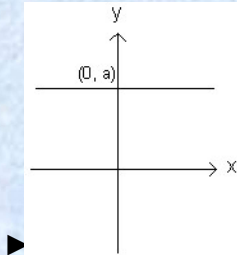
$r \cos \theta = a$

where  $a$  is an arbitrary constant

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pg 126



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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  $(r, \theta)$  by  $(r, \pi - \theta)$  then the curve is said to be symmetric about which of the following?

►Initial line

►y-axis pg 128

►Pole

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

---

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

▶Initial line

▶y-axis

▶Pole pg 128

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

---

$$f(x) = \sin \frac{x}{3}$$

What is the amplitude of a periodic function defined by ?

▶0

▶1 pg 197

$\frac{1}{3}$

▶

▶Does not exist

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

---

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

$\frac{\pi}{4}$

$\frac{\pi}{3}$

$\frac{2\pi}{3}$  pg 197

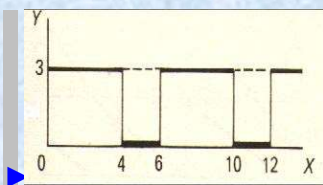
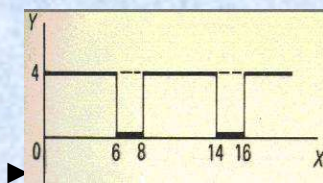
$\pi$

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

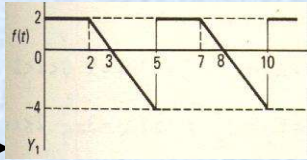
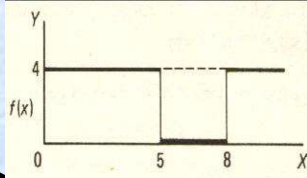
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Match the following periodic function with its graph.

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



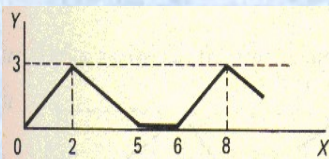
pg 197



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

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



▶2

▶5

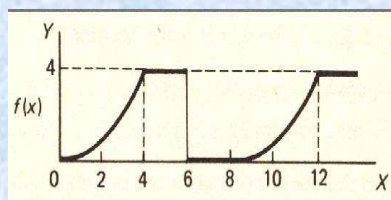
▶6 pg 197

▶8

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

---

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



▶0

▶4

▶6

▶8 pg 198

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  $\lim_{t \rightarrow 0} \left( \frac{F(t)}{t} \right)$  exists then which of the following equation holds?

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

▶

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



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

pg 227



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



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

---

Which of the following is Laplace inverse transform of the function  $f(s)$  defined by

$$f(s) = \frac{3}{s-2} - \frac{2}{s}$$

?

▶  $3te^{2t} - 2$

▶  $3e^{2t} - 2t$

▶  $3e^{2t} - 2$  correct answer

▶ 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 pg 11
- ▶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 pg 170
- ▶One
- ▶Infinite

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

---

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

▶  $L\{t\} = \frac{1}{s}$  pg 222 Laplace transform of constant = a/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?

▶  $L\{e^{5t}\} = \frac{1}{s-5}$  pg 222

▶  $L\{e^{5t}\} = \frac{s}{s^2+25}$

▶  $L\{e^{5t}\} = \frac{5}{s^2+25}$

▶  $L\{e^{5t}\} = \frac{5!}{s^6}$

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

---

$$\int_C (3x+2y) dx + (2x-y) dy$$

Evaluate the line integral  
2).

where C is the line segment from (0, 0) to (0,

▶1

▶0

▶2 keeping  $x=0, dx=0$  and limits of  $y$  0 to 2

▶-2

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

---

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

Evaluate the line integral  
0).

where C is the line segment from (0, 0) to (2,

▶0

▶-4

▶4 putting  $y=0, dy=0$  and  $x$  from 0 to 2

▶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 pg 13

▶ 2, -3 and 20

▶ 0.5, -3 and 5/4

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

---

If  $R = \{(x, y) / 0 \leq x \leq 2 \text{ and } 1 \leq y \leq 4\}$ , then

$$\iint_R (6x^2 + 4xy^3) dA =$$

▶  $\int_1^4 \int_0^2 (6x^2 + 4xy^3) dy dx$

▶  $\int_0^2 \int_1^4 (6x^2 + 4xy^3) dx dy$

▶  $\int_1^4 \int_0^2 (6x^2 + 4xy^3) dx dy$

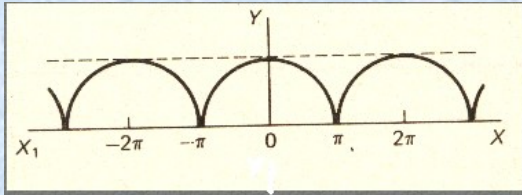
Correct answer

▶  $\int_2^4 \int_0^1 (6x^2 + 4xy^3) dx dy$

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

---

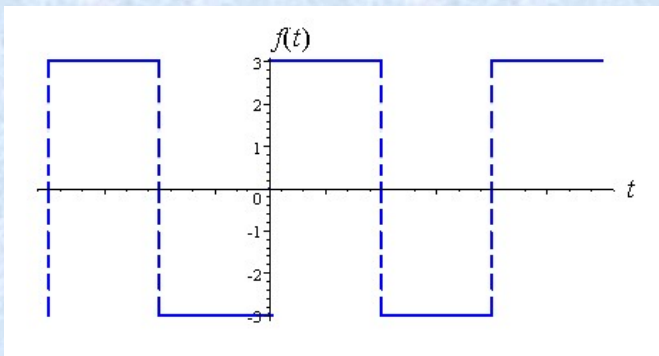
Which of the following is true for a periodic function whose graph is as below?



- ▶ Even function pg 208
- ▶ Odd function
- ▶ Neither even nor odd function

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 pg 207
- ▶ 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

**Solution:**

In domain function is always defined but may be discontinuous

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

---

$\pi$  is an example of -----

▶ Irrational numbers pg 3

▶ Rational numbers

▶ Integers

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

---

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

- ▶ Surface
- ▶ Curve
- ▶ [Plane pg 13](#)
- ▶ Parabola

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 pg 11](#)

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

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

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

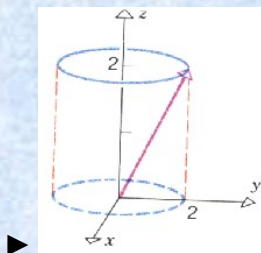
- ▶  $f(x, y)$  is continuous at origin
- ▶  $f(0, 0)$  is not defined
- ▶  $f(0, 0)$  is defined but  $\lim_{(x,y) \rightarrow (0,0)} f(x, y)$  does not exist
- ▶  $f(0, 0)$  is defined and  $\lim_{(x,y) \rightarrow (0,0)} f(x, y)$  exists but these two numbers are not equal.

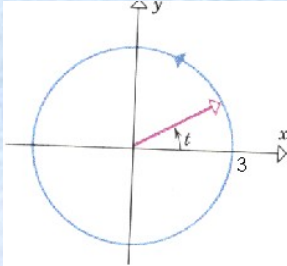
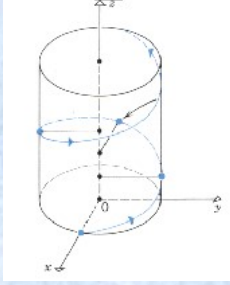
**Question No: 6 ( Marks: 1 ) - Please choose one**

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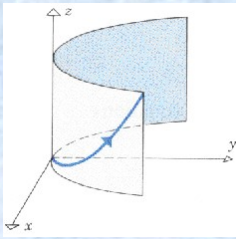
Match the following vector-valued function with its graph.

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





pg 141



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

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

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

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▶  $\vec{r}(0)$  is not defined

►  $\lim_{t \rightarrow 0} r(t)$  is defined but  $\lim_{t \rightarrow 0} r(t)$  does not exist

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

►  $r(t)$  is continuous at  $t = 0$

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

---

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

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

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

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

pg 182

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



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

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Which of the following is correct?

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



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

pg 181



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



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

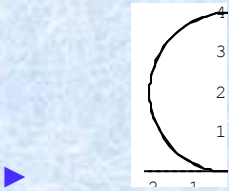
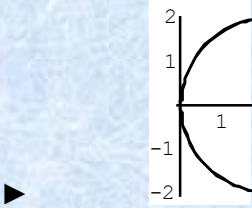


Question No: 15 ( Marks: 1 ) - Please choose one

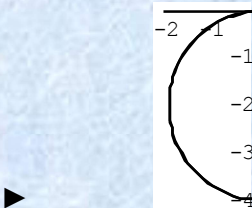
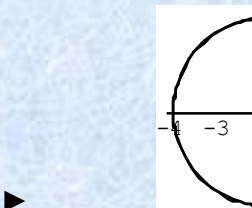
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Match the following equation in polar co-ordinates with its graph.

$r = 4 \sin \theta$



not sure

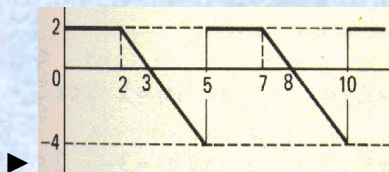
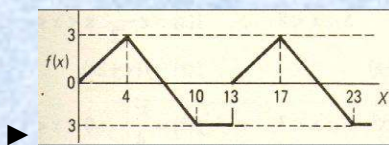
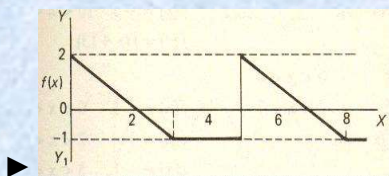
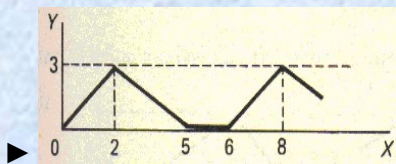


**Question No: 18 ( Marks: 1 ) - Please choose one**

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Match the following periodic function with its graph.

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

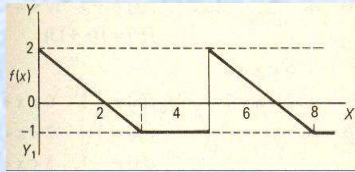


pg 198

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

---

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



▶ 2

▶ 3

▶ 4

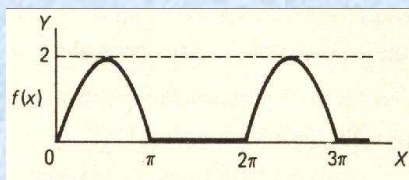
▶ 5 pg 198

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

---

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



▶ 0

▶ 2

▶  $\pi$

▶  $2\pi$  pg 198

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

---

$$\left(-2, \frac{-3\pi}{2}\right)$$

Polar co-ordinates of a point are . Which of the following is another possible polar co-ordinates representation of this point?

▶  $\left(2, \frac{-\pi}{4}\right)$



▶  $\left(2, \frac{-\pi}{2}\right)$



▶  $\left(2, \frac{-\pi}{3}\right)$



▶  $\left(2, \frac{3\pi}{4}\right)$  not sure



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 pg 209

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

---

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

- ▶ x-axis
- ▶ y-axis pg 207
- ▶ 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) pg 9
- ▶ (-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) pg 9
- ▶ (-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?

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

- ▶  $f(x, y)$  is continuous at origin
- ▶  $\lim_{(x,y) \rightarrow (0,0)} f(x, y)$  does not exist [pg 27](#)
- ▶  $f(0, 0)$  is defined and  $\lim_{(x,y) \rightarrow (0,0)} f(x, y)$  exists but these two numbers are not equal.

**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. Pg 175](#)
- ▶ 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)

▶  $\int_0^s e^{-st} F(t) dt$

▶  $\int_0^{\infty} e^{st} F(t) dt$

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

▶  $\int_0^{\infty} e^{-st} F(t) dt$

pg 222

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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?

▶  $L\{e^{5t}\} = \frac{1}{s-5}$  according to pg 223

▶  $L\{e^{5t}\} = \frac{s}{s^2+25}$

▶  $L\{e^{5t}\} = \frac{5}{s^2+25}$

▶  $L\{e^{5t}\} = \frac{5!}{s^6}$

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

---

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

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

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

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

▶  $L^{-1}\left\{\frac{1}{s+1}\right\} = e^{-t}$  **pg 231 formula**

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

---

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

▶  $L^{-1}\left\{\frac{5}{s^2+25}\right\} = \sin 5t$  **pg 231**

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

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

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

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

---

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

▶  $L\{-6\} = \frac{1}{s+6}$

▶  $L\{-6\} = \frac{-6}{s}$  pg 223

▶  $L\{-6\} = \frac{s}{s^2+36}$

▶  $L\{-6\} = \frac{-6}{s^2+36}$

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

---

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

▶  $dr = dx \hat{i} + dy \hat{j}$

▶  $dr = dx \hat{i} + dy \hat{j} + dz \hat{k}$  pg 185

▶  $dr = dx + dy + dz$

▶  $dr = dx + dy$

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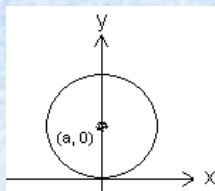
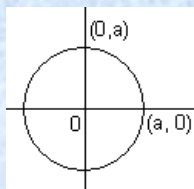
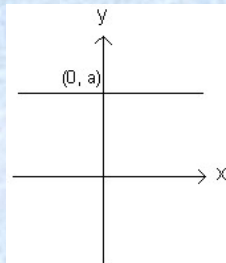
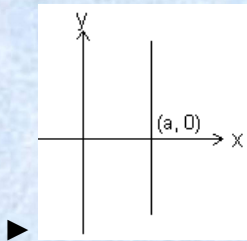
Question No: 38 ( Marks: 1 ) - Please choose one

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

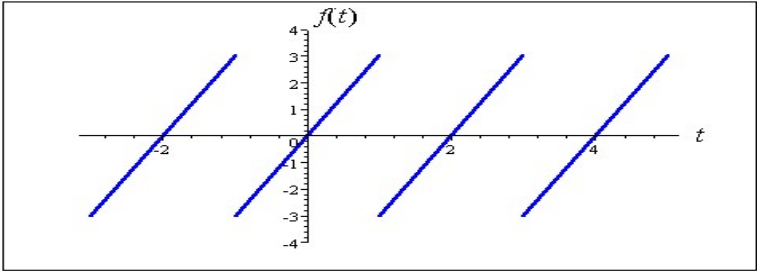
$$r = a$$

where  $a$  is an arbitrary constant.



pg 127

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



The graph of “saw tooth wave” given above is -----

- ▶ An odd function because it is passing through the origin
- ▶ An even function
- ▶ Neither even nor odd

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