CHOOSE THE BEST ANSWER FOR THE FOLLOWING QUESTIONS

PART – 1

1. *Which of the following is* ***NOT TRUE*** *about the graph of the function* $f(x) = \frac{x^2 - x - 2}{x^2 - 1}$?

   A. $y = 1$ *is the horizontal asymptote of the graph of* f

   B. The domain of f *is the set of all real numbers except at* $x = \pm 1$

   C. $x = -1$ *and* $x = 1$ *are vertical asymptotes of* f

   D. The graph has a hole at a point $(-1, f(-1))$

2. *Let the function f:* $\boldsymbol{Z \to Z}$ *defined by* $f(x) = x^2$ *. Which one is* ***TRUE****?*

   A f is one-one but not onto *C. f is not one to one but it is onto*

   B f is neither one to one nor an onto *D f is both one to one and onto*

3. *For what value of* k *will the system of equations* $\begin{cases} kx - 2y = 6 \\ 3x + 4y = 4 \end{cases}$ *have no solution?*

   A. $k = -\frac{3}{2}$ *B.* $k = 2$ *C.* $k \neq -\frac{3}{2}$ *D.* $k = -3$

4. *.Which one of the following is NOT the property of a parallelogram?*

   A its opposite sides are parallel to each other

   B. its diagonals are bisect each other

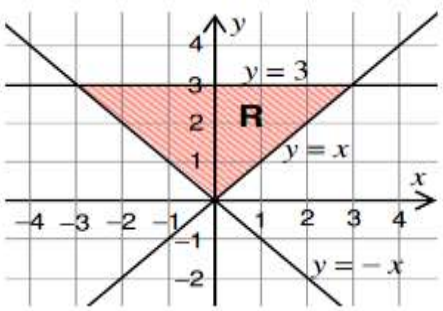
   C. its opposite angles are equal measure

   D. The sum of its two adjacent angles is complimentary

5. *Which of the following system of inequalities is the solution set for the shaded region in The given graph below ?*

   A. $\begin{cases} x < 3 \\ y > -x \\ y \leq x \end{cases}$. *C.* $\begin{cases} y \geq 3 \\ y > -x \\ y \leq x \end{cases}$

   .B. $\begin{cases} y \leq 3 \\ y \geq -x \\ y \geq x \end{cases}$ *D.* $\begin{cases} y \leq 3 \\ y \leq -x \\ y \geq x \end{cases}$



6.*The solution set of the logarithm equation* $log_4 x - log_2(x-2) = 0$ *?*

A $\{1, 4\}$ *B* $\left\{6, \frac{1}{4}\right\}$ *C* $\{3, 4\}$ *D* $\{4\}$

7.*What is the* value of $x + y$ if *the system of equations is given by* $\begin{cases} \frac{6}{x} + \frac{12}{y} = 7 \\ \frac{2}{x} + \frac{3}{y} = 2 \end{cases}$

A. 5 *B.* 7 *C.* -1 *D.* -3

8. Which of the following is true about the given polynomial function:-

$P(x) = -3x^4 - 3x^3 - 7$ *and* $Q(x) = 5x^5 + 4x^4 + 3x^3 - 8$

A Leading coefficient when $p(x) + Q(x)$ *is* 5

B. The degree when $p(x) \times Q(x)$ *is* 20

C The constant term when $p(x) - Q(x)$ *is* -15

D the coefficient of x^3 *when* $p(x) + Q(x)$ *is* -6

9. *Which one of the following triplets* ***CANNOT*** *be the length of sides of a triangle?*

A 5 cm, 6 cm and 7cm *C 15 cm, 16 cm and 17cm*

B 21 cm, 9 cm and 12cm *D 5 cm, 12 cm and 13cm*

10. *Which one of the following is* ***NOT*** *the part of Classifying Triangles by Sides?*

A. Isosceles triangle *C. Equiangular triangle*

B Equilateral triangle *D Scalene triangle*

11. All rhombuses possess the following properties ***EXCEPT:*** *-*

A. The diagonals of a rhombus are equal

B. The diagonals of a rhombus bisect the opposite angles

C The diagonals of a rhombus bisect each other

D. The diagonals of a rhombus are perpendicular

12. What is the value of $(1 - \sin 45°)(1 - \sin 225°)$ *?*

PART -2

1. *Suppose that* $\sum_{k=1}^{10} a_k = 64$ *and* $\sum_{k=1}^{10} b_k = -45$, *then what is the value of* $\sum_{k=1}^{10}(a_k + b_k - 2)$ *?*

   A. 19 *B.* 7 *C.* -1 *D.* 11

2. *What is the sum of the series* $\sum_{k=0}^{\infty} 6^{-k}(3^{k+1} - 4^k)$ *?*

   A.. 3 *B.* -2 *C.* $\frac{3}{4}$ *D. 0*

3. *Which one of the following is true about* $(x) = -3 - 4\cos\left(\frac{2}{3}x - \pi\right)$ *?*

   A. Its period is 2π *C. its range is* $[-7, 1]$

   B. its phase shift is $\frac{2}{3}\pi$ *D. its amplitude is* -4

4. *What is the equation of the circle that is tangent to the line* $3y - 4x - 5 = 0$ *and has center at* $(2, 1)$ *?*

   A. $\left(x - \frac{2}{5}\right)^2 + \left(y - \frac{11}{5}\right)^2 = 2$ *C.* $(x-2)^2 + (y-1)^2 = 5$

   B. $(x-2)^2 + (y-1)^2 = 4$ *D.* $(x+2)^2 + (y+1)^2 = 2\sqrt{3}$

5. *What is the maximum are of a triangle which is inscribed in a circle* 2 *units and one of its side passing through the center of the circle ? (in sq. units)*

   A. 2 B. 4π C. 4 D. 8π

6. *Let* $\vec{a}$ *and* $\vec{b}$ *be vectors such that* $(\overrightarrow{a} - \overrightarrow{b}).(\overrightarrow{a} + \overrightarrow{b}) = 12$ *and* $\|\overrightarrow{a}\| = 2\|\overrightarrow{b}\|$ *.Then which of the following is equal to* $\|\overrightarrow{a}\|$ *?*

   A. 4 *B.* 2 *C. 3* *D.* 6

7. *If the function* $f(x) = 1 + x^2$ *is continuous on [0, 1] and the partition breaks up [0, 1] into three subintervals is given* $P = \{0, \frac{1}{2}, \frac{3}{4}, 1\}$ *, then. Which of the following is approximate the area according to Riemann's taken on at the left endpoints:*

   A. $\frac{94}{64}$

8. *A box will be built with a square base and an open top. Material for the base costs \$8 per square foot, while material for the sides costs \$2 per square foot. Find the dimensions of the box of maximum volume that can be built for \$2400.(i.e. Let S is the sides and h is the height of the box)*

A. $S = 10$ *unites* *and* $h = 20$ *unites*

9. *Volume of the cube is increasing at a rate of 9 cubic inches per second. What is the rate at which surface area is increasing when the length of the edge of the cube is 10 inches?*

A. 3.6 *sq.inches/sec*

10. *We have a rectangular field whose length is changing at the rate of 4 m/s and the perimeter is changing at a rate of 12 m/s at an instant of time. At what rate is the width changing at that instant ?*

A. $2m/ses$

11. *A particle moves along the curve* $6y = x^3 + 2$, *what is the possible point on the curve at which y coordinate is changing* 8 *times as fast as x coordinate.*

4 (, 11)

12. *If* $f(x) = \frac{x^2}{x - 1}$, *then which one is* ***true*** *about the f ?*

A. f *has a relative minimum at* $x = 0$

B. *The critical numbers are* $x = 0$ *and* $x = 2$.

C. f *has a relative maximum at* $x = 2$

D. f *has no relative extrema*

13. *The absolute maximum value of* $f(x) = 4x^2 - 8x^2 + 1$ *on the closed interval* $[-1, 1]$ *is :*

A. $\frac{9}{3}$ B. *11* C. 1 D. $\frac{11}{3}$

PART - 3

1. *A particle moves along the curve* $6y = x^3 + 2$, *what is the possible point on the curve at which y coordinate is changing* 8 *times as fast as x coordinate.*

   A. $(4, 11)$

2. *A man 2m high walks, at a uniform speed of 6m/min away from a lamp post, 5m high. Then which one is the rate at which the length of the man's shadow increasing ?*

   A. $4m/min$

3. *A company produces and sells a product and fixed costs of the company are Birr. 6,000 and variable cost is Birr. 25 per unit, and sells the product at Birr. 50 per unit. How many units have to be produced and sold to yield a profit of Birr. 10,000?*

   A. $x = 640$ *units*

4. *A ladder 20 feet long is leaning against a wall 12 feet high with its top projecting over the wall. Its bottom is being pulled away from the wall at the constant rate of 5 ft/min. How rapidly is the height of the top of the ladder decreasing when the top of the ladder reaches the top of the wall?*

   A. *Decreasing at the rate of 2.4 feet per minute.*

5. *Let* $f(x) = \frac{x^2 - 3}{x^3}$. *Which one is* ***Not*** *True about the function* f *?*

   A. The critical numbers are $0, 3, and -3$.
   C. a relative minimum at $x = -3$
   B. A relative maximum at $x = 3$,
   D. There is a vertical asymptote at $x = 0$.

6. *Which one of the following set is the critical number(s) of the function*

   $f(x) = \frac{3}{5}x^{5/3} - 3x^{2/3}$ *?*

   A. $\{-2, 0, 2\}$ B. $\{0\}$ C. $\{2\}$ D. $\{0, 2\}$

   A.

PART – 4

1. *When the exponential equation* $\left(\frac{2}{3}\right)^{2x-1} - \left(\frac{27}{8}\right)^{1-x} = 0$ *, Then what is the value of* x *?*

   A. 1 *and* $\frac{1}{2}$ *B.* 2 *C.* $\frac{1}{3}$ *and* $\frac{1}{2}$ *D.* -2

2. *If* $\cos\theta = -\frac{3}{5}$ *,* θ *lies in the third quadrant, then which of the following is the value of* $\tan\theta$ *?*

   A $\frac{3}{4}$ ***B*** $\frac{4}{3}$ ***C*** $-\frac{3}{5}$ *D* $-\frac{3}{4}$

3. *What is the value of* $\sin(840°)$ *?*

   A $\frac{\sqrt{3}}{2}$ B $\sqrt{3}$ C $-\sqrt{3}$ D $-\frac{1}{2}$

4. *Which one of the following is* ***NOT true*** *about the following trigonometric functions?*

   A *Thus, domain of* $y = \sin x$ *and* $y = \cos x$ *is the set of all real numbers*

   B. *The range of* $y = \sin x$ *and* $y = \cos x$ *is the set of all real numbers*

   C *The domain of* $y = \tan x$ *is the set* $\{x : x \in \boldsymbol{R} \text{ and } x \neq (2n+1)\frac{\pi}{2}\}$

   D *The range of* $y = \tan x$ *is the set of all real numbers*

5. *Which one of the following is the value of* K *if* $P(x) = 3x^3 + Kx^2 - 4x + 7$ *is divide by* $(x-2)$ *to gives a remainder of* 3 *?*

   A. 5 B 9 C -10 D -5

6 *The solution set of the inequality* $|2x-3| \leq 7$ *is :*

   A $\{x: x \leq 5\}$ *C* $\{x: -2 \leq x \leq 5\}$

   B $\{x: -2 \leq x\}$ *D* $\{x: -5 \leq x \leq 2\}$

7. *Let* $R = \{(x,y): y \leq -x+3 \text{ and } y > x+2 \text{ and } x > -3\}$ *be a relation. Then which one of the following is the invers of the given relation R ?*

   A $R^{-1} = \{(x,y): x \leq -y+3 \text{ and } x < y-2 \text{ and } y > -3\}$

   B $R^{-1} = \{(x,y): x \leq -y+3 \text{ and } x > y+2 \text{ and } y > -3\}$

   C $R^{-1} = \{(x,y): y \geq -x-3 \text{ and } y < x-2 \text{ and } x > -3\}$

   D $R^{-1} = \{(x,y): y \leq -x+3 \text{ and } y > -x-2 \text{ and } x < -3\}$

8. *Which one of the following is* ***True*** *about the given logarithm equations?*

A. $log\,6 + log\,9 = log(6+9)$ C. $log_9(6) \times log_6(9) = 1$

B $log(6\times 9) = log\,6 \times log\,9$ D. $log\left(\frac{6}{9}\right) = log\,6 \div log\,9$

9. *The solution set of the equation* $x + 1 = \frac{4}{x+1}$ *?*

A $\{-3\ ,\ 1\}$ B $\{-2\ ,1\}$ C $\left\{0,\ \frac{1}{4}\right\}$ D $\{2\ ,3\}$

10. *Which one of the following quadrilateral is NOT a parallelogram?*

A. *Rectangle* B. *Trapezoid* C. *Rhombuses* D *Square*

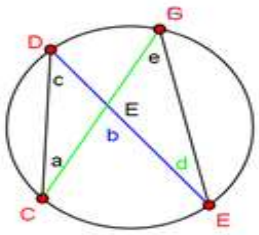
11. *In the figure below,* $m(\angle DCG) = 34°$ *and* $m(\ arc\ CE) = 84°$ *. Then which of the following are the value of the given small letter angles* d *and* c *respectively ?*

A. $d = 34°$ *and* $c = 42°$

B. $d = 64°$ *and* $c = 168°$

C. $d = 34°$ *and* $c = 84°$

D. $d = 68°$ *and* $c = 42°$



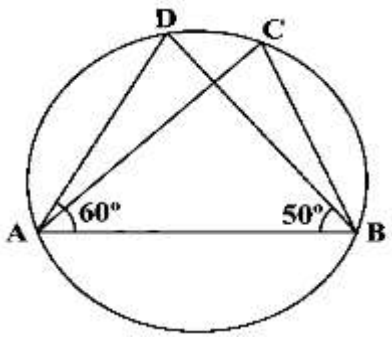
. 12. *In Fig. below if* $\angle DAB = 60°$, $\angle ABD = 50°$, *then* $\angle ACB$ *is equal to:*

A. $60°$

B. $50°$

C. $70°$

D. $80°$



PART – 5

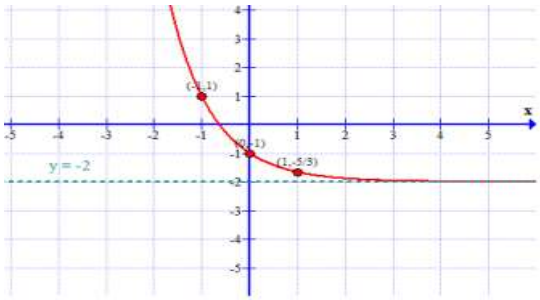
1. *Which of the following functions could most likely be sketched as in the figure as shown?*

A. $f(x) = -2 - 3^x$

B. $f(x) = -2 + 3^{-x}$

C. $f(x) = -2 + \log_3 x$

D. $f(x) = -2 + \log_{\frac{1}{3}} x$



2. *If the four angles of a quadrilateral are in the ratio* $3:4:5:6$ *, then the angles are :-*

A. $20°, 40°, 140°, 160°.$ *C.* $60°, 80°, 100°, 120°.$

B. $20°, 40°, 140°, 160°.$ *D.* $60°, 60°, 100°, 140°.$

3. *The point at which the altitudes of a triangle, or the lines containing the altitudes a triangle, are concurrent at point* p *. This point is:-*

A. In center of the triangle *C. Orthocenter of the triangle*

B. Centroid of the triangle *D. Circumcenter of the triangle*

4. *Length of the two parallel sides of a trapezium are 20 cm and 12 cm and the distance between them is 5 cm. Then the area of the trapezium is :-*

A. $80cm^2$ *B.* $75cm^2$ *C.* $60cm^2$ *D.* $65cm^2$

5. *Which of the following is the center (c) and radius(r) of the circle that has An equation* $x^2 + y^2 - 6x + 4y - 12 = 0$

A. $c(3,-2)$ *and* $r = \sqrt{5}$ *C .*$c(3,-2)$ *and* 5

B. $c(-3,-2)$ *and* $r = 5$ *D.* $c(-3, 2)$ *and* $\sqrt{5}$

6. *Which of the following is* ***True*** *about the equation of the ellipse* $\frac{(x-3)^2}{25}+\frac{(y+2)^2}{9}=1$ *?*

A. one of its vertex is $(8,-2)$ *C. Its eccentricity is* $\frac{3}{5}$

B. its major axis length is 6 *?* *D. its latus rectum is* $\frac{9}{5}$

7. *A quadrilateral whose all sides are equal, opposite angles are equal and the diagonals bisect each other at right angles is a* _____.

A. Rhombus B. Parallelogram C. Square D. Rectangle

8. . *Which of the following is* ***NOT true*** *about the parabola* $(y+5)^2=-16(x-3)$*?*

A. the parabola opens to the left side *C. its latus rectum is* -16

B. its vertex is $(3,-5)$ *D. Its focus is* $(-1,-5)$

9. *The solution set of the equation* $|2x+3|=|4x+1|$ *is : -*

A . $\left\{-\frac{2}{3},1\right\}$ *B.* $\{1\}$ *C* $\left\{-\frac{4}{4},-1\right\}$ *D* $\left\{-1,\frac{2}{3}\right\}$

10 *If* $\cos\theta=-\frac{3}{5}$, θ *lies in the third quadrant, then which of the following is the value of* $\cos 2\theta$ *?*

A $\frac{3}{4}$ ***B*** $\frac{4}{3}$ ***C*** $-\frac{3}{5}$ *D* $-\frac{3}{4}$

11. *Which one is the equation of the image of the circle* $(x+2)^2+(y-3)^2=10$ *when translated by the vector* $\overrightarrow{AB}$ *, where* $A=(1,-1)$ *and* $B=(-4,3)$ *?*

A. $(x-6)^2+(y-3)^2=10$ *B .* $(x+2)^2+(y-3)^2=10$

B. $(x+5)^2+(y-8)^2=10$ *D.* $(x+7)^2+(y-7)^2=10$

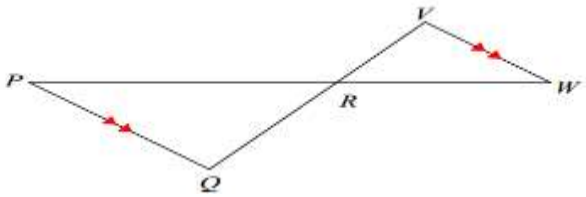
12. *If the point* $Q(-3,3)$ *is translated to the point* $Q'(2,-2)$*, then which one is the equation of the image of* $xy=4$ *?*

A. $xy+5x+5y-21=0$ *C.* $xy+5x-5y-29=0$

B. $xy-5x+5y=0$ *D.* $xy+5x-5y-4=0$

13. By which of the following is the triangles RQP ~RVW ?

A. SSS similarity
B. ASA similarity
C. AA similarity
D. SAS similarity



14.The end point of the latus rectum of a parabola are $(4\ ,\ a)$ *and* $(-4\ ,\ a)$*. If the vertices of the parabola is at the origin and the parabola opens down ward , then which of the following is the equation of the parabola and the value of 'a' ?*

A. $x^2 = 8y$ *and a=2*
B... $x^2 = -8y$ *and a=* -2
C. $y^2 = 4y$ *and a= 4*
D. $y^2 = -4x$ *and a= 4*

15. *If the distance from a point* $p(x\ ,y)$ *to the point* $(-1\ ,2)$ *is added to the distance from p to a point* $(1\ ,2)$ *the sum is 4 , then which one of the following is the equation for all points* $(x\ ,y)$ *?*

A. $4x^2 - 3y^2 = 12$
B. $3x^2 - 4(y-2)^2 = 12$
C. $3x^2 + 4y^2 = 12$
D... $3x^2 + 4(y-2)^2 = 12$

16. *which of the following is the equation of the hyperbola whose foci are the vertices of the ellipse* $4x^2 + 9y^2 = 36$ *and whose vertices are the foci of this ellipse ?*

A... $4x^2 - 5y^2 = 20$
B. $3x^2 - 5y^2 = 15$
C. $5x^2 - 4y^2 = 20$
D. $4x^2 - y^2 = 4$

17. *Halley's Comet has an elliptical orbit with eccentricity* $e = 0.9$ *. The closest distance that Halley's comet comes to the sun is* $0.72AU$ *, approximately , what is the maximum distance of the comet from the sun ?*

A. $24.7AU$ *B.* $7.68AU$ *C.* $15.51AU$ *D...* $13.68AU$

A. $\sqrt{3}$ *B* $.\frac{1}{2}$ *C.* $\frac{\sqrt{3}}{2}$ *D* $.\frac{\sqrt{2}}{2}$