X   UNIVERSAL MAT HR. SEC. SCHOOL

UT 03/A&C   UNIT TEST - 3   EXAM NO -3

MATHEMATICS - A & C

TIME : 1.30   MATRICES   MARKS : 50

I   Fill in the blanks: 10 x 1 = 10

1. If A = 2 x 2 matrix and B = 3 x 4 matrix how many columns does AB have _____

2. If number of columns and rows are not equal in a matrix then it is said to be a _____

3. If $A = \begin{bmatrix} 1 & 3 & 5 & 7 \\ 2 & 4 & 6 & 8 \\ 9 & 11 & 13 & 15 \end{bmatrix}$ then the order of the matrix $A^T =$ _____

4. Transpose of a column matrix is _____

5. Find the matrix X if $2X + \begin{bmatrix} 1 & 3 \\ 5 & 7 \end{bmatrix} = \begin{bmatrix} 5 & 7 \\ 9 & 5 \end{bmatrix}$ is _____

6. A square matrix in which elements in the leading diagonal are all "1" and rest are all zero is called an _____ matrix.

7. If $A = \begin{pmatrix} 8 & 9 & 4 & 3 \\ -1 & \sqrt{7} & \sqrt{3}/2 & 5 \\ 1 & 4 & 3 & 0 \\ 6 & 8 & -11 & 1 \end{pmatrix}$ write the element of $a_{43} =$ _____

8. If the order of matrix A is m x n and B is n x p then the order of AB is _____

9. If A is order of matrix 4 x 3 and B is order of 3 x 2 then the order of the product AB = _____

10. If $A = \begin{bmatrix} 5 & 4 & 3 \\ 1 & -7 & 9 \\ 3 & 8 & 2 \end{bmatrix}$ then find the transpose of A = _____

II   Answer the following :   5 x 2 = 10

11. If $A = \begin{bmatrix} 5 & 4 & -2 \\ 1/2 & 3/4 & \sqrt{2} \\ 1 & 9 & 4 \end{bmatrix}$, $B = \begin{bmatrix} -7 & 4 & -3 \\ 1/4 & 7/2 & 3 \\ 5 & -6 & 9 \end{bmatrix}$ find 4 A - 3B

12. Define diagonal matrix.

13. If $A = \begin{bmatrix} 5 & 2 & 2 \\ -\sqrt{17} & 0.7 & 5/2 \\ 8 & 3 & 1 \end{bmatrix}$ then verify $(A^T)^T = A$

14. If $A = \begin{bmatrix} 2 & 1 \\ 1 & 3 \end{bmatrix}$, $B = \begin{bmatrix} 2 & 0 \\ 1 & 3 \end{bmatrix}$ find AB , BA and check if AB = BA ?

15. Construct a 3 x 3 matrix whose elements are given by $a_{ij} = | i - 2 j|$

III   Answer the following :   4 x 5 = 20

16. If $A = \begin{bmatrix} 3 & 1 \\ -1 & 2 \end{bmatrix}$ show that $A^2 - 5A + 7I_2 = 0$

17. If $A = \begin{bmatrix} 1 & 2 & 1 \\ 2 & -1 & 1 \end{bmatrix}$ $B = \begin{bmatrix} 2 & -1 \\ -1 & 4 \\ 0 & 2 \end{bmatrix}$ show that $(AB)^T = B^T A^T$

18. If $A = \begin{bmatrix} 1 & 1 \\ -1 & 3 \end{bmatrix}$, $B = \begin{bmatrix} 1 & 2 \\ -4 & 2 \end{bmatrix}$, $C = \begin{bmatrix} -7 & 6 \\ 3 & 2 \end{bmatrix}$ verify that A (B+C) = AB + AC

19. Find the value of x and y. If $x \begin{bmatrix} 4 \\ -3 \end{bmatrix} + y \begin{bmatrix} -2 \\ 3 \end{bmatrix} = \begin{bmatrix} 4 \\ 6 \end{bmatrix}$

IV   Answer the following (Graph)   1 x 10 = 10

20. Discuss the nature of the solution of the quadratic equation $x^2 - 8x + 16 = 0$

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X   UNIVERSAL MAT HR. SEC. SCHOOL

UT-01/AC   UNIT TEST - I EXAM NO - 1

MATHEMATICS - A & C

TIME : 1.30   RELATION & FUNCTION - I   MARKS : 50

I   Fill in the blanks: 10 x 1 = 10

1) If $n(A \times B) = 6$ and $A=\{1,3\}$ then $n(B)=$...............

2) If the ordered pairs $(a+2, 4)$ and $(5, 2a+b)$ are equal then (a,b) is ....

3) If $f(x)=2x^2$ and $g(x) = \frac{1}{3x}$ then fog is ......

4) If $f:A \rightarrow B$ is a bijective function and if $n(B)=7$, then $n(A)=$ ....

5) $A=\{a,b,p\}, B=\{2,3\}, C=\{p,q,r,s\}$ then $n[(A \cup C \times B]$ is...........

6) If $\{(a,8),(6,b)\}$ represent an identity function , then value of a and b are..............

7) The range of the relation $R=\{(x,x^2) / x$ is a prime number $<13\}$ is........

8) If $f(a) =b$, then b is called "image" of a under f and a is called ....of b .

9) A relation which contains no element is called a ....

10) A function $f:A \rightarrow B$ is said to be ....if the range of f is equal to the co – domain of f .

II   Answer the following :   5 x 2 = 10

11) If $A=\{2,-2,3\}$ and $B=\{1,-4\}$ then find $A \times B$ and $B \times A$.

12) If $A \times B=\{(3,2),(3,4),(5,2)(5,4)\}$ then find A and B.

13) Let $A=\{1,2,3,4.........,45\}$ and R be the relation as "is square of "on A. Write R as a subset of A x A also, find the domain and range of R.

14) A plane is flying at a speed of 500 km per hour . Express the distance d travelled by the plane as function of time t in hours.

15) Let $f(x) = 2x +5$. If $x \neq 0$ then find $\frac{f(x+2)-f(2)}{x}$

III   Answer the following :   6 x 5 = 30

16) If $A=\{5,6\}, B= \{4,5,6\}, C=\{5,6,7\}$ show that $A \times A = (B \times B) \cap (C \times C)$

17) Given $f(x) = 2x-x^2$, find i) $f(1)$ ii) $f(x+1)$ iii) $f(x) + f(1)$

18) A relation R is given by the set $\{ (x,y) / y = x + 3, x \in \{ 0, 1 , 2, 3, 4, 5 \} \}$. Determine its domain and range.

19) A function $f : R \rightarrow R$ is defined by

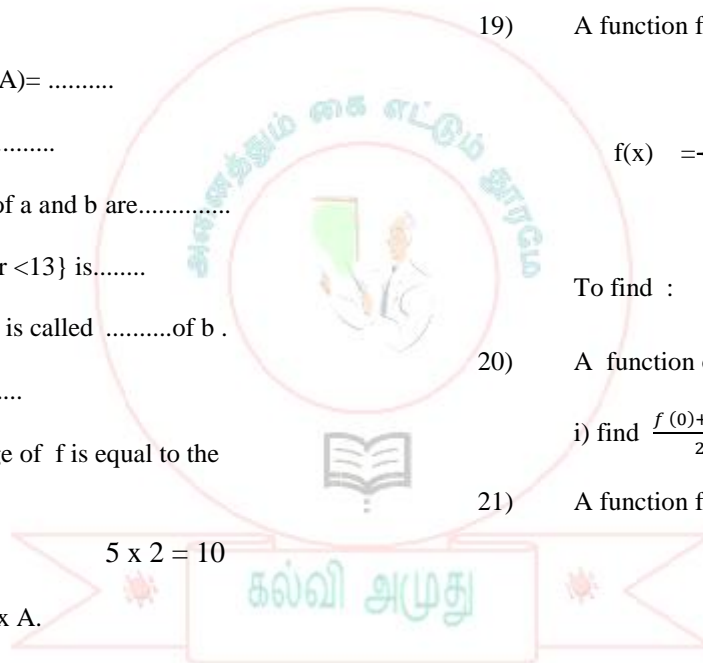$$f(x) = \begin{cases} 2x+7, & x < -2 \\ x^2 -2, & -2 \leq x<3 \\ 3x-2, & x \geq 3 \end{cases}$$

To find : i) $f(4) + 2 f(1)$ ii) $\frac{f(1)-3f(4)}{f(-3)}$

20) A function of is defind by $f(x)= 2x – 3$

i) find $\frac{f(0)+f(1)}{2}$ ii) find x such that $f(x) = 0$

21) A function f is defind by $f(x) = 3 - 2x$. Find x such that $f(x^2)= (f(x))^2$

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X   UNIVERSAL MAT HR. SEC. SCHOOL

UT 02/A&C   UNIT TEST - 2 EXAM NO -2

MATHEMATICS - A & C

TIME : 1.30   RELATION & FUNCTION - II   MARKS : 50

I   Fill in the blanks: 10 x 1 = 10

1.   If g ={(1,1),(2,3),(3,5),(4,7)} is a function given by g(x)=α x+β then the values of α and β are..........

2.   If n (AxB) =6 and A={1,3} then n(B)..........

3.   The composition of fog denoted as the function gof (x)=..................

4.   A function f:A$\rightarrow$B is called .... function if distinct elements of A have distrinct images in B.

5.   Let A = {1,2,3,4} and B={4,8,9,10} a function f:A$\rightarrow$B given by

f ={(1,4),(2,8),(3,9)(4,10)} is a ....

6.   a= {a,b,p} B={2,3} C= {p,q,r,s} then n[(A$\cup$C) x B] is ....

7.   Let n(A)=m and n(B)=n then the total number of non – empty relations that can be defined from A to B is............

8.   If there are 1024 relations from a set A={1,2,3,4,5} to set B, them the number of element in B is ....

9.   F(x)= $(x+1)^3 - (x-1)^3$ represents a function which is ....

10.   Let f (x)= $\sqrt{1 + x^2}$ then..........

II   Answer the following :   5 x 2 = 10

11.   Show that function f :N$\rightarrow$N defined by f(x)=2x - 1 is one - one but not onto.

12.   Represent the function f= {(1.2),(2,2),(3,2),(4,3),(5,4)} through

i)an arrow diagram   ii)a table

13.   Represent the function

F(x)=$\sqrt{2x^2 - 5x + 3}$ as a composition of two functions.

14.   Find fog and gof when f(x) = 3+x and g(x)= x-4

15.   Find fof (k) = 5, where f(k) = 2k - 1

III   Answer the following :   6 x 5 = 30

16.   If f (x) = x-1 , g(x)= 3x+1, and h(x)=x^2 prove that (fog) oh = fo (goh)

17.   A function f:[-5,9]$\rightarrow$ R is defind as

$$f (x) = \begin{cases} 6x+1 , & -5 \le x < 2 \\ 5x^2-1, & 2 \le x < 6 \\ 3x -4 , & 6 \le x \le 9 \end{cases}$$

Find: i)f(-3)+f(2)   ii)2f(4) +f (8)

18.   Let A= {-1,1} and B= {0,2} if the function A $\rightarrow$B defined by f (x) = ax + b an onto function ? Find a and b.

19.   Find the value of k , such that fog = gof

Given that f (x)= 3x+2,g(x)=6x – k

20.   The distance S an object travels under the influence of gravity in time T seconds is given by S (t) =$\frac{1}{2}$ g t ^{2} +at+b where (g iss the acceleration due to gravity) , a,b are constants . check if the function S(t) is one – one .

21.   Let A = { 1, 2 , 3, 4 } and   B = { 2, 5, 8, 11, 14 } be two sets. Let

f: A $\rightarrow$ B be a function given by f(x) = 3x - 1. Represent this function.

a) an arrow diagram   b) a table

c) a set of ordered pairs   d) a graph

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X   UNIVERSAL MAT HR. SEC. SCHOOL

UT 05/A&C   UNIT TEST - 5 EXAM NO -5

TIME : 1.30   MATHEMATICS - A & C   MARKS : 50

I   Fill in the blanks: 10 x 1 = 10

1. The solution of the system $x + y - 3x = - 6, - 7y + 7z = 7, 3z = 9$ is ....

   a) $x = 1, y = 2, z = 3$ b) $x = - 1, y = 2, z = 3$

   c) $x = - 1, y = - 2, z = 3$ d) $x = 1, y = 2, z = 3$

2. If $(x - 6)$ is the HCF of $x^2 - 2x - 24$ and $x^2 - kx - 6$ then the value of k is .....

   a) 3   b) 5   c) 6   d) 8

3. $\frac{3y-3}{y} \div \frac{7y-7}{3y^2}$ is ......

   a) $\frac{9y}{7}$ b) $\frac{9y^3}{(21y-21)}$ c) $\frac{21y^2 - 42y + 21}{3y^3}$ d) $\frac{7(y^2 - 2y + 1)}{y^2}$

4. The square root of $\frac{256\, x^8 y^4 z^{10}}{25\, x^6 y^6 z^6}$ is equal to ....

   a) $\frac{16}{5}\left|\frac{x^2 z^4}{y^2}\right|$ b) $16\left|\frac{y^2}{x^2 z^4}\right|$ c) $\frac{16}{5}\left|\frac{y}{x\, z^2}\right|$ d) $\frac{16}{5}\left|\frac{x z^2}{y}\right|$

5. Which of the following should be added to make $x^4 + 64$ a perfect square ......

   a) $4x^2$ b) $16x^2$ c) $8x^2$ d) $- 8x^2$

6. The solution of $(2x - 1)^2 = 9$ is equal to ....

   a) $- 1$ b) 2   c) $- 1, 2$ d) none of these

7. Graph of a liner polynomial is a ......

   a) straight line   b) circle   c) parabola   d) hyperbola

8. The number of points of intersection of the quadratic polynomial $x^2 + 4x + 4$ with the X axis is ......   a) 0   b) 1   c) 0 or 1   d) 2

9. The values of a and b if $4x^4 - 24x^3 + 76x^2 + ax + b$ is a perfect square are ......

   a) 100, 120   b) 10, 12   c) $- 120, 100$ d) 12, 10

10. $y^2 + \frac{1}{y^2}$ is not equal to ... a) $\frac{y^4 + 1}{y^2}$ b) $\left(y + \frac{1}{y}\right)^2$ c) $\left(y - \frac{1}{y}\right)^2 + 2$ d) $\left(y + \frac{1}{y}\right)^2 - 2$

II   Answer the following :   (any 5)   5 x 2 = 10

11. Find the square root of $9x^2 - 24\,xy + 30\,xz - 40\,yz + 25\,z^2 + 16y^2$

12. Simplify : $\frac{4x}{x^2 - 1} - \frac{x+1}{x-1}$

13. Simplify : $\frac{1}{x^2 + 2}$ from $\frac{2x^3 + x^2 + 3}{(x^2 + 2)^2}$

14. Find the quadratic equation whose sum and product of roots are $\frac{5}{3}, 4$

15. Solve : $x^2 + 2x - 2 = 0$ by formula method.

16. Determine the nature of roots for the quadratic equation $15x^2 + 11x + 2 = 0$

III   Answer the following :   (any 4)   4 x 5 = 20

17. If the roots of the equation $(c^2 - ab)\, x^2 - 2(a^2 - bc)\, x + b^2 - ac = 0$ are real and equal prove that either $a = 0$ (or) $a^3 + b^3 + c^3 = 3\,abc$.

18. Find the values of a and b if give polynomial is a perfect square .

   $4x^4 - 12x^3 + 37x^2 + bx + a$

19. If $A = \frac{x}{x+1}$, $B = \frac{1}{x+1}$ prove that $\frac{(A+B)^2 + (A-B)^2}{A \div B} = \frac{2(x^2 + 1)}{x(x+1)^2}$

20. Simplify : $\frac{1}{x^2 - 5x + 6} + \frac{1}{x^2 - 3x + 2} - \frac{1}{x^2 - 8x + 15}$

21. A ball rools down a slope and travels a distance $d = t^2 - 0.75\,t$ feet in t seconds. Find the time when the distance travelled by the ball is 11. 25 feet.

IV   Answer the following (Graph)   1 x 10 = 10

22. Discuss the nature of solution of the quadratic equation $x^2 - 4x + 4 = 0$

[OR]

Discuss the nature of solution of the quadratic equation $x^2 + x - 12 = 0$

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X   UNIVERSAL MAT HR. SEC. SCHOOL

UT 04/A&C UNIT TEST - 4   EXAM NO -4 ALGEBRA - I

TIME : 1.30   MATHEMATICS - A & C   MARKS : 50

I   Fill in the blanks: 10 x 1 = 10

1.   The solution of the system $x + y - 3z = -6$, $-7y + 7z = 7$, $3z = 9$ is _____

     a) $x = 1, y = 2, z = 3$ b) $x = -1, y = 2, z = 3$

     c) $x = -1, y = -2, z = 3$ d) $x = 1, y = 2, z = 3$

2.   If $(x - 6)$ is the HCF of $x^2 - 2x - 24$ and $x^2 - kx - 6$ then the value of k is _____

     a) 3   b) 5   c) 6   d) 8

3.   ÷ is _____

     a)   b)   c)   d)

4.   The square root of is equal to _____

     a)   b) 16   c)   d)

5.   Which of the following should be added to make $x^4 + 64$ a perfect square _____

     a) $4x^2$ b) $16x^2$ c) $8x^2$ d) $-8x^2$

6.   The solution of $(2x - 1)^2 = 9$ is equal to _____

     a) -1   b) 2   c) -1, 2   d) none of these

7.   Graph of a linear polynomial is a _____

     a) straight line   b) circle   c) parabola   d) hyperbola

8.   The number of points of intersection of the quadratic polynomial $x^2 + 4x + 4$ with the X axis is _____

     a) 0   b) 1   c) 0 or 1   d) 2

9.   The general form of linear equation in two variables x and y is _____

10. What is the value of x in $3 = 9$?

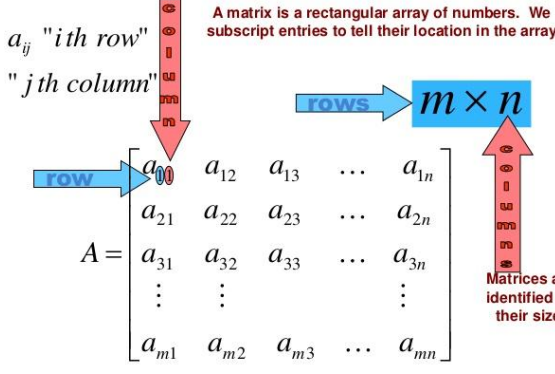**II**   Answer the following :   5 x 2 = 10

11. Solve : $2x - 3y = 6$; $x + y = 1$

12. Find the LCM of $-9a^3 b^2$, $12a^2b^2c$

13. Reduce the rational expression to its lowest form

14. Find the excluded value :

15. Simplify :   x

III   Answer the following :   (any 4)   4 x 5 = 20

16. Find the square root of $64x^4 - 16x^3 + 17x^2 - 2x + 1$

17. Find the GCD of the polynomials $x^3 + x^2 - x + 2$ and $2x^3 - 5x^2 + 5x - 3$

18. Solve : $x + 2y - z = 5$; $x - y + z = -2$; $-5x - 4y + z = -11$

19. If $x =$ and $y =$ find the values of $x^2 y^{-2}$

20. Simplify :   ÷

IV   Answer the following (Graph)   1 x 10 = 10

21. Discuss the nature of the solution of the quadratic equation :

     $x^2 - 9x + 20 = 0$

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Matrices and Rows

A matrix is a rectangular array of numbers. We subscript entries to tell their location in the array

a_{ij} "i th row"
"j th column"

rows $\boxed{m \times n}$

$$A = \begin{bmatrix} a_{00} & a_{12} & a_{13} & \dots & a_{1n} \\ a_{21} & a_{22} & a_{23} & \dots & a_{2n} \\ a_{31} & a_{32} & a_{33} & \dots & a_{3n} \\ \vdots & \vdots & \vdots & & \vdots \\ a_{m1} & a_{m2} & a_{m3} & \dots & a_{mn} \end{bmatrix}$$

Matrices are identified by their size.

பாடம்	: கணிதம்
பாடத்தலைப்பு	: 3.இயற்கணிதம்
வகுப்பு	: 10-D
தேதி	: 10/10/2019, வியாழக் கிழமை.
மதிப்பெண்கள்	: 25
காலம்	: 1:00 மணி

I) அனைத்து வினாக்களுக்கும் விடையளிக்கவும்: 5 X 2 = 10

1. $\begin{pmatrix} a-b & 2a+c \\ 2a-b & 3c+d \end{pmatrix} = \begin{pmatrix} 1 & 5 \\ 0 & 2 \end{pmatrix}$ என்ற அணி சமன்பாட்டிலிருந்து a, b, c, d மதிப்புகளைக் காண்க.

2. $A = \begin{pmatrix} \sqrt{7} & -3 \\ -\sqrt{5} & 2 \\ \sqrt{3} & -5 \end{pmatrix}$ எனில், $-A$–யின் நிரை நிரல் மாற்று அணியைக் காண்க

3. $A = \begin{pmatrix} 5 & 2 & 2 \\ -\sqrt{17} & 0.7 & \frac{5}{2} \\ 8 & 3 & 1 \end{pmatrix}$ எனில், $(A^T)^T = A$ என்பதனைச் சரிபார்க்க.

4. $A = \begin{pmatrix} 1 & 9 \\ 3 & 4 \\ 8 & -3 \end{pmatrix}$, $B = \begin{pmatrix} 5 & 7 \\ 3 & 3 \\ 1 & 0 \end{pmatrix}$ எனில், பின்வருவனவற்றைச் சரிபார்க்க.
$A + B = B + A$

5. $A = \begin{pmatrix} 1 & 9 \\ 3 & 4 \\ 8 & -3 \end{pmatrix}$, $B = \begin{pmatrix} 5 & 7 \\ 3 & 3 \\ 1 & 0 \end{pmatrix}$ எனில், பின்வருவனவற்றைச் சரிபார்க்க.
$A + (-A) = (-A) + A = O.$

II) அனைத்து வினாக்களுக்கும் விடையளிக்கவும்: 3 X 5 = 15

1. $A = \begin{pmatrix} a & b \\ c & d \end{pmatrix}$, $I = \begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix}$ எனில், $A^2 - (a+d)A = (bc-ad)I_2$ என நிறுவுக.

2. $A = \begin{pmatrix} 5 & 2 & 9 \\ 1 & 2 & 8 \end{pmatrix}$, $B = \begin{pmatrix} 1 & 7 \\ 1 & 2 \\ 5 & -1 \end{pmatrix}$ எனில், $(AB)^T = B^T A^T$ என்பதைச் சரிபார்க்கவும்.

3. $A = \begin{pmatrix} 3 & 1 \\ -1 & 2 \end{pmatrix}$ எனில், $A^2 - 5A + 7I_2 = 0$ என நிறுவுக.

X   UNIVERSAL MAT HR. SEC. SCHOOL

UT 06/A&C   UNIT TEST - 6 EXAM NO -6

TIME : 1.30   MATHEMATICS - A & C   MARKS : 50

I   Fill in the blanks: 10 x 1 = 10

1. In $\triangle$ LMN, $\angle$L = 60°, $\angle$M = 50°. If $\triangle$ LMN ~ $\triangle$ PQR then the value of $\angle$R is _____ a) 40°   b) 70°   c) 30°   d) 110°

2. If $\triangle$ ABC is an isosceles triangle with $\angle$C = 90° and AC = 5 cm then AB is _____ a) 2.5 cm   b) 5 cm   c) 10 cm   d) $5\sqrt{2}$ cm

3. How many tangents can be drawn to the circle from an exterior point ?

   a) one   b) two   c) infinite   d) 0

4. If in $\triangle$ ABC DE $\parallel$ BC. AB = 3.6 cm, AC = 2.4 cm, AD = 2.1 cm then the length of AE is _____ a) 1.4 cm   b) 1.8 cm   c) 1.2 cm   d) 1.05 cm

5. A tangent is perpendicular to the radius at the _____

   a) centre   b) point of constant   c) infinity   d) chord

6. If in triangles ABC and EDF $\frac{AB}{DE} = \frac{BC}{FD}$ then they will be similar, when _____ a) $\angle$B = $\angle$E   b) $\angle$A = $\angle$D   c) $\angle$B = $\angle$D   d) $\angle$A = $\angle$F

7. The two tangents from an external point P to a circle with centre at O are PA and PB. If $\angle$ APB = 70° then the value of $\angle$ AOB is _____

   a) 100°   b) 110°   c) 120°   d) 130°

8. In a $\triangle$ ABC, AD is the bisector of $\angle$ABC . If AB = 8 cm, BD = 6cm and DC = 3 cm then the length of side AC is _____

   a) 6 cm   b) 4 cm   c) 3 cm   d) 8 cm

9. If PR = 26 cm, QR = 24 cm, $\angle$PAQ = 90°, PA = 6 cm and QA = 8 cm. Find $\angle$ PQR = _____

   a) 80°   b) 85°   c) 75°   d) 90°

10. A straight line that touches a circle at a common point is called a _____

   a) radius   b) diameter   c) tangent   d) chord
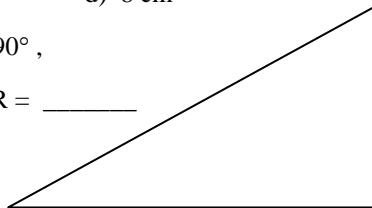
II   Answer the following :   5 x 2 = 10

11. If QA and PB are perpendicular to AB. If AO = 10 cm, BO = 6 cm and PB = 9cm. Find AQ.
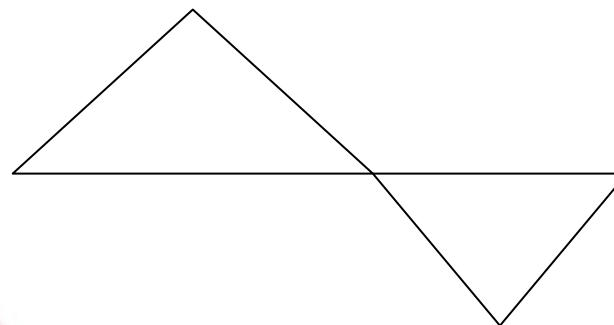
12. If $\triangle$ ABC is similar to $\triangle$ DEF such that BC = 3cm, EF = 4 cm and area of $\triangle$ ABC = 54 cm^2. Find the area of $\triangle$ DEF.

13. If AD is the bisector of $\angle$A. If BD = 4cm, DC = 3 cm, and AB = 6 cm find AC.

14. If radii of two concentric circles are 4 cm and 5 cm then find the length of the chord of one circle which is a tangent to the other circle ?

15. Find the length of the tangent drawn from a point whose distance from the centre of a circle is 5 cm and radius of the circle is 3 cm.

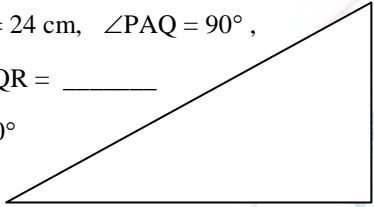**III   Answer the following :**   4 x 5 = 20

16. State and prove Alternate segment theorem.
17. State and prove Pythagoras theorem.
18. State and prove Angle Bisector Theorem.
19. State and Prove Thales theorem.

IV   Answer the following (Practical Geometry)   1 x 10 = 10

20. Construct a $\triangle$ PQR such that QR = 6.5 cm, $\angle$P = 60° and the altitude from P to QR is of length 4.5 cm.   [OR]

Construct a $\triangle$ PQR which the base PQ = 4.5 cm, $\angle$R = 35° and the median from R to RG is 6 cm.

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X   UNIVERSAL MAT HR. SEC. SCHOOL

UT 06/B&D   UNIT TEST - 6 EXAM NO -6

TIME : 1.30   MATHEMATICS - B & D   MARKS : 50

I   Choose the best answer: 10 x 1 = 10

1. The perimeters of two similar triangles Δ ABC and Δ PQR are 36 cm and 24 cm respectively. If PQ = 10 cm, then the length of AB is ____

   a) $6\frac{2}{3}$ cm   b) $\frac{10\sqrt{6}}{3}$ cm   c) $66\frac{2}{3}$ cm   d) 15 cm

2. Two ploles of heights 6m and 11m stand vertically on a plane ground. If the distance between their feet is 12 m, what is the distance between their tops ? a) 13 m   b) 14 m   c) 15 m   d) 12.8 m

3. In the given figure PR = 26 cm, QR = 24 cm, $\angle$PAQ = 90°, PA = 6 cm and QA = 8 cm. Find $\angle$ PQR = _____

   a) 80°   b) 85°   c) 75°   d) 90°

4. If in Δ ABC DE $\parallel$ BC. AB = 3.6 cm, AC = 2.4 cm, AD = 2.1 cm then the length of AE is _____ a) 1.4 cm   b) 1.8 cm   c) 1.2 cm   d) 1.05 cm

5. How many tangents can be drawn to the circle from an exterior point ?

   a) one   b) two   c) infinite   d) 0

6. In Δ LMN, $\angle$L = 60°, $\angle$M = 50 °. If Δ LMN ~ Δ PQR then the value of $\angle$R is _____ a) 40°   b) 70 °   c) 30 °   d) 110 °

7. If Δ ABC is an isosceles triangle with $\angle$C = 90° and AC = 5 cm then AB is _____ a) 2.5 cm   b) 5 cm   c) 10 cm   d) 5 $\sqrt{2}$ cm

8. In a ΔABC, AD is the bisector of $\angle$ABC.If AB=8cm, BD=6cm and DC=3cm then the length of side AC is _____ a) 6 cm   b) 4 cm   c)3 cm   d)8 cm

9. A tangent is perpendicular to the radius at the _____

   a) centre   b) point of constant   c) infinity   d) chord

10. The two tangents from an external point P to a circle with centre at O are PA and PB. If $\angle$ APB = 70° then the value of $\angle$ AOB is _____

   a) 100°   b) 110 °   c) 120 °   d) 130 °

III   Answer the following :   4 x 5 = 20

11. State and Prove Thales theorem.

12. State and prove Angle Bisector Theorem.

13. State and prove Pythagoras theorem.

14. State and prove Alternate segment theorem.

IV Answer the following (Practical Geometry)   2 x 10 = 20

15. Construct a Δ PQR in which PQ = 8 cm $\angle$R = 60° and the median RG from R to PQ is 5.8 cm. Find the length of the altitude from R to PQ.

[OR]

Construct a triangle Δ PQR such that QR = 5 cm, $\angle$P = 30° and the altitude from P to QR is of length 4.2 cm.

16. Discuss the nature of solution of the quadratic equation x^2 - 9x + 20 = 0

[OR]

Discuss the nature of solution of the quadratic (2x - 3) (x + 2) = 0

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X   UNIVERSAL MAT HR. SEC. SCHOOL

UT 03/B&D   UNIT TEST - 3 EXAM NO -3

MATHEMATICS - B & D

TIME : 1.30   MATRICES   MARKS : 50

I   Fill in the blanks: 10 x 1 = 10

1.   If A = 2 x 2 matrix and B = 3 x 4 matrix how many columns does AB have _____

2.   If number of columns and rows are not equal in a matrix then it is said to be a _____

3.   If $A = \begin{bmatrix} 1 & 3 & 5 & 7 \\ 2 & 4 & 6 & 8 \\ 9 & 11 & 13 & 15 \end{bmatrix}$ then the order of the matrix A^T = _____

4.   Transpose of a column matrix is _____

5.   Find the matrix X if $2X + \begin{bmatrix} 1 & 3 \\ 5 & 7 \end{bmatrix} = \begin{bmatrix} 5 & 7 \\ 9 & 5 \end{bmatrix}$ is _____

6.   A matrix is said to be a _____ if it has only one column and any number of rows.

7.   A diagonal matrix in which all the leading diagonal elements are equal is called a _____

8.   If order of A = 4 x 3 and order of B = 3 x 2 then the order of the product matrix AB = _____

9.   If A is order of 4 x 2 and B is order of 2 x 2 then the order of AB = ____

10.   If $A = \begin{pmatrix} 8 & 9 & 4 & 3 \\ -1 & \sqrt{7} & \sqrt{3}/2 & 5 \\ 1 & 4 & 3 & 0 \\ 6 & 8 & -11 & 1 \end{pmatrix}$ write the element of a_{34} = _____

II   Answer the following :   5 x 2 = 10

11.   If $A = \begin{bmatrix} 5 & 2 & 2 \\ -\sqrt{17} & 0.7 & 5/2 \\ 8 & 3 & 1 \end{bmatrix}$ then verify $(A^T)^T$ = A.

12.   Verify that $A^2 = I$ when $A = \begin{bmatrix} 5 & -4 \\ 6 & 5 \end{bmatrix}$

13.   If a matrix has 18 elements, what are the possible orders it can have? What if it has 6 elements.?

14.   If $A = \begin{bmatrix} 2 & 5 \\ 4 & 3 \end{bmatrix}$, $B = \begin{bmatrix} 1 & -3 \\ 2 & 5 \end{bmatrix}$ find AB , BA and check if AB = BA ?

15.   If $A = \begin{bmatrix} 1 & 9 \\ 3 & 4 \\ 8 & -3 \end{bmatrix}$, $B = \begin{bmatrix} 5 & 7 \\ 3 & 3 \\ 1 & 0 \end{bmatrix}$ then verify that A + B = B + A

III   Answer the following :   4 x 5 = 20

16.   Solve for x, y $\begin{bmatrix} x^2 \\ y^2 \end{bmatrix} + 2\begin{bmatrix} -2x \\ -y \end{bmatrix} = \begin{bmatrix} 5 \\ 8 \end{bmatrix}$

17.   If $A = \begin{bmatrix} 1 & 1 \\ -1 & 3 \end{bmatrix}$, $B = \begin{bmatrix} 1 & 2 \\ -4 & 2 \end{bmatrix}$, $C = \begin{bmatrix} -7 & 6 \\ 3 & 2 \end{bmatrix}$ verify that A (B+C) = AB + AC

18.   If $A = \begin{bmatrix} 3 & 1 \\ -1 & 2 \end{bmatrix}$ show that $A^2 - 5A + 7I_2 = 0$

19.   If $A = \begin{bmatrix} 5 & 2 & 9 \\ 1 & 2 & 8 \end{bmatrix}$ $B = \begin{bmatrix} 1 & 7 \\ 1 & 2 \\ 5 & -1 \end{bmatrix}$ verify that $(AB)^T = B^T A^T$

IV   Answer the following (Graph)   1 x 10 = 10

20.   Discuss the nature of the solution of the quadratic equation $x^2 + 2x + 5 = 0$

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X   UNIVERSAL MAT HR. SEC. SCHOOL

UT 08/A&C   UNIT TEST - 8   EXAM NO - 8

TIME : 1.30   MATHEMATICS - A & C   MARKS : 50

I   Answer the following :   7 x 2 = 14

1. The volumes of two cones of the same radius are 3600 cm^3 and 5040 cm^3. Find the ratio of heights.

2. If the ratio of radii of two spheres is 4 : 7. Find the ratio of their volumes.

3. A solid sphere and a solid hemisphere have equal total surface area. Prove that the ratio of their volumes is.

4. A right circular cylinder just enclose a sphere of radius r units. Calculate the CSA of cylinder.

5. A metallic sphere of radius 16cm is melted and recast into small spheres each of radius 2 cm. How many small spheres can be obtained?

6. A cone of height 24cm is made up of modeling clay. A child reshapes it in the form of a cylinder of same radius as cone. Find the height of cylinder.

7. A conical flask is full of water. The flask has base radius r units and height h units, the water poured into a cylindrical flask of base radius xr units. Find the height of water in the cylindrical flask.

II   Answer the following : (any 4)   4 x 5 = 20

8. A toy is in the shape of a cylinder surmounted by a hemisphere. The height of the joy is 25 cm. Find the TSA of the joy if its common diameter is 12 cm.

9. A vessel is in the form of a hemispheral bowl mounted by a hollow cylinder. The diameter is 14cm and the height of the vessel is 13 cm. Find the capacity of the vessel.

10. A capsule is in the shape of a cylinder with two hemisphere stuck to each of its ends.If the length of the entire caosule is 12 mm and the diameter of the capsule is 3 mm, how much medicine it can hdd?

11. Water is flowing at the rate of 15km per hour through a pipe of diameter 14cm into a rectangular tank which is 50 m long and 44m wide. Find the time in which the level of water in the tanks will rise by 21 cm.

12. A solid right circular cone of diameter 14cm and height 8 cm is melted to form a hollow sphere. If the ecxternal diameter of the sphere is 19 cm. Find the internal diameter.

III   Answer the following (Practical Geometry and Graph) 2 x 8 = 16

13. Draw a triangle ABC of base BC = 8 cm, $\angle A = 60°$ and the bisector of $\angle A$ meets BC at D such that BD = 6 cm.

14. Draw the graph of $y = x^2 + 4x + 3$ and hence find the roots of $x^2 + x + 1 = 0$

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X   UNIVERSAL MAT HR. SEC. SCHOOL

UT 08/B&D   UNIT TEST - 8 EXAM NO -8

TIME : 1.30   MATHEMATICS - B & D   MARKS : 50

I   Choose the best answer :   10 x 1 = 10

1. The height of a right circular cone whose radius is 5 cm and slant height is 13 cm will be _____
   a)12 cm   b)10 cm   c)13 cm   d)5 cm

2. If the radius of the base of a cone is tripled and the height is doubled then the volume is _____
   a) made 6 times b) made 18 times   c) made 12 times d) unchanged

3. The total surface area of a hemi - sphere is how much times the square of its radius _____
   a) π b) 4π c) 3π d) 2π

4. The curved surface area of a right circular cone of height 15cm and base diameter 16 cm is ____a) 60π cm^2 b)68π cm^2 c)120π cm^2 d)136π cm^2

5. A solid sphere of radius x cm is melted and cast into a shape of a solid cone of same radius. The height of the cone is _____
   a) 3x cm   b) x cm   c) 4 x cm   d) 2 x cm

6. A shuttle cock used for playing badminton has the shape of the combination of _____
   a) a cylinder and a sphere b) a hemisphere and a cone
   c) a sphere and a cone   d) frustum of a cone and a hemisphere

7. The volume (in cm^3) of the greatest sphere that can be cut off from a cylindrical log of wood of base radius 1 cm and height 5 cm is _____
   a) $4/3\,\pi$ b) $10/3\,\pi$ c) $5\,\pi$ d) $20/3\,\pi$

8. The height and radius of the cone of which thet frustum is a part are h_1 units and r_1 units respectively. Height of the frustum is h_2 units and radius of the smaller base is r_2 units. If $h_2 : h_1 = 1 : 2$ then $r_2 : r_1$ is ____
   a) 1 : 3   b) 1 : 2   c) 2 : 1   d) 3 : 1

9. The ratio of the volumes of a cylinder, a cone and a sphere, if each has the same diameter and same height is _____
   a) 1 : 2 : 3   b) 2 : 1 : 3   c) 1 : 3 : 2 d) 3 : 1 : 2

10. If the radius of the base of a right circular cylinder is halved keeping the same height, then the ratio of the volume of the cylinder thus obtained to the volume of original cylinder is _____
    a) 1 : 2   b) 1 : 4   c) 1 : 6   d) 1 : 8

II   Answer the following : (any 5)   5 x 2 = 10

11. The CSA of a right circular cylinder f height 14 cm is 88 cm^2. Find the diameter of the cylinder.

12. Find the diameter of a sphere whose surface area is 154 m^2

13. If the ratio of radii of two spheres is 4 : 7 find the ratio of their volumes.

14. A cylindrical glass with diameter 20 cm has water to a height of 9 cm. A small cylindrical metal of radius 5 cm and height 4 cm is immersed it completely. Calculate the raise of the water in the glass?

15. The volume of a solid right circular cone is 11088cm^3, If its height is 24 cm then find the radius of the cone.

16. If the TSA of a cone of radius 7 cm is 704 cm^2, then find its slant height.

III   Answer the following : (any 4)   4 x 5 = 20

17. A cylindrical drum has a height of 20 cm and base radius of 14 cm. Find its CSA and TSA.

18. A container open at the top is in the form of a frustum of a cone of height 16cm with radii of its lower and upper ends are 8 cm and 20 cm respectively. Find the cost of milk which can completely fill a container at the rate of ₹40 per litre.

19. The external radius and the length of a hollow wooden log are 16 cm and 13 cm respectively. If its thickness is 4 cm then find its TSA.

20. If the radii of the circular ends of a frustum which is 45 cm high are 28 cm and 7 cm, find the volume of the frustum.

21. A girl wishes to prepare birthday caps in the form of right circular cones for her birthday party, using a sheet of paper whose area is 5720cm^2 how many caps can be made with radius 5cm and height 12 cm.

IV   Answer the following (Practical Geometry)   1 x 10 = 10

22. Draw a circle of diameter 6 cm from a point P, which is 8 cm away from its centre. Draw the two tangents PA and PB to the circle and measure their lengths.

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X   UNIVERSAL MAT HR. SEC. SCHOOL

UT 09/A&C   UNIT TEST - 9   EXAM NO - 9

TIME : 1.30   MATHEMATICS - A & C   MARKS : 50

I   Fill in the blanks :   8 x 1 = 8

1.   If f: $A \to B$ is a bijective function and if $n(B) = 7$, then $n(A) = $ _____

2.   If $n(A \times B) = 6$ and $A = \{1, 3\}$ then $n(B) = $ _____

3.   If numbers of columns and rows are not equal in a matrix then it is said to be _____

4.   The solution of $(2x - 1)^2 = 9$ is equal to _____

5. $\frac{3y-3}{y} \div \frac{7y-7}{3y^2} = $ _____

6.   If $f(x) = 2x^2$ and $g(x) = \frac{1}{3x}$ then $fog = $ _____

7.   If $(x - 6)$ is the HCF of $x^2 - 2x - 24$ and $x^2 - kx - 6$ then the value of k is _____

8.   A tangent is perpendicular to the radius at the _____

II   Answer the following :   7 x 2 = 14

9.   Let $f(x) = 2x + 5$. If $x \neq 0$ then find $\frac{f(x+2) - f(2)}{x}$

10.   Show that function $f : N \to N$ defined by $f(x) = 2x - 1$ is one - one but not onto.

11.   If $A = \begin{bmatrix} 2 & 1 \\ 1 & 3 \end{bmatrix}$, $B = \begin{bmatrix} 2 & 0 \\ 1 & 3 \end{bmatrix}$ find Ab and BA. Check if AB = BA ?

12.   If $A = \begin{bmatrix} 5 & 2 & 2 \\ -\sqrt{17} & 0.7 & 5/2 \\ 8 & 3 & 1 \end{bmatrix}$ then verify $(A^T)^T = A$

13.   Subtract $\frac{1}{x^2 + 2}$ from $\frac{2x^3 + x^2 + 3}{(x^2 + 2)^2}$

14.   Simplify : $\frac{4x}{x^2 - 1} - \frac{x+1}{x-1}$

15.   Define : Function

III   Answer the following :   4 x 5 = 20

16.   A function $f : [-5, 9) \to R$ is defined as

$$f(x) = \begin{cases} 6x + 1, & -5 \le x < 2 \\ 5x^2 + 1, & 2 \le x < 6 \\ 3x - 4, & 6 \le x \le 9 \end{cases}$$

Find :

i) $f(-3) + f(2)$ ii) $2 f(4) + f(8)$

17.   If $A = \begin{bmatrix} 1 & 1 \\ -1 & 3 \end{bmatrix}$ $B = \begin{bmatrix} 1 & 2 \\ -4 & 2 \end{bmatrix}$, $C = \begin{bmatrix} -7 & 6 \\ 3 & 2 \end{bmatrix}$ verify that A (B+C)=AB+AC

18.   Find the GCD of the polynomials $x^3 + x^2 - x + 2$ and $2x^3 - 5x^2 + 5x - 3$

19.   Find the values of a and b if give polynomial is a perfect square. $4x^4 - 12x^3 + 37x^2 + bx + a$

IV   Answer the following (Graph)   1 x 8 = 8

20.   Draw the graph of $y = x^2 + x - 2$ and hence solve $x^2 + x - 2 = 0$

[OR]

Draw the graph of $y = x^2 - 4x + 3$ and use it to solve $x^2 - 6x + 9 = 0$

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X   UNIVERSAL MAT HR. SEC. SCHOOL
UT 09/B&D   UNIT TEST - 9   EXAM NO - 9
TIME : 1.30   MATHEMATICS - B & D   MARKS : 50

I Choose the best answer :   10 x 1 = 10

1. If $n(A \times B) = 6$ and $A = \{1, 3\}$ then $n(B) = $ _____
   a) 1   b) 2   c) 3   d) 6

2. If $\{(a, 8), (6, b)\}$ represents an identify function then the value of a and b respectively.   a) $(8, 6)$ b) $(8, 8)$ c) $(6, 8)$ d) $(6, 6)$

3. The square root of $\frac{256x^8y^4z^{10}}{25\,x^6y^6z^6}$ _____
   a) $\frac{16}{5}\left|\frac{x^2z^4}{y^2}\right|$ b) $16\left|\frac{y^2}{x^2z^4}\right|$ c) $\frac{16}{5}\left|\frac{y}{xz^2}\right|$ d) $\frac{16}{5}\left|\frac{xz^2}{y}\right|$

4. In a $\triangle ABC$, $AD \perp \angle ABC$. If $AB = 8$ cm, $BD = 6$cm, and $DC = 3$cm the length of side AC _____ a) 6 cm b) 4 cm   c) 3 cm   d) 8 cm

5. Find the matrix x if $2X + \begin{bmatrix} 1 & 3 \\ 5 & 7 \end{bmatrix} = \begin{bmatrix} 5 & 7 \\ 9 & 5 \end{bmatrix}$ is _____

6. A tangent is perpendicular to the radius at the _____
   a) centre   b) point of constant   c) infinity   d) chord

7. If (x-6) is the HCF of $x^2-2x-24$ and $x^2 - Kx - 6$ then the value of $K = $ ____
   a) 3   b) 5   c) 6   d) 8

8. $f(x) = (x+1)^3 - (x-1)^3$ represents a function which is _____
   a) linear   b) cubic   c) reciprocal   d) quadratic

9. If $f: A \rightarrow B$ is a bijective function and if $n(B) = 7$ then $n(A) = $ _____
   a) 7   b) 49   c) 1   d) 14

10. Graph of a linear polynomial is a _____
    a) straight line   b) circle   c) parabola   d) hyperbola

II Answer the following :   6 x 2 = 12

11. If $A = \{1, 3, 5\}$ and $B = \{2, 3\}$ then find $A \times B$ and $B \times A$.

12. Find the value of K, if $f(x) = 2x - K$, $g(x) = 4x + 5$ then find $fog = gof$.

13. Simplify : $\frac{5t^3}{4t-8}$ x $\frac{6t-12}{10\,t}$

14. If $A = \begin{bmatrix} 5 & 2 & 2 \\ -\sqrt{17} & 0.7 & 5/2 \\ 8 & 3 & 1 \end{bmatrix}$ then verify $(A^T)^T = A$

15. If $A = \begin{bmatrix} 2 & 5 \\ 4 & 3 \end{bmatrix}$, $B = \begin{bmatrix} 1 & -3 \\ 2 & 5 \end{bmatrix}$ find AB and BA. Check if AB = BA ?

16. Find the square root : $256(x-a)^8 (x-b)^4 (x-c)^{16} (x-d)^{20}$

III Answer the following :   4 x 5 = 20

17. If $9x^4 + 12x^3 + 28x^2 + ax + b$ is a perfect square. Find the value of a and b.

18. If $A = \begin{bmatrix} 3 & 1 \\ -1 & 2 \end{bmatrix}$ show that $A^2 - 5A + 7I_2 = 0$

19. A function $f : R \rightarrow R$ is defined by
    $$f(x) = \begin{cases} 2x + 7, & x \leq -2 \\ x^2 - 2, & -2 \leq x < 3 \\ 3x - 2, & x \geq 3 \end{cases}$$
    Find, i) $f(4) + 2f(1)$ ii) $\frac{f(1) - 3f(4)}{f(-3)}$

20. Let $f : A \rightarrow B$ be a function defined by $f(x) = \frac{x}{2} - 1$ where $A = \{2, 4, 6, 10, 12\}$ $B = \{0, 1, 2, 4, 5, 9\}$ represent f by i) A set of ordered pairs ii) a table   iii) an arrow diagram   iv) a graph

IV Answer the following (Graph)   1 x 8 = 8

21. Draw the graph of $y = x^2 - 4x + 3$ and use it to solve $x^2 - 6x + 9 = 0$

[OR]

Draw the graph of $y = x^2 + 3x - 4$ and hence solve $x^2 + 3x - 4 = 0$

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X UNIVERSAL MAT HR. SEC. SCHOOL
UT 10/A&C UNIT TEST - 10 EXAM NO - 10
TIME : 1.30 MATHEMATICS - A & C MARKS : 50

I Choose the correct answer : 8 x 1 = 8

1. The range of the data 8, 8, 8, 8, 8 ...., 8 is _____
   a) 0 b) 1 c) 8 d) 3

2. Variance of first 20 natural numbers is _____
   a) 32.25 b) 44.25 c) 33.25 d) 30

3. If the mean and co-efficient of variation of a data are 4 and 87.5% then
   the S.D is _____ a) 3.5 b) 3 c) 4.5 d) 2.5

4. The mean of 100 observations is 40 and their S.D is 3. The sum of
   squares of all deviations is _____
   a) 40000 b) 160900 c) 160000 d) 30000

5. Probability of sure event is _____
   a) 0 b) 1 c) 0.1 d) 2

6. A page is selected at random from a book. The probability that the digit
   at units place of the page number choosen is less than 7 is _____
   a) 3/10 b) 7/10 c) 3/9 d) 7/9

7. If a letter is choosen at random from the English alphabets { a, b, ...,z}
   then the probability that the letter chosen precedes x.
   a)12/13 b) 1 / 13 c) 23 / 16 d) 3 / 26

8. If the S.D of x, y, z is p then the S.D of 3x +5, 3y + 5, 3x +z is ____
   a) 3p + 5 b) 3p c) p + 5 d) 9p + 15

II Answer the following : 7 x 2 = 14

9. Find the range and co-efficient of range: 63, 89, 98, 125, 79, 108, 117, 68

10. The range of a set of data is 13.67 and the largest value is 70.08. Find
    the smallest value.

11. Find the standard deviation of first 21 natural numbers.

12. The mean of a data is 25.6 and its co - efficient of variation 18.75. Find
    the standard deviation.

13. If $n = 5$, $\bar{x} = 6$, $\Sigma x^2 = 765$ then calculate the co - efficient of variation.

14. If $P(A) = 0.37$, $P(B) = 0.42$, $P(A \cap B) = 0.09$ then find $P(A \cup B)$.

15. Two coins are tossed together. Waht is the probability of getting different
    faces on the coins?

III Answer the following : (any 4) 4 x 5 = 20

16. Find the mean and variance of the first 'n' natural numbers.

17. The marks scored by the students in a sliptest are given below :

x	4	6	8	10	12
f	7	3	5	9	5

   Find the standard deviation.

18. Find the co-efficient of 24, 26, 33, 37,29, 31.

19. Two dice are rolled. Find the probability that the sum of outcomes is
    a) equal to 4 b) greater than 10 c) less than 13

20. A card is drawn from of 52 cards . Find the probability of getting a
    king or a heart or a red card.

IV Answer the following (Graph) 1 x 8 = 8

21. Draw the graph of $y = x^2 + 3x + 2$ and use it solve $x^2 + 2x + 1 = 0$.
    [OR]
    Draw the graph of $y = 2x^2 - 3x - 5$ and hence solve $2x^2 - 4x - 6 = 0$

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