GOVIND VIDYALAYA, TAMULIA

MATH (SET I)

SAMPLE PAPER OF 1ST TERM (2015-16)

STD. XII

Time allowed: 3 hrs **Maximum marks -100**

General Instructions:

a) All questions are compulsory.

b) The question paper consists of 26 questions divided into three sections A, B and C. Section A comprises of 6 questions of one mark each, Section B comprises of 13 questions of four marks each and Section C comprises of 7 questions of six marks each.

c) All questions in Section A are to be answered in one word, one sentence or as per the exact requirement of the question.

d) Use of calculators is not permitted.

SECTION – A 1X6=6

1) IF f(x) = x + 7 and g(x) = x – 7 , find (fog)(7).

2) Find the principal value of $\tan^{-1}(-\sqrt{3})$

3) If a square matrix of order 3 such that $|adjA|$ =225 , find $|A'|$

4) Find $\frac{dy}{dx}$ if y = $\tan^{-1}\left[\frac{1+tan\,x}{1-\tan x}\right]$, x ∈ $\left[-\frac{\pi}{4}, \frac{\pi}{4}\right]$

5) If a matrix A= $\begin{bmatrix} 1 & -1 \\ -1 & 1 \end{bmatrix}$ and A^2 = KA , then write the value of k.

6) Write the integrating factor of the differential equation:

$(1+x^2)\frac{dy}{dx} + y = tan^{-1}x$

SECTION – B 4X13=52

7) Solve: $y + \frac{d}{dx}(xy) = x(\sin x + \log x)$

8) SHOW THAT THE RELATION R IN R DEFINED BY R = {(a,b):a≤b}, IS REFLEXIVE AND TRANSITIVE

BUT NOT SYMMETRIC.

9) If F(x) = $\begin{bmatrix} cosx & -sinx & 0 \\ sinx & cosx & 0 \\ 0 & 0 & 1 \end{bmatrix}$, show that F(X).F(Y) = F(X+Y)

10) If y = $\cot^{-1}\sqrt{cosx} - \tan^{-1}\sqrt{cosx}$, then prove that Sin y = $tan^2(\frac{x}{2})$.

11) If $\tan^{-1}\frac{x-1}{x-2} + \tan^{-1}\frac{x+1}{x+2} = \frac{\pi}{4}$, then find the value of x.

12) $\int \frac{sinx}{(1-cosx)(2-cosx)}$dx

13) $\int sinxsin2xsin3x\,dx$

14) . $\begin{vmatrix} a+b & b+c & c+a \\ b+c & c+a & a+b \\ c+a & a+b & b+c \end{vmatrix} = 2\begin{vmatrix} a & b & c \\ b & c & a \\ c & a & b \end{vmatrix}$

15) . If y = $\sqrt{\tan x\sqrt{tanx\sqrt{\tan x + \ldots . to\infty}}}$, Prove that $\frac{dy}{dx} = \frac{sec^2x}{2y-1}$

16) . Find the value of P if following function

f(x) = $\frac{\sqrt{1+px}-\sqrt{1-px}}{x}$, if $-1 \le x < 0$

$\frac{2x+1}{x-2}$, if $0 \le x < 1$ is continuous at x = 0.

17) . If y= $\frac{x}{2}\sqrt{a^2-x^2}+\frac{a^2}{2}\sin^{-1}\left(\frac{x}{a}\right)$, show that $\frac{dy}{dx}=\sqrt{a^2-x^2}$.

18) Prove that the curves $x = y^2$ and $xy = k$ cut at right angle if $8k^2 = 1$

19) Using differential ,find the approximation value of $\sqrt{49.5}$

SECTION – C **6X7=42**

20) Show that the semi-vertical angle of a right circular cone of

Given surface area and maximum volume is $\sin^{-1}(1/3)$

21) LET Q BE THE SET OF ALL RATIONAL NUMBERS. DEFINE AN OPERATION * ON

Q – {-1} BY $a * b = a + b + ab$

SHOW THAT

a) * IS A BINARY OPERATION ON Q – {-1}

b) * IS COMMUTATIVE

c) * IS ASSOCIATIVE

d) ZERO IS THE IDENTITY ELEMENT ON Q – {-1}

e) $a^{-1}=\frac{-a}{1+a}$,WHERE $a \in Q - \{-1\}$

22) A school wants to award its students for the value of Honesty, Regularity and Hard work with a total cash award of Rs 6000. Three times the award money for hardwork added totha Given for honesty amount to Rs11,000 .The award money Given for honesty and hardwork together is double the oneGiven for regularity. Represent the above situation

Algebraically and find the award money for each value, using Matrix method. Apart from these values , namely, honesty, Regularity and hardwork ,suggest one more value which the School must include for awards.

23) By using properties prove that

$$\begin{vmatrix} a & b & c \\ a-b & b-c & c-a \\ b+c & c+a & a+b \end{vmatrix} = a^3+b^3+c^3-3abc$$

24) Evaluate : $\int_0^{\frac{3}{2}}|x\cos\pi x|dx$

OR

Evaluate $\int_1^3(3x^2+2x)dx$ as limit of sums.

25) Find the area of the region enclosed between two circles

$x^2 + y^2 = 1$ and $(x-1)^2 + y^2 = 1$.

26) Solve: $(1 - y^2) + (x - e^{\tan^{-1}y})\frac{dy}{dx} = 0$

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MATH (SET II)
SAMPLE PAPER OF 1ST TERM (2015-16)
STD. XII

Time allowed: 3 hrs **Maximum marks -100**

General Instructions:

a) All questions are compulsory.
b) The question paper consists of 26 questions divided into three sections A, B and C. Section A comprises of 6 questions of one mark each, Section B comprises of 13 questions of four marks each and Section C comprises of 7 questions of six marks each.
c) All questions in Section A are to be answered in one word, one sentence or as per the exact requirement of the question.
d) Use of calculators is not permitted.

SECTION – A 1X6=6

01) check whether the relation R in the set {1 , 2, 3} given by R = {(1 , 2) , (2,1)}

is transitive.

02) Find the v alue of $\tan^{-1}[2\cos(2\sin^{-1}\frac{1}{2})]$

03) If A is a square matrix and $|A| = 2$,then write the value of $|AA'|$,

Where A' is the transpose of matrix A.

04) Evaluate : $\begin{vmatrix} cos15^0 & sin15^0 \\ sin75^0 & cos75^0 \end{vmatrix}$

05)If y = $[sin\frac{x}{2} + cos\frac{x}{2}]^2$, find $\frac{dy}{dx}$ $at\ x = \frac{\pi}{6}$

06) . Write the integrating factor of the differential equation:

$(1+x^2)\frac{dy}{dx} + y = tan^{-1}x$

SECTION – B 4X13=52

07) Prove that: $\sin^{-1}\frac{8}{17} + \sin^{-1}\frac{3}{5} = \cos^{-1}\frac{36}{85}$

08) If A = $\begin{bmatrix} cos\theta & sin\theta \\ -sin\theta & cos\theta \end{bmatrix}$, prove that $A^n = \begin{bmatrix} cosn\theta & sinn\theta \\ -sinn\theta & cosn\theta \end{bmatrix}$, n∈ N.

09) . $\begin{vmatrix} a-b-c & 2a & 2a \\ 2b & b-c-a & 2b \\ 2c & 2c & c-a-b \end{vmatrix}$ = $(a + b + c)^3$

10) Verify Rolle's theorem for the function f(x) in the interval [-3, -2]

: $f(x) = x^2 + 5x + 6$.

11) Show that $y = ae^{2x} + be^{-x}$ is a solution of the differential equation

$\frac{d^2y}{dx^2} - \frac{dy}{dx} - 2y = 0$.

12) Find the value of P if following function

f(x)= $\frac{\sqrt{1+px} - \sqrt{1-px}}{x}$, if $-1 \leq x < 0$

$\frac{2x+1}{x-2}$, if $0 \leq x < 1$ is continuous at x = 0.

13) . Solve: $y + \frac{d}{dx}(xy) = x(\sin x + \log x)$

14) Evaluate: $\int \frac{2x-1}{(x-1)(x+2)(x-3)}dx$

15) If$\tan^{-1}\frac{x-1}{x-2} + \tan^{-1}\frac{x+1}{x+2} = \frac{\pi}{4}$, then find the value of x.

16) Evaluate $\int x^2 \tan^{-1} x\ dx$

17) Using differential ,find the approximation value of $\sqrt{49.5}$

18) Find the interval in which the function $f(x)=x^3 -12x^2 +36x+17$

Is (a) increasing ,(b)decreasing.

19)Let L be the set of all lines in a plane and R be the relation in L defined as R={(L1,L2):L1 is parallel to L2}. Is L reflexive?

SECTION – C 6X7=42

20) On R – {1} a binary operation * is defined by a*b = a+b-ab. Prove that * is commutative and associative. Find the identity element for * on R – {1}.

21) In a survey of 20 richest persons of three residential society A , B, C it is found that in society A, 5 believe in honesty, 10 in hard Work, 5 in unfair means while in B, 5 in honesty, 8 in hard work, 7 in unfair means and in C, 6 in honesty, 8 in hard work, 6 in Unfair means .If the per day income of 20 richest persons of Society A , B , C are Rs 32,500 ,Rs 30,000 ,Rs 31,000 respectively, Then find the per day income of each type of people by matrix Method.

a) Which type of people has more per day income?

b) According to you , which type of person is better for

22) Show that $\begin{vmatrix} a^2 & 2ab & b^2 \\ b^2 & a^2 & 2ab \\ 2ab & b^2 & a^2 \end{vmatrix}$ = $(a^3 + b^3)^2$

23) A manufacturer can sell x items at a price of Rs $(5 - \frac{x}{100})$ Each . The cost price of x items is Rs $(\frac{x}{5} + 500)$. Find the Number of items he should sell to earn maximum profit.

24) Evaluate: $\int_0^{\frac{\pi}{2}} \frac{\cos^2 x}{\cos^2 x + 4\sin^2 x} dx$

Or

Evaluate: $\int_0^{\frac{\pi}{4}} \frac{Sinx+Cosx}{9+16Sin2x} dx$

25) Using integration, find the area bounded by the lines x+2y=2, y- x=1 and 2x+y=7.

26) Solve: $x\left(\frac{dy}{dx}\right) \sin\left(\frac{y}{x}\right) + x - y \sin\frac{y}{x} = 0$, $y(1) = \frac{\pi}{2}$

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MATH (SET III)
SAMPLE PAPER OF 1ST TERM (2015-16)
STD. XII

Time allowed: 3 hrs **Maximum marks -100**

General Instructions:

a) All questions are compulsory.

b) The question paper consists of 26 questions divided into three sections A, B and C. Section A comprises of 6 questions of one mark each, Section B comprises of 13 questions of four marks each and Section C comprises of 7 questions of six marks each.

c) All questions in Section A are to be answered in one word, one sentence or as per the exact requirement of the question.

d) Use of calculators is not permitted.

SECTION – A 1X6=6

01) If A is a square matrix such that $A^2 = A$, then write the value of

$(I + A)^3 - 7A$.

02) If A = $\begin{bmatrix} 0 & i \\ i & 1 \end{bmatrix}$ and $B = \begin{bmatrix} 0 & 1 \\ 1 & 0 \end{bmatrix}$, find the value of $|A| + |B|$.

03)If f(1) = 4 , $f'(1) = 2$, find the value of derivative of log $f(e^x)$ w . r .t. x

At all the point x=0.

04) State whether $y = e^{-x}(x+a)$ is the solution of differential equation:

$\frac{dy}{dx} + y = e^{-x}$

05) Represent $\cot(\sin^{-1}x)$ in terms of x only.

06) If f is an invertible function , defined by $f(x) = \frac{3x-4}{5}$, write $f^{-1}(x)$.

SECTION – B 4X13=52

07) A trust fund has Rs30,000 that is to be invested in two different

Types of bond. The first bond pays 5% p.a. interest which will be

Given to orphanage and second bond pays 7% interest p.a. which

Will be given to financial benefits of the trust. Using matrix

Multiplication , determine how to divide Rs30,000 among two

Types of bond if the trust fund obtain an annual total interest

Of Rs 1800.

a) what are the values reflected in the question?

b) Why is it required to help orphan children?

08) Using properties prove that

$$\begin{vmatrix} a^2 & bc & c^2 + ac \\ a^2 + ab & b^2 & ca \\ ab & b^2 + bc & c^2 \end{vmatrix} = 4a^2b^2c^2$$

09)Find the values of a and b so that function f given by

$$f(x) = \begin{cases} 1 & , \quad x \le 3 \\ ax + b & , \quad 3 < x < 5 \\ 7, & 5 \le x \end{cases}$$

is continuous at x= 3 and x = 5.

10) Solve: $(x^2-1)\frac{dy}{dx} + 2xy = \frac{2}{x^2-1}$

11) Prove that $\tan^{-1}\frac{1}{2} + \tan^{-1}\frac{1}{5} + \tan^{-1}\frac{1}{8} = \frac{\pi}{4}$

12)) Evaluate: $\int \frac{1-x^2}{x(1-2x)}dx$

13) Evaluate: $\int \frac{(x+2)}{\sqrt{(x-2)(x-3)}}dx$

14) If y = log $[x+\sqrt{x^2+y^2}]$, show that $(x^2 + y^2)\frac{d^2y}{dx^2} + x\frac{dy}{dx} = 0$.

15) If y= sin(logx), prove that $x^2\frac{d^2y}{dx^2} + x\frac{dy}{dx} + y = 0$.

16) Prove that the curves $x = y^2$ and xy = k cut at right angle if

$8k^2 = 1$

17) Prove that :$\cot^{-1}(\frac{\sqrt{1+sinx}+\sqrt{1-sinx}}{\sqrt{1+sinx}-\sqrt{1-sinx}}) = \frac{x}{2}$, $x \in (0, \frac{\pi}{4})$.

18) Using differential ,find the approximation value of $\sqrt{0.48}$

19) Check whether the relation R in R defined by

$R = \{(a,b) : a \leq b^3\}$ is a reflexive , symmetric or transitive.

SECTION – C

6X7=42

20) If $A=\begin{bmatrix}2 & -3 & 5\\ 3 & 2 & -4\\ 1 & 1 & -2\end{bmatrix}$, find A^{-1} and hence solve the following

System of linear equations:

$2x + 3y + z = 11$

$-3x + 2y - 4z = 4$

$5x - 4y - 2z = -9$

21) By using properties of determinants, show that

$\begin{vmatrix}a^2+1 & ab & ac\\ ab & b^2+1 & bc\\ ca & cb & c^2+1\end{vmatrix} = 1+a^2+b^2+c^2$.

22) Show that the volume of the greatest cylinder that can be

Inscribed in a cone of height h and semi-vertical angle α

Is $\frac{4}{27}\pi h^3 tan^2\alpha$.

23) Solve: $y.e^{x/y}\,dx = (xe^{x/y} + y^2)\,dy$, $y \neq 0$

24) Find the area of the region $\{(x,y) : x^2 + y^2 \leq 1 \leq x+y\}$.

25) Evaluate: $\int_0^{\frac{\pi}{2}}(2logsinx - logsin2x)\,dx$

Or

Evaluate: $\int \frac{\sin^{-1}\sqrt{x}-\cos^{-1}\sqrt{x}}{\sin^{-1}\sqrt{x}+\cos^{-1}\sqrt{x}}dx$

26) let a = q x q ,where q is the set of all rational numbers, and * be a

Binary operation defined on 'a' by

(a ,b) * (c ,d) = (ac , b + ad), for all (a, b)(c , d) ∈ a.

find

a) the identity element in a

b) the invertible element of a.

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MATH (SET IV)
SAMPLE PAPER OF 1ST TERM (2015-16)
STD. XII

Time allowed: 3 hrs **Maximum marks -100**

General Instructions:

a) All questions are compulsory.

b) The question paper consists of 26 questions divided into three sections A, B and C. Section A comprises of 6 questions of one mark each, Section B comprises of 13 questions of four marks each and Section C comprises of 7 questions of six marks each.

c) All questions in Section A are to be answered in one word, one sentence or as per the exact requirement of the question.

d) Use of calculators is not permitted.

SECTION – A 1X6=6

01) let * be the binary operation on the set q of rational numbers given as

b * a = 3a – b + 5 , find 3 * 5.

02) Write the principal value of $\tan^{-1}(\sqrt{3})$ - $\cot^{-1}(-\sqrt{3})$

03) If $\begin{bmatrix} a+4 & 3b \\ 8 & -6 \end{bmatrix} = \begin{bmatrix} 2a+2 & b+2 \\ 8 & a-8b \end{bmatrix}$ write the value of a-2b.

04) Find the value of γ so that the points (1,-5) ,(-4,5),and(γ, 7) are collinear

05) Find the derivative of $\log_{10} x$ w.r.t. x.

06) Find the degree of $\left(\frac{d^2y}{dx^2}\right)^3 + y\left(\frac{dy}{dx}\right)^4 + x^3 = 0$

SECTION – B 4X13=52

07) Find the value of k such that the function f defined by.

f(x) = $\begin{cases} \frac{2^{x+2}-16}{4^x-16}, & \text{if } x \neq 2 \\ k & \text{if } x = 2 \end{cases}$ is continuous at x=2

08) If y = log $[x+\sqrt{x^2+y^2}]$, show that $(x^2 + y^2)\frac{d^2y}{dx^2} + x\frac{dy}{dx} = 0$.

09) If f(x) = $\sqrt{x}$ (x≥0) and g(x) = $x^2 - 1$ are two real function , find fog and gof .

is fog = gof.

10) If $x^{13} y^7 = (x+y)^{20}$, prove that $\frac{dy}{dx} = \frac{y}{x}$

11 Using properties prove that

$$\begin{vmatrix} a-b-c & 2a & 2a \\ 2b & b-c-a & 2b \\ 2c & 2c & c-a-b \end{vmatrix} = (a+b+c)^3$$

12) Prove that: $\sin^{-1}\frac{8}{17} + \sin^{-1}\frac{3}{5} = \cos^{-1}\frac{36}{85}$

13) Solve the following differential equation $(x-1)\frac{dy}{dx} = 2x^3y$.

14) Evaluate: $\int \frac{Cos2x - Cos2\propto}{Cosx - Cos\propto} dx$

15) Evaluate: $\int \frac{2x-1}{(x-1)(x+2)(x-3)} dx$

16) If $A=\begin{bmatrix} 0 & -tan\frac{\propto}{2} \\ tan\frac{\propto}{2} & 0 \end{bmatrix}$ and I is the identity matrix of order 2, show

That I + A = (I - A). $\begin{bmatrix} cos\propto & -sin\propto \\ sin\propto & cos\propto \end{bmatrix}$

17) Find the value of :- $\tan\frac{1}{2}[\sin^{-1}\frac{2x}{1+x^2} + \cos^{-1}\frac{1-y^2}{1+y^2}]$, $|x| \angle 1, y > o \text{ and } xy \angle 1.$

18) Find the interval in which the function f given by

f(x) = $x^3 + \frac{1}{x^3}$, $x \neq 0$ is

a) increasing b) decreasing

19) If the radius of a sphere is measured as 9 cm with an error of

0.03cm , find the approximate error in calculating its surface Area.

SECTION – C **6X7=42**

20) consider f: $r_+ \to [-5, \propto)$ given by $f(x) = 9x^2 + 6x - 5$, show that f is

invertible with $f^{-1}(y) = \left(\frac{\sqrt{y+6}-1}{3}\right)$

21) Find the area of the region $\{(x,y): y^2 \leq 4x, 4x^2 + 4y^2 \leq 9\}$ using

Method of integration .

Or

Using integration ,find the area of the triangle ABC with vertices

As A(-1,0) ,B(1,3), and C(3,2).

22) By using properties of determinants, show that

$$\begin{vmatrix} 1+a^2-b^2 & 2ab & -2b \\ 2ab & 1-a^2+b^2 & 2a \\ 2b & -2a & 1-a^2-b^2 \end{vmatrix} = (1+a^2+b^2+c^2)^3$$

23) Evaluate: $\int_0^{\frac{3}{2}} |x Cos\pi x| dx$

Or

evaluate $\int_1^3 (3x^2 + 2x) dx$ as limit of sums.

24) Show that $xdy - ydx = \sqrt{x^2 + y^2}\, dx$ is homogeneous and solve it.

25) Two trust A and B receive Rs 70,000 and Rs 55,000 respectively from central government to award prize to persons of a district in three fields agriculture , education and social service. Trust A Awarded 10, 5 and 15 persons in the field of agriculture, Education and social service respectively. While trust B awarded 15,10 and 5 persons respectively. If all the three prizes together amount to Rs 6000, then find the amount of each prize by matrix Method.
What field do you prefer most for award for development of Society? Give reason with justification.

26) Show that height of a closed right circular cylinder of given Surface and maximum volume , is equal to the diameter Of its base.

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MATH (SET V)
SAMPLE PAPER OF 1ST TERM (2015-16)
STD. XII

Time allowed: 3 hrs **Maximum marks -100**

General Instructions:

a) All questions are compulsory.

b) The question paper consists of 26 questions divided into three sections A, B and C. Section A

comprises of 6 questions of one mark each, Section B comprises of 13 questions of four marks each and Section C comprises of 7 questions of six marks each.

c) All questions in Section A are to be answered in one word, one sentence or as per the exact requirement of the question.

d) Use of calculators is not permitted.

SECTION – A 1X6=6

01) let a={1,2,3}, b={4,5,6,7} and let f = {(1,4)(2,5)(3,6)} be a function from a to

b. state whether f is one-one or onto.

02) Write the principal value of $\tan^{-1}(\sqrt{3})$ - $\sec^{-1}(-2)$

03) If A is a square matrix and $|A| = 2$,then write the value of $|AA'|$,

Where A' is the transpose of matrix A.

04) Determine the value of x for which the matrix

A = $\begin{bmatrix} 1 & -1 & 3 \\ 1 & 2 & 1 \\ X & 2 & -3 \end{bmatrix}$ = is singular?

05) If f(1) = 4 , $f'(1) = 2$, find the value of derivative of log f(e^x) w . r .t. x at all the point x=0.

06) Find the degree of $\left(\frac{dy}{dx}\right)^4 + 3x\frac{d^2y}{dx^2} = 0$

SECTION – B 4X13=52

07) Check whether the relation r in r defined by r ={(a,b) : $a \leq b^3$} is reflexive, symmetric or transitive

08)) If $\tan^{-1}\frac{x-1}{x-2} + tan^{-1}\frac{x+1}{x+2} = \frac{\pi}{4}$, than find the value of x.

09) Prove that $\tan^{-1}\left(\frac{\sqrt{1+x} - \sqrt{1-x}}{\sqrt{1+x} + \sqrt{1-x}}\right) = \frac{\pi}{4} - \frac{1}{2}\cos^{-1}x$

10) Express the following matrix as the sum of symmetric and skew

symmetric matrix $\begin{bmatrix} 1 & 3 & 5 \\ -6 & 8 & 3 \\ -4 & 6 & 5 \end{bmatrix}$

11) Using determinant prove that $\begin{vmatrix} a & a+b & a+2b \\ a+2b & a & a+b \\ a+b & a+2b & a \end{vmatrix}$ $=9b^2(a+b)$

12) Find $\frac{dy}{dx}$: y = $(\sin x)^x + (\cos x)^{\tan x}$

13) If $y = \cos^{-1}\left(\frac{2^{x+1}}{1+4^x}\right)$, find $\frac{dy}{dx}$

14) Find the value of k so that the function f, defined by

f(x) = $\begin{cases} kx + 1 \text{ , } if\ x \leq \pi \\ cosx \quad \text{ , } if\ x > \pi \end{cases}$ is continuous at x = π

15) Find the interval in which the function $f(x)=x^3 - 12x^2 + 36x + 17$

is (a) increasing ,(b)decreasing.

16) Find the equation of the normal to the curve $y = x^3 + 2x + 6$ which are parallel to the line x+14y+4=0.

17) Evaluate: $\int sinxsin2xsin3x\ dx$

18) Evaluate: $\int \frac{sinx}{(1-cosx)(2-cosx)}$ dx

19) Solve: $\frac{dy}{dx}$ = cos(x+y) + sin (x+y)

SECTION – C 6X7=42

20) let a = qxq ,where q is the set of all rational numbers, and * be a binary operation defined on a by

(a,b) * (c,d) = (ac , b+ad), for all (a,b)(c,d) ∈ a.

find

a) the identity element in a

b) the invertible element of a.

21) the management committee of a residential colony decided to award some of its members (say x) for honesty, some(say y) for helping others and some others (say z) for supervising the

workers to keep the colony neat and clean. The sum of all the awardees is 12. Three times the sum of awardees for cooperation and supervision added to two times the number of awardees for honesty is 33. If the sum of the number of awardees for honesty and supervision is twice the number of awardees for helping others ,using matrix method ,find the number of awardees for each category . Apart from these values, namely ,honesty, cooperation and supervision, suggest one more value which the management of the colony must include for awards.

22) Let f(t) = $\begin{vmatrix} cost & t & 1 \\ 2sint & t & 2t \\ sint & t & t \end{vmatrix}$, then find $\lim_{t \to 0} \frac{f(t)}{t^2}$.

23) A jet of enemy country is flying along the curve $y = x^2 + 2$.

A soldier , placed at (3,2), wants to shoot down the jet of enemy

When it is nearest to him . Find the nearest distance .

How does this problem help soldier in the battle field?

Justify your answer.

24) Evaluate: $\int_0^4 [|x| + |x-2| + |x-4|]dx$

25) Using integration ,find the area of the region

$\{(x , y) : 9x^2 + y^2 \leq 36$ and $3x+y \geq 6\}$.

Or

Find the area of the region enclosed between two circles

$x^2 + y^2 = 1$ and $(x-1)^2 + y^2 = 1$.

26) . Solve: $(1 – x^2) \frac{dy}{dx} - 2xy = x\sqrt{1-x^2}$, y(0) = 0

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MATH (SET VI)
SAMPLE PAPER OF 1ST TERM (2015-16)
STD. XII

Time allowed: 3 hrs **Maximum marks -100**

General Instructions:

a) All questions are compulsory.

b) The question paper consists of 26 questions divided into three sections A, B and C. Section A comprises of 6 questions of one mark each, Section B comprises of 13 questions of four marks each and Section C comprises of 7 questions of six marks each.

c) All questions in Section A are to be answered in one word, one sentence or as per the exact requirement of the question.

d) Use of calculators is not permitted.

SECTION – A **1X6=6**

01) let * be the binary operation on the set q of rational numbers given as

b * a = 3a – b + 5 , find 5 * 7.

02) If A is a square matrix such that $A^2 = A$, then write the value of

$(I + A)^3 - 7A$.

03) If $\sin(\sin^{-1}\frac{1}{3} + \cos^{-1}x) = 1$,then find the value of x.

04) A matrix A of order 3x3 has determinant 22 .what is the value of $|4A|$?

05) Determine the order and degree of the following differential equation.

$Y = x\frac{dy}{dx} + \sqrt{a^2\left(\frac{dy}{dx}\right)^2} + b^2$

06) Find the derivative of $\log_{10} x$ w.r.t. x.

SECTION – B **4X13=52**

07) checkwheather the relation r in r defined by r ={(a,b) : a≤b^3} is reflexive, symmetric or transitive.

08) Prove that $\tan^{-1}(\frac{\sqrt{1+x}\ -\ \sqrt{1-x}}{\sqrt{1+x}\ +\ \sqrt{1-x}}) = \frac{\pi}{4} - \frac{1}{2}\cos^{-1}x$

09) Prove that :- $\tan(\frac{\pi}{4} + \frac{1}{2}\ cas^{-1}\frac{a}{b}) + \tan(\frac{\pi}{4} - \frac{1}{2}\ cas^{-1}\frac{a}{b}) = \frac{2b}{a}$

10) Solve the following differential equation $(x-1)\frac{dy}{dx} = 2x^3y$.

11) $\begin{vmatrix} a-b-c & 2a & 2a \\ 2b & b-c-a & 2b \\ 2c & 2c & c-a-b \end{vmatrix} = (a + b + c)^3$

12) If $y = \sqrt{\tan x\sqrt{tanx\ \sqrt{\tan x + \ ....to\infty}}}$, Prove that $\frac{dy}{dx} = \frac{sec^2x}{2y-1}$

13) Find the values of a and b so that function f given by

$$f(x) = \begin{cases} 1 & , \quad x \le 3 \\ ax + b & , \quad 3 < x < 5 \\ 7, & \quad 5 \le x \end{cases}$$ is continuous at x= 3 and x = 5.

14) If $y = (\sin^{-1}\ x)^2$, Prove that $(1-x^2)\ y_2 - xy_1 = 2$.

15) Evaluate: $\int sinxsin2xsin3x\ dx$

16) Evaluate: $\int \frac{sinx}{(1-cosx)(2-cosx)}\ dx$

17) using differential ,find th approximation value of f(2.01) , where $f(x)=4x^3 +5x^2 +2$.

18) A trust fund has Rs30,000 that is to be invested in two different types of bond. The first bond pays 5% p.a. interest which will be given to orphanage and second bond pays 7% interest p.a. which will be given to financial benefits of the trust. Using matrix Multiplication , determine how to divide Rs30,000 among two types of bond if the trust fund obtain an annual total interest of Rs 1800.

a) what are the values reflected in the question?

b) Why is it required to help orphan children?

19) Find the equation of the tangent to the curve $y = \sqrt{3x-2}$, which are parallel to the line 4x-2y+5=0.

SECTION – C **6X7=42**

20) Solve: $(1 - x^2)\frac{dy}{dx} - 2xy = x\sqrt{1-x^2}$, y(0) = 0

21) In a triangle ABC ,if

$$\begin{vmatrix} 1 & 1 & 1 \\ 1+sinA & 1+sinB & 1+sinC \\ sinA+sin^2A & sinB+sin^2B & sinC+sin^2C \end{vmatrix} = 0$$

Then prove that Δ ABC is an isosceles triangle.

22) Using integration ,find the area of the triangle ABC with vertices A(-1,0) ,B(1,3), and C(3,2).

OR

Using integration ,find the area of the region { (x , y) : $9x^2 + y^2 \leq 36$ and $3x+y \geq 6$}.

23) Evaluate: $\int_{-1}^{\frac{3}{2}} |x\ Sin\pi x|$dx.

24) A tank with rectangular base and rectangular sides, open at the

The top is to be constructed so that its depth is 2 m and volume

Is 8 m^3 . If building of tank costs Rs 70 per sq metres for the base

And Rs 45 per sq metre for sides . What is the cost of least

Expensive tank?

What kind of value is hidden in this question and what is its use

In practical life.

25) let q be the set of all rational numbers. define an operation * on q – {-1} by a*b=a+b+ab

show that

a) * is a binary operation on q – {-1}

b) * is commutative

c) * is associative

d) zero is the identity element on q – {-1}

e) $a^{-1} = \frac{-a}{1+a}$,where a ϵ q – {-1}

26) Given A = $\begin{bmatrix} 1 & -1 & 1 \\ 1 & -2 & -2 \\ 2 & 1 & 3 \end{bmatrix}$ and B = $\begin{bmatrix} -4 & 4 & 4 \\ -7 & 1 & 3 \\ 5 & -3 & -1 \end{bmatrix}$,find AB and

Use this result in solving the following equations:

X – y + z = 4;

X -2y – 2z = 9;

2x + y + 3z = 1.

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MATH (SET VII)
SAMPLE PAPER OF 1ST TERM (2015-16)
STD. XII

Time allowed: 3 hrs **Maximum marks -100**

General Instructions:

a) All questions are compulsory.

b) The question paper consists of 26 questions divided into three sections A, B and C. Section A comprises of 6 questions of one mark each, Section B comprises of 13 questions of four marks each and Section C comprises of 7 questions of six marks each.

c) All questions in Section A are to be answered in one word, one sentence or as per the exact requirement of the question.

d) Use of calculators is not permitted.

SECTION – A **1X6=6**

01) let a={1,2,3}, b={4,5,6,7} and let f = {(1,4)(2,5)(3,6)} be a function from a to b. State whether f is one-one or onto.

02) Write the principal value of $\tan^{-1}(\sqrt{3})$ - $\cot^{-1}(-\sqrt{3})$

03) If $\begin{bmatrix} a+4 & 3b \\ 8 & -6 \end{bmatrix} = \begin{bmatrix} 2a+2 & b+2 \\ 8 & a-8b \end{bmatrix}$ write the value of a-2b.

04) Determine the value of x for which the matrix

A = $\begin{bmatrix} 1 & -1 & 3 \\ 1 & 2 & 1 \\ X & 2 & -3 \end{bmatrix}$ = is singular?

05) If y =$[sin\frac{x}{2} + cos\frac{x}{2}]^2$, find $\frac{dy}{dx}$ $at\ x = \frac{\pi}{6}$

06) Find the degree of following

$x^3\left(\frac{d^2y}{dx^2}\right)^2 + x(\frac{dy}{dx})^4 = 0$

SECTION – B **4X13=52**

07) If $\tan^{-1}\frac{x-1}{x-2} + \tan^{-1}\frac{x+1}{x+2} = \frac{\pi}{4}$, then find the value of x.

08) If y = $\cot^{-1}\sqrt{cosx} - \tan^{-1}\sqrt{cosx}$, then prove that Sin y = $tan^2(\frac{x}{2})$.

09) If A = $\begin{bmatrix} cos\theta & sin\theta \\ -sin\theta & cos\theta \end{bmatrix}$, prove that $A^n = \begin{bmatrix} cosn\theta & sinn\theta \\ -sinn\theta & cosn\theta \end{bmatrix}$, n∈ N.

10) $\begin{vmatrix} a^2 & bc & c^2+ac \\ a^2+ab & b^2 & ca \\ ab & b^2+bc & c^2 \end{vmatrix}$ = $4a^2b^2c^2$

11) Find the value of a for which the function f defined by

f(x) = $\begin{cases} a\ sin\frac{\pi}{2}(x+1), & x \le 0 \\ \frac{tanx-sinx}{x^3}, & x > 0 \end{cases}$ is continuous at x=0.

12) Find $\frac{dy}{dx}$: y = $(sinx)^x + (cosx)^{tanx}$

13) If y = $\cos^{-1}(\frac{2^{x+1}}{1+4^x})$, find $\frac{dy}{dx}$

14) Find the interval in which the function f given by f(x)=sinx+cosx,

$0 \le x \le 2\pi$,is strictly increasing or strictly decreasing.

15) Using differential ,find the approximation value of $\sqrt{49.5}$

16) Evaluate: $\int \frac{1}{Cos(x+a)Cos(x-a)}dx$

17) Evaluate: $\int_0^{\frac{\pi}{4}} \frac{Sinx+Cosx}{9+16Sin2x}dx$

18)Show that $y = ae^{2x} + be^{-x}$ is a solution of the differential equation

$\frac{d^2y}{dx^2} - \frac{dy}{dx} - 2y = 0$.

19) If f : R → R be defined by $f(x) = (3 - x^3)^{1/3}$

SECTION – C **6X7=42**

20) consider f: $r_+ \to [4, \infty)$ given by $f(x) = x^2 + 4$, show that f is invertible with the inverse(f^{-1}) of f given by $f^{-1}(y) = \sqrt{y-4}$, where r_+ is the set of all non – negative real numbers.

OR

let a = qxq ,where q is the set of all rational numbers, and * be a binary operation defined on a by (a,b) * (c,d) = (ac , b+ad), for all (a,b)(c,d) ∈ a. Find

a) the identity element in a

b) the invertible element of a.

21) Two trust A and B receive Rs 70,000 and Rs 55,000 respectively from central government to award prize to persons of a district in three fields agriculture , education and social service. Trust A Awarded 10, 5 and 15 persons in the field of agriculture, Education and social service respectively.while trust B awarded 15,10 and 5 persons respectively. If all the three prizes together amount to Rs 6000, then find the amount of each prize by matrix Method.

What field do you prefer most for award for development of Society? Give reason with justification.

22) By using properties of determinants, show that

$$\begin{vmatrix} 1+a^2-b^2 & 2ab & -2b \\ 2ab & 1-a^2+b^2 & 2a \\ 2b & -2a & 1-a^2-b^2 \end{vmatrix} = (1+a^2+b^2+c^2)^3$$

23) Solve: $(1-y^2) + (x - e^{\tan^{-1} y}) \frac{dy}{dx} = 0$

24) evaluate $\int_1^3 (3x^2 + 2x)dx$ as limit of sums.

OR

Evaluate: $\int_0^{\frac{3}{2}} |x Cos\pi x| dx$

25) A jet of enemy country is flying along the curve $y = x^2 + 2$. A soldier , placed at (3,2), wants to shoot down the jet of enemy When it is nearest to him . Find the nearest distance .

How does this problem help soldier in the battle field? Justify your answer.

26) Find the area of the region in the 1st quadrant enclosed by x-axis. The line y =x , and the circle $x^2 + y^2 = 32$.

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MATH (SET VIII)
SAMPLE PAPER OF 1ST TERM (2015-16)
STD. XII

Time allowed: 3 hrs **Maximum marks -100**

General Instructions:

a) All questions are compulsory.

b) The question paper consists of 26 questions divided into three sections A, B and C. Section A comprises of 6 questions of one mark each, Section B comprises of 13 questions of four marks each and Section C comprises of 7 questions of six marks each.

c) All questions in Section A are to be answered in one word, one sentence or as per the exact requirement of the question.

d) Use of calculators is not permitted.

SECTION – A **1X6=6**

01) If $f(x) = 27x^3$ and $g(x) = x^{1/3}$, find gof(x).

02) Write the value of $\sin(2\sin^{-1}\frac{3}{5})$.

03) If $A = [a_{ij}]$ is a 2 x 2 matrix such that $a_{ij} = i^2 + j^2$, write A.

04) If A is a square matrix of order 3 such that $|adjA|$ =225 ,

Find $|A'|$.

05) Find the derivative of $\log_{10} x$ w.r.t. x.

06) Write integrating factor of (xlogx)$\frac{dy}{dx}$+ y =2logx

SECTION – B **4X13=52**

07)if f(x) = $\sqrt{x}$ (x≥0) and g(x) = $x^2 - 1$ are two real function , find fog and gof .

Is fog = gof.

08) Find the interval in which the function f given by f(x)=sinx+cosx,

$0 \leq x \leq 2\pi$,is strictly increasing or strictly decreasing

09) Using differential ,find the approximation value of $\sqrt{0.48}$

10) If A=$\begin{bmatrix} 0 & -tan\frac{\propto}{2} \\ tan\frac{\propto}{2} & 0 \end{bmatrix}$ and I is the identity matrix of order 2, show

That I + A = (I - A).$\begin{bmatrix} cos \propto & -sin \propto \\ sin \propto & cos \propto \end{bmatrix}$

11)Prove that $\tan^{-1}\frac{63}{16} = \sin^{-1}\frac{5}{13} + \cos^{-1}\frac{3}{5}$

12) Prove that :$\cot^{-1}(\frac{\sqrt{1+sinx}+\sqrt{1-sinx}}{\sqrt{1+sinx}-\sqrt{1-sinx}}) = \frac{x}{2}$, x ∈ $(0, \frac{\pi}{4})$.

13)Evaluate:$\int x^2 \tan^{-1} x \ dx$

14) Evaluate: $\int \frac{5x+3}{\sqrt{x^2+4x+10}}$ dx

15) From the differential equation representing the family of ellipses

Foci on x-axis and centre at the origin.

16) $\begin{vmatrix} a^2 & bc & c^2 + ac \\ a^2 + ab & b^2 & ca \\ ab & b^2 + bc & c^2 \end{vmatrix}$ = $4a^2b^2c^2$

17)) Find the value of a for which the function f defined by

f(x) = $\begin{cases} a\ sin\frac{\pi}{2}(x+1), & x \leq 0 \\ \frac{tanx-sinx}{x^3}, & x > 0 \end{cases}$ is continuous at x=0.

18) . If y = $x^{x^{x^{\cdot^{\cdot^{\cdot^{\propto}}}}}}$ then prove that $x\frac{dy}{dx} = \frac{y^2}{1-y\ logx}$

19) If y = $\sqrt{\tan x\sqrt{tanx\ \sqrt{\tan x + \ ....to\infty}}}$, Prove that $\frac{dy}{dx} = \frac{sec^2x}{2y-1}$

SECTION – C **6X7=42**

20) If A=$\begin{bmatrix} 2 & -3 & 5 \\ 3 & 2 & -4 \\ 1 & 1 & -2 \end{bmatrix}$, find A^{-1} and hence solve the following

System of linear equations:

2x + 3y + z = 11

-3x + 2y -4z = 4

5x -4y – 2z = - 9

21) Let q be the set of all rational numbers. define an operation * on q – {-1} by a*b=a+b+ab

show that

a) * is a binary operation on q – {-1}

b) * is commutative

c) * is associative

d) zero is the identity element on q – {-1}

e) $a^{-1}=\frac{-a}{1+a}$,where a ϵ– {-1}

22) Evaluate: $\int_0^{\frac{\pi}{2}}(2logsinx - logsin2x)$ dx

23) A tank with rectangular base and rectangular sides, open at the the top is to be constructed so that its depth is 2 m and volume is 8 m^3 . If building of tank costs Rs 70 per sq metres for the base

and Rs 45 per sq metre for sides . What is the cost of least

Expensive tank?

What kind of value is hidden in this question and what is its use

In practical life.

24) . Find the particular solution of the differential equation

$(1+x^3)\frac{dy}{dx} + 6x^2y = (1+x^2)$, given that y=1 when x=1.

25) Show that $\begin{vmatrix} a^2 & 2ab & b^2 \\ b^2 & a^2 & 2ab \\ 2ab & b^2 & a^2 \end{vmatrix} = (a^3 + b^3)^2$

26) Find the area of the region $\{(x,y): y^2 \leq 4x, 4x^2 + 4y^2 \leq 9\}$ using Method of integration.

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MATH (SET IX)
SAMPLE PAPER OF 1ST TERM (2015-16)
STD. XII

Time allowed: 3 hrs **Maximum marks -100**

General Instructions:

a) All questions are compulsory.

b) The question paper consists of 26 questions divided into three sections A, B and C. Section A comprises of 6 questions of one mark each, Section B comprises of 13 questions of four marks each and Section C comprises of 7 questions of six marks each.

c) All questions in Section A are to be answered in one word, one sentence or as per the exact requirement of the question.

d) Use of calculators is not permitted.

SECTION – A 1X6=6

01) let f : r – $\{-\frac{3}{5}\} \rightarrow$ r , given by f(x) = $\frac{2x}{5x+3}$, find f^{-1} : $range_f \rightarrow$ r – $\{-\frac{3}{5}\}$.

02) If a matrix A= $\begin{bmatrix} 1 & -1 \\ -1 & 1 \end{bmatrix}$ and A^2 = KA , then write the value of k.

03) Find the value of $\sin^{-1}(\sin\frac{2\pi}{5})$.

04) Find the degree of $\left(\frac{dy}{dx}\right)^4 + 3x\frac{d^2y}{dx^2} = 0$

05) Find the value of γ so that the points (1,-5) ,(-4,5),and(γ, 7) are collinear.

06) Discuss the continuity of the function f given by f(x) =$|x|$ at x = 0.

SECTION – B 4X13=52

07) Using properties of determinants prove that

$$\begin{vmatrix} a+b & b+c & c+a \\ b+c & c+a & a+b \\ c+a & a+b & b+c \end{vmatrix} = 2 \begin{vmatrix} a & b & c \\ b & c & a \\ c & a & b \end{vmatrix}$$

08) Evaluate: $\int \frac{sinx}{(1-cosx)(2-cosx)}$ dx

09) Evaluate: $\int \frac{1-x^2}{x(1-2x)}$dx

10) Prove that $\cot^{-1}\frac{\sqrt{1+sinx}+\sqrt{1-sinx}}{\sqrt{1+\sin x}-\sqrt{1-sinx}} = \frac{x}{2}, x \in \left(0, \frac{\bar{\wedge}}{4}\right)$.

11) Find the value of :- $\tan\frac{1}{2}[\sin^{-1}\frac{2x}{1+x^2} + \cos^{-1}\frac{1-y^2}{1+y^2}], |x| \angle 1, y > o \; and \; xy \angle 1.$

12) Prove the following by the principle of mathematical induction:

If A = $\begin{bmatrix} 3 & -4 \\ 1 & -1 \end{bmatrix}$, then $A^n = \begin{bmatrix} 1+2n & -4n \\ n & 1-2n \end{bmatrix}$ for every positive Integer n.

13) If $y = \frac{x}{2}\sqrt{a^2-x^2} + \frac{a^2}{2}\sin^{-1}\left(\frac{x}{a}\right)$, show that $\frac{dy}{dx} = \sqrt{a^2-x^2}$

14) Verify Rolle's theorem for the function f(x) in the interval [-3, -2]: $f(x) = x^2 + 5x + 6$

15) Find the value of 'a' and 'b' such that the function f defined by

$$f(x) = \begin{cases} \frac{x-4}{|x-4|} + a, & \text{if } x < 4 \\ a+b, & \text{if } x = 4 \text{ is continuous at } x = 4 \\ \frac{x-4}{|x-4|} + b, & \text{if } x > 4 \end{cases}$$

16) Solve: $xy\frac{dy}{dx} = (x+2)(y+2)$,find the solution curve passing through the Point (1 , -1).

17) A men of height 2m walks at a uniform speed of 5km/h away from a lamp, past which is 6m high. Find the rate at which the lengths of his shadow increase.

18) Find the equation of tangent to the curve x = sin3t , y = cos2t At t = $\frac{\pi}{4}$.

19) check whether the relation r in r defined by r ={(a,b) : $a \leq b^3$} is reflexive, symmetric or transitive.

SECTION – C 6X7=42

20) Find the area of the region {(x,y) : $x^2 + y^2 \leq 1 \leq x+y$ } .

21) Evaluate: $\int_0^{\frac{\pi}{2}}(2logsinx - logsin2x)$ dx

22) A point on the hypotenuse of a triangle is at distance a and b from the sides of the triangle. Show that the minimum length of the hypotenuse is $(a^{2/3} + b^{2/3})^{3/2}$.

OR

Show that the volume of the greatest cylinder that can be Inscribed in a cone of height h and semi-vertical angle α Is $\frac{4}{27}\pi h^3 tan^2\alpha$.

23) let a = qxq ,where q is the set of all rational numbers, and * be a binary operation defined on a by (a,b) * (c,d) = (ac , b+ad), for all (a,b)(c,d) ∈ a. Find

a) the identity element in a

b) the invertible element of a.

24) The management committee of a residential colony decided to award some of its members (say x) for honesty, some(say y) for helping others and some others (say z) for supervising the

workers to keep the colony neat and clean. The sum of all the awardees is 12. Three times the sum of awardees for cooperation and supervision added to two times the number of awardees for honesty is 33. If the sum of the number of awardees for honesty and supervision is twice the number of awardees for helping others ,using matrix method ,find the number of awardees for each category . Apart from these values, namely ,honesty, cooperation and supervision, suggest one more value which the management of the colony must include for awards.

25) Show that xdy – ydx = $\sqrt{x^2+y^2}$ dx is homogeneous and solve it.

26) In a triangle ABC ,if

$$\begin{vmatrix} 1 & 1 & 1 \\ 1+sinA & 1+sinB & 1+sinC \\ sinA+sin^2A & sinB+sin^2B & sinC+sin^2C \end{vmatrix} = 0$$

Then prove that Δ ABC is an isosceles triangle.

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MATH (SET X)
SAMPLE PAPER OF 1ST TERM (2015-16)
STD. XII

Time allowed: 3 hrs **Maximum marks -100**

General Instructions:

a) All questions are compulsory.

b) The question paper consists of 26 questions divided into three sections A, B and C. Section A comprises of 6 questions of one mark each, Section B comprises of 13 questions of four marks each and Section C comprises of 7 questions of six marks each.

c) All questions in Section A are to be answered in one word, one sentence or as per the exact requirement of the question.

d) Use of calculators is not permitted.

SECTION – A 1X6=6

01) Write fog ,if f: R→R and g: R →R are given by f(x) = $|x|$and g(x)=$|5x-2|$.

02) If A is a square matrix such that A^2 = A , then write the value of $(I + A)^3 - 7A$.

03) Find the value of γ so that the points (1,-5) ,(-4,5),and(γ, 7) are collinear.

04) If $\sin(\sin^{-1}\frac{1}{3} + \cos^{-1}x) = 1$,then find the value of x.

05) If f(1) = 4 , $f'(1) = 2$, find the value of derivative of log $f(e^x)$ w . r .t. x
At all the point x=0.

06) State whether $y = e^{-x}(x+a)$ is the solution of differential equation:
$\frac{dy}{dx} + y = e^{-x}$

SECTION – B 4X13=52

07) Find the value of a for which the function f defined by

$$f(x) = \begin{cases} a\sin\frac{\pi}{2}(x+1), & x \le 0 \\ \frac{tanx-sinx}{x^3}, & x > 0 \end{cases}$$ is continuous at x=0.

08) If $x^{13}y^7 = (x+y)^{20}$, prove that $\frac{dy}{dx} = \frac{y}{x}$

09) Find $\frac{dy}{dx}$: $y = (sinx)^x + (cosx)^{tanx}$

10) $\begin{vmatrix} a & a+b & a+2b \\ a+2b & a & a+b \\ a+b & a+2b & a \end{vmatrix}$ $=9b^2(a+b)$

11) Find the value of :- $\tan\frac{1}{2}[\sin^{-1}\frac{2x}{1+x^2} + \cos^{-1}\frac{1-y^2}{1+y^2}], |x| < 1, y > 0 \text{ and } xy < 1.$

12) If a_1, a_2, a_3 ------- a_n is an A.P with c.d d then evaluate the following expression

tan $[\tan^{-1}(\frac{d}{1+a1\ a2}) + tan^{-1}\frac{d}{1+a2\ a3} + tan^{-1}\frac{d}{1+a3\ a4} + -- \quad + \frac{d}{1+an-1\ an}]$

13) Solve: $(x^2-1)\frac{dy}{dx} + 2xy = \frac{2}{x^2-1}$

14) Evaluate: $\int \frac{Cos2x - Cos2\propto}{Cosx - Cos\propto} dx$

15) Evaluate: $\int \frac{x^4+1}{x^2+1} dx$

16) Find the value of x for which $y = [x(x-2)]^2$ is an increasing function.

17) If the radius of a sphere is measured as 9 cm with an error of 0.03cm, find the approximate error in calculating its surface area.

18) Is the binary operation defined on set N ,given by $a*b = \frac{a+b}{2}$ for all $a,b \in N$, Commutative ? Is the above binary operation associative?

19) If $A^{-1} = \begin{bmatrix} 3 & -1 & 1 \\ -15 & 6 & -5 \\ 5 & -2 & 2 \end{bmatrix}$ and $B = \begin{bmatrix} 1 & 2 & -2 \\ -1 & 3 & 0 \\ 0 & -2 & 1 \end{bmatrix}$, find $(AB)^{-1}$.

SECTION – C 6X7=42

20) let f: N→ R be a function defined as $f(x) = 4x^2 + 12x + 15$ show that f: N→ S is invertible , where s is the range of f . hence , find inverse of f.

21) Show that the height of a closed cylinder of given volume and minimum surface area is equal to its diameter.

22) A school wants to award its students for the value of Honesty, Regularity and Hard work with a total cash award of Rs 6000. Three times the award money for hardwork added to that Given for honesty amount to Rs11,000 .The award money given for honesty and hardwork together is double the one given for regularity. Represent the above situation Algebraically and find the award money for each value, using Matrix method. Apart from these values , namely, honesty, Regularity and hard work ,suggest one more value which the School must include for awards.

23) By using properties of determinants, show that

$$\begin{vmatrix} 1+a^2-b^2 & 2ab & -2b \\ 2ab & 1-a^2+b^2 & 2a \\ 2b & -2a & 1-a^2-b^2 \end{vmatrix} = (1+a^2+b^2+c^2)^3$$

24) Find the particular solution of the differential equation $(1+x^3)\frac{dy}{dx} + 6x^2y = (1+x^2)$, given that y=1 when x=1.

25) Evaluate: $\int_0^{\frac{\pi}{4}} \frac{Sinx+Cosx}{9+16Sin2x} dx$

OR

Evaluate: $\int_1^4 [|x-1| + |x-2| + |x-4|] dx$

26) Using integration find the area of the region bounded by the lines 4x-y+5=0, x+y-5=0 , x-4y +5=0.

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