For First Terminal Examination -2081

Class-10

Subject: Optional MathematicsCourse Contents:

1.Algebra: Function

2.Matrix: All

3.Coordinate Geometry: conditions for lines to be parallel and perpendicular

4.Trigonometry: Multiple anglesSub- multiple angles

5.Limit and continuity :all

6. Statistics :all

For Second Terminal Examination -2081

1.Algebra: Polynomials, Function

2.Coordinate Geometry: angle between two lines, pair of straight lines,

3.Trigonometry: transformation of trigonometric ratio, Conditional trigonometric identities

4.Vectors: all

5. Limit and continuity: all

6. Statistics: all

7. Matrix:all

For Third Terminal Examination-2081Course Contents

- Algebra: sequence and series.
- Coordinate: conic section, circle
- linear programming problems.
- Quadratic equation and graphs.
- Limit and continuity.
- Trigonometry: * Solution of trigonometric equation
- Height and distance
- Transformation: All
- Revision all chapter

EMBOCS NAWALPARASI
Specification Grid for First Terminal Examination-2081

S. N	Contents	Topic	K	U	A	H. A	Total number of Questions	Total mark
1	Algebra	* Function	2	2	2	1	7	16
2	Matrix	all	1	1	1		3	6
3.	*Coordinate Geometry	conditions for lines to be parallel and perpendicular	1					1
4	Trigonometry	* Multiple angle * Sub – multiple angle	2	2	3	-	7	15
5.	Statistics	All		1	2		3	8
6.	Limit & continuity	All	1		1		2	4
		Total mark	7	6	9	1	22	50

S. N	Contents	Topic	K	U	A	H. A	Total number of Questions	Total mark
1	Algebra	* Function * Polynomials	1	1	1	1	4	10
2	Matrix	all	1	1	1		3	6
3.	Coordinate Geometry	all	1	1	1	1	4	10
4	Trigonometry	* Multiple angle * Sub – multiple angle * Transformation of Trigonometric ratio * Conditional trigonometric identities	2	2	1		6	9
5.	Vectors	* Scalar product * Vector Geometry	1	1			2	3
6	statistics	all		1	2		3	8
7.	Limit & continuity	all	1		1		2	4
	Total		7	7	7	2	24	50
	Marks		7	14	21	8		50

EMBOCS NAWALPARASI
Specification Grid for Third Terminal Examination-2081

SN	Contents	Knowledge each of 1 marks	Understanding each of 2 marks	Application each of 3 marks	Higher ability each of 4 marks	Total questions	Total marks
1.	बीजगणित (Algebra)	2	2	2	1	7	16
2.	सीमान्त मान र निरन्तरता (Limit and continuity)	1		1		2	4
3.	मेट्रिक्स (Matrix)	1	1	1		3	6
4.	निर्देशाङ्क ज्यामिति (Co-ordinate Geometry)	2	1	1	1	5	11
5.	त्रिकोणमिति (Trogonometry)	2	2	3		7	15
6.	भेक्टर (Vectors)	1	1		1	3	7
7.	स्थानान्तरण (Transformation)	1		1	1	3	8
8.	तथ्याङ्क शास्त्र (Statistics)		1	2		3	8
	जम्मा प्रश्न सङ्ख्या (Total questions)	10	8	11	4	33	75

Sub: Opt : Math   **Time**   **FM:50**

Class:10   **Group A   7x1=6**

1a. Define trigonometric function.

 b) What is the maximum value of y=sinx.

2a) Write in sentence $\dfrac{lim}{x \to a+}$ f(x).

 b) Write the condition of two lines parallel.

3. a) Define singular matrix.

 b) Express cos2A in term cosA.

4a) Write the formula to find sin3A.

<center>Group B 6x2=12</center>

5a. In the f= {(1, 2) ,(2, 3) , (3, 4) } and g= (2, a), (4, c) , (3, b) , then show the composite function gof in arrow diagram and find it in ordered pair form.

b) If F(x)=8x+7   then find the value of fof(x) and fof(-2)

6a) If matrix A=$\begin{bmatrix} 3 & 5 \\ 1 & 2 \end{bmatrix}$ Find the value of $A^{-1.}$

 b) prove that: $\dfrac{sin2A - sinA}{1 - cosA + cos2A} = tanA$.

7a) IF sinA=$\dfrac{1}{2}$ (m+$\dfrac{1}{m}$) then prove that: cos2A= -$\dfrac{1}{2}$ (m^2+$\dfrac{1}{m^2}$).

 b) In a group data the quartile deviation and its Coefficient are 15 and $\dfrac{3}{7}$ respectively find first quartile.

<center>Group C   9x3=27</center>

8. IF f(x)=4x+5 , fog(x)=8x+17, find the value of $g^{-1}(7)$

9. If f(x)=2x-5 and g(x)=3x+1 are two function then find $f^{-1}(x)$ and $g^{-1}(x)$.

10. A real value function f:R$\to$ R is Defined by f(x) = 2x + 3

   i) find the value of f(x) at x= 4.9, 4.99, 4.999.

   ii) find the value of f(5)

   iii) Is this function continuous at x = 5.

11. Solve by cramers method: 8x+11=3y and 6y-15=-2x+11

12. prove that: Tan(45°+A)=sec2A+tan2A

13. prove that : $\dfrac{1}{sin10°} - \dfrac{\sqrt{3}}{cos10°} = 4$

14. prove that: 4cos^{3}20°+4sin^{3}10° = $3(cos20° + sin10°)$

15. . Calculate the mean deviation from the median of the given data

x	0-10	10-20	20-30	30-40	40-50
f	2	3	5	4	6

16. Calculate the standard deviation from the given data.

Class interval	0-4	4-8	8-12	12-16	16-20
Frequency	10	8	12	6	4

<center>Group D   1x4=4</center>

17. Two functions are f(x)=$\dfrac{2x+5}{8}$ and g(x)=3x-4. If (fog)$^{-1}$(x) is an identity function, find the value of x.

<center>THE END</center>

Sub: Opt : Math   **Time**   **FM:50**

Class:10   **Group A   7x1=6**

1a)Define identity function.

b) Write a condition to be a continuous for a function.

2a) If matrix A=$\begin{pmatrix} 3 & 5 \\ 1 & 2 \end{pmatrix}$ find A^{-1}.

3a) If θ be the angle between the two straight lines whose equations are as
   y=$m_1 x + c_1$ and $y = m_2 x + c_2$, then find the value of tan θ.

     b) The slopes of two straight lines L1 and L2 are M1 and M2 respectively. write the condition of parallelism of lines.

4a) Express sinA in term of tan $\frac{A}{2}$.

  b) Write cosx+cosy into product form.

<p align="center">Group B   7x2=14</p>

5a) If f(x)=$\frac{2x-3}{5}$, Find the value of f$^{-1}(\frac{1}{5})$.

  b) Find the obtuse angle between the lines 2x-y+3=0 and x-3y+4=0.

6a)Find the value of D$_1$ and D$_2$ from the given equation y=2x, x+2y=10 by cramers rule.

  b) prove that: $\frac{sin\theta + sin\frac{\theta}{2}}{1+cos\theta + cos\theta/_2} = tan\frac{\theta}{2}$.

7a) Find the value of $sin75° - sin15°$.

  b)The position vectors of A and B are $\underset{7i}{\rightarrow} + \underset{2j}{\rightarrow}$ and $\underset{3i}{\rightarrow} - \underset{4j}{\rightarrow}$ respectively. If the point P is the midpoint of line AB, find the position vectors of point P.

8a) In a data , the first quartile and quartile deviation are 17.5 and 20 respectively. Find the third quartile and coefficient of quartile deviation.

<p align="center">Group C   7x3=21</p>

9. If f(x)=2x-4, then prove that (fof^{-1})x is an identitity function.

10, If f(x)=$\begin{cases} 3x + 5 & x < 3 \\ 6x - 4 & x \geq 3 \end{cases}$

     i)   For x=2.9999, find the value of f(x)

     ii)   For x=3.0001 find the value of f(x)

     iii)   Is the function f(x) continuous at x=3.give reason

11. Prove that: 2cos4A+1= (2cosA-1) (2cosA+1) (2cos2A-1)

12. Solve the equation by matrix method. 2x-3y=7and 4y-3x= -1

13. Find the equation of a pair of line through (2,5) and perpendicular to the line 5x+2y=7

14. . Calculate the mean deviation from the mean of the given data

x	0-15	15-30	30-45	45-60	60-75
f	2	7	10	6	5

15. Calculate the standard deviation from the given data.

Class interval	0-4	4-8	8-12	12-16	16-20
Frequency	12	10	8	5	15

<p align="center">Group D   4x2=8</p>

16.Find the equation of straight line passing through the point (3,2) and making angle 0f $45° \, with \, line \, x - 2y - 3 = 0$

17. Solve: y^3-19y-30=0

<p align="center">***THE END****</p>

Sub: Opt : Math   **Time**   **FM:75**

Class:10   **Group A   10x1=10**

समूह क Group 'A' $10 \times 1 = 10$

1. त्रिकोणमितीय फलनको परिभाषा लेख्नुहोस् ।
   Define trigonometric function.

2. दुई सङ्ख्याहरू a र b बिचको अङ्कगणितीय मध्यक कति हुन्छ ?
   What is arithmetic mean between two numbers a and b.

3. अविच्छिन्न सङ्ख्याहरूको समूहको नाम लेख्नुहोस् ।
   Write the name of the set of numbers which is continuous.

4. यदि मेट्रिक्स $A = \begin{bmatrix} a & b \\ c & d \end{bmatrix}$ भए, $|A|$ को मान कति हुन्छ ?
   If matrix $A = \begin{bmatrix} a & b \\ c & d \end{bmatrix}$ what is the value of $|A|$?

5. यदि दुई सिधा रेखाहरूका बिचको कोण θ र भुकाव क्रमशः m_1 र m_2 भए $\tan\theta$ को मान पत्ता लगाउने सुत्र लेख्नुहोस् ।
   If the angle between two straight lines is θ and their slopes are m_1 and m_2 respectively, write the formula to find the value of $\tan\theta$.

6. एउटा सोलीलाई समतलीय सतहले आधारसँग समानान्तर हुने गरी प्रतिच्छेदन गर्दा कस्तो आकृति बन्छ लेख्नुहोस् ।
   Which geometric figure will be formed if a plane intersects a cone parallel to its base? Write.

7. $\sin 2A$ लाई $\tan A$ को रूपमा व्यक्त गर्नुहोस् ।
   Express $\sin 2A$ in terms of $\tan A$.

8. उन्नतांश कोणको परिभाषा लेख्नुहोस् ।
   Define angle of elevation.

9. यदि $\vec{a}$ र $\vec{b}$ बिचको कोण θ भए $\vec{a}$ र $\vec{b}$ को स्केलर गुणन के हुन्छ ?
   What is the scalar product of two vectors $\vec{a}$ and $\vec{b}$ if the angle between them is θ?

10. केन्द्रबिन्दु O र अर्धव्यास r भएको वृत्तमा कुनै विपरीत स्थानान्तरणमा P को प्रतिबिम्ब P' भए OP, OP' र r को सम्बन्ध लेख्नुहोस् ।
    If P' is the image of P and r is radius of circle with centre O in an inversion transformation, write the relation of OP, OP' and r.
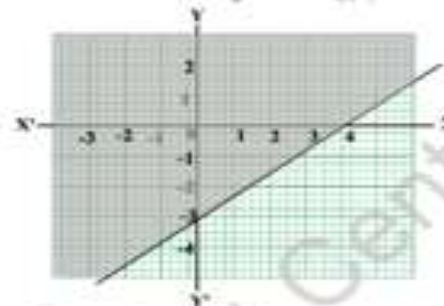
11. यदि $2x^3 - 7x^2 + x + 10 = (x-1)Q(x) + R$, भए शेष R र भागफल Q(x) पत्ता लगाउनुहोस् ।

   If $2x^3 - 7x^2 + x + 10 = (x-1)Q(x) + R$, find the reminder R and quotient Q(x).

12. दिइएको ग्राफमा छाया परिएको भागलाई जनाउने असमानता लेख्नुहोस् ।

   Write down the inequality represented by the shaded region in the adjoining figure.

13. समीकरणहरू $4x - 5y = 2$ र $3x + 4y = 48$ मा क्रामरको नियम प्रयोग गरी x र y का गुणाङ्कहरूका डिटरमिनान्टहरू क्रमशः D_1 र D_2 पत्ता लगाउनुहोस् ।

   Find the determinants D_1 and D_2 of coefficient of x and y by using Cramer's rule from the equations $4x - 5y = 2$ and $3x + 4y = 48$.

14. समीकरणहरू $3x + 4y + 5 = 0$ र $6x + 8y + 7 = 0$ भएका रेखाहरूका भुकाव पत्ता लगाई ती रेखाहरूको सम्बन्ध लेख्नुहोस् ।

   Find the slopes of two straight lines having equations $3x + 4y + 5 = 0$ and $6x + 8y + 7 = 0$ and write the relationship between them.

15. sin6A.cos4A लाई sine वा cosine को योग वा अन्तरमा रूपान्तरण गर्नुहोस् ।

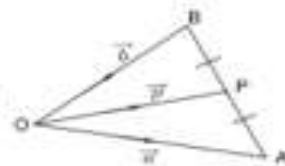   Convert sin6A.cos4A into sum or difference of sine or cosine.

16. यदि $2sin2\theta = \sqrt{3}$ भए θ को मान पत्ता लगाउनुहोस् . ($0° \le \theta \le 180°$)

   If $2sin2\theta = \sqrt{3}$, find the value of θ. ($0° \le \theta \le 180°$)

17. दिइएको चित्रमा O उद्गम बिन्दु हो । यदि $\vec{a}$ र $\vec{b}$ बिन्दु A र B का स्थिति भेक्टर भए, बिन्दु P को स्थिति भेक्टर $\vec{p} = \frac{1}{2}(\vec{a} + \vec{b})$ हुन्छ भनी देखाउनुहोस् ।

   O is the origin in the given figure. If $\vec{a}$ and $\vec{b}$ are the position vector of the points A and B, show that the position vector of point P is $\vec{p} = \frac{1}{2}(\vec{a} + \vec{b})$

18. यदि एउटा श्रेणीको पहिलो चतुर्थांश $(Q_1) = 35$ र तेस्रो चतुर्थांश $(Q_3) = 75$ भए चतुर्थांशीय विचलन र यसको गुणाङ्क पत्ता लगाउनुहोस् ।

   In a series, the first quartile (Q1) = 35 and third quartile (Q3) = 75, find the quartile deviation and it's coefficient.

19. यदि दुई फलनहरू $f(x) = \frac{2x+5}{8}$ र $g(x) = 3x - 4$ भए $(f \circ g)^{-1}(3)$ पत्ता लगाउनुहोस् ।

   If two functions are $f(x) = \frac{2x+5}{8}$ and $g(x) = 3x - 4$, find $(f \circ g)^{-1}(3)$.

20. रेखाचित्र विधिद्वारा हल गर्नुहोस् ।

   Solve by graphical method:
   $2x^2 + x - 6 = 0$.

21. वास्तविक फलन f(x) = 2x + 3 का लागि f(2.99), f(3.01) र f(3) का मानहरू पत्ता लगाउनुहोस् । के यो फलन $x = 3$ मा अविच्छिन्न हुन्छ ?

   For a real valued function f(x) = 2x + 3, find the values of f(2.99), f(3.01) and f(3). Is this function continuous at $x = 3$?

22. मेट्रिक्स विधिको प्रयोग गरी तल दिइएका समीकरणहरू हल गर्नुहोस् :

   Use matrix method to solve the following systems of equations:

   $3x + 5y = 11, 2x - 3y = 1$

23. समीकरण $6x^2 - xy - y^2 = 0$ ले प्रतिनिधित्व गर्ने जोडा रेखाहरूको समीकरण पत्ता लगाउनुहोस् र ती रेखाहरू बिचको कोण पनि पत्ता लगाउनुहोस् ।

   Find the equations of the pair of lines represented by the equation $6x^2 - xy - y^2 = 0$ and also find the angle between them.

24. प्रमाणित गर्नुहोस् ।

   Prove that: $tanA + 2 tan2A + 4 cot4A = cot A$

25. यदि $A + B + C = \pi$, भए प्रमाणित गर्नुहोस् :

   If $A + B + C = \pi$, prove that: $sin^2A - sin^2B + sin^2C = 2sinAcosBsinC$

26. एउटा धरहरको ठिक अगाडि जमिनको सतहमा रहेको कुनै एक स्थानबाट धरहरको माथि ठड्याइएको 6m अग्लो झन्डादण्डको टुप्पो र फेदका उन्नतांश कोणहरू क्रमशः 60° र 45° पाइयो । धरहरको उचाइ र धरहरको फेदबाट सो बिन्दुसम्मको दुरी पत्ता लगाउनुहोस् ।

   From a place at the ground level in front of a tower, the angle of elevations of the top and bottom of flag staff 6m high situated at the top of a tower are observed 60° and 45° respectively. Find the height of the tower and the distance between the base of the tower and point of observation.

27. एउटा वर्ग $\begin{pmatrix} 0 & 1 & 1 & 0 \\ 0 & 0 & 1 & 1 \end{pmatrix}$ लाई समानान्तर चतुर्भुज $\begin{pmatrix} 0 & 3 & 4 & 1 \\ 0 & 0 & 1 & 1 \end{pmatrix}$ का रूपमा

19. यदि दुई फलनहरू $f(x) = \frac{2x+5}{8}$ र $g(x) = 3x - 4$ भए $(f \circ g)^{-1}(3)$ पत्ता लगाउनुहोस् ।

   If two functions are $f(x) = \frac{2x+5}{8}$ and $g(x) = 3x - 4$, find $(f \circ g)^{-1}(3)$.

20. रेखाचित्र विधिद्वारा हल गर्नुहोस् ।

   Solve by graphical method:

   $2x^2 + x - 6 = 0$.

21. वास्तविक फलन $f(x) = 2x + 3$ का लागि f(2.99), f(3.01) र f(3) का मानहरू पत्ता लगाउनुहोस् । के यो फलन $x = 3$ मा अविच्छिन्न हुन्छ ?

   For a real valued function $f(x) = 2x + 3$, find the values of f(2.99), f(3.01) and f(3). Is this function continuous at $x = 3$?

22. मेट्रिक्स विधिको प्रयोग गरी तल दिइएका समीकरणहरू हल गर्नुहोस् :

   Use matrix method to solve the following systems of equations:

   $3x + 5y = 11, 2x - 3y = 1$

23. समीकरण $6x^2 - xy - y^2 = 0$ ले प्रतिनिधित्व गर्ने जोडा रेखाहरूको समीकरण पत्ता लगाउनुहोस् र ती रेखाहरू बिचको कोण पनि पत्ता लगाउनुहोस् ।

   Find the equations of the pair of lines represented by the equation $6x^2 - xy - y^2 = 0$ and also find the angle between them.

24. प्रमाणित गर्नुहोस् ।

   Prove that: $\tan A + 2\tan 2A + 4\cot 4A = \cot A$

25. यदि $A + B + C = \pi$ भए प्रमाणित गर्नुहोस् :

   If $A + B + C = \pi$, prove that: $\sin^2 A - \sin^2 B + \sin^2 C = 2\sin A \cos B \sin C$

26. एउटा धरहराको ठिक अगाडि जमिनको सतहमा रहेको कुनै एक स्थानबाट धरहराको माथि ठड्याइएको 6m अग्लो ध्वजादण्डको टुप्पो र फेदका उन्नतांश कोणहरू क्रमशः 60° र 45° पाइयो । धरहराको उचाइ र धरहराको फेदबाट सो बिन्दुसम्मको दूरी पत्ता लगाउनुहोस् ।

   From a place at the ground level in front of a tower, the angle of elevations of the top and bottom of flag staff 6m high situated at the top of a tower are observed 60° and 45° respectively. Find the height of the tower and the distance between the base of the tower and point of observation.

27. एकाइ वर्ग $\begin{pmatrix} 0 & 1 & 1 & 0 \\ 0 & 0 & 1 & 1 \end{pmatrix}$ लाई समानान्तर चतुर्भुज $\begin{pmatrix} 0 & 3 & 4 & 1 \\ 0 & 0 & 1 & 1 \end{pmatrix}$ का रूपमा स्थानान्तरण गर्ने 2×2 मेट्रिक्स पत्ता लगाउनुहोस् ।

   Find the 2×2 matrix which transforms unit square $\begin{pmatrix} 0 & 1 & 1 & 0 \\ 0 & 0 & 1 & 1 \end{pmatrix}$ to a parallelogram $\begin{pmatrix} 0 & 3 & 4 & 1 \\ 0 & 0 & 1 & 1 \end{pmatrix}$

28. दिइएको तथ्याङ्कको मध्यक भिन्नता र यसको गुणाङ्क पत्ता लगाउनुहोस् :

Find the mean deviation and its coefficient of the given data.

प्राप्ताङ्क (Marks obtained)	0-10	10-20	20-30	30-40	40-50
विद्यार्थी सङ्ख्या (No. of students)	2	3	6	5	4

29. दिइएको तथ्याङ्कबाट स्तरीय भिन्नता पत्ता लगाउनुहोस् :

Find the standard deviation from given data.

उमेर (Age)	0 – 10	10 – 20	20 – 30	30 – 40	40 – 50	50 – 60
मानिसको सङ्ख्या (No. of Persons)	4	6	10	20	6	4

समूह घ 'Group D'   4 × 4 = 16

30. एउटा समानान्तरीय श्रेणीमा तीनओटा पदहरूको योगफल 24 छ । यदि ती पदहरूमा क्रमशः 1, 6 र 18 जोड्दा परिणाम गुणोत्तर श्रेणीमा हुन्छ भने ती पदहरू निकाल्नुहोस् ।

The sum of three terms in an arithmetic series is 24. If 1, 6 and 18 are added to them respectively, the results are in geometrical series, find the terms.

31. दिइएको चित्रमा X र Y क्रमशः A र B का केन्द्रबिन्दुहरू हुन् । बृत्त B को केन्द्रबिन्दु Y भएर बृत्त A गएको छ । यदि बृत्त B को समीकरण $x^2 + y^2 - 4x + 6y - 12 = 0$ र X को निर्देशाङ्क (−4, 5) छ भने बृत्त A को समीकरण पत्ता लगाउनुहोस् ।

In the given figure, X and Y are the center of circles A and B respectively. Circle A passes through the centre Y of the circle B. If the equation of the circle B is $x^2 + y^2 - 4x + 6y - 12 = 0$ and the coordinates of X is (−4,5), find the equation of the circle A.

32. भेक्टर विधिको प्रयोग गरी कुनै पनि चतुर्भुजका भुजाहरूका मध्यबिन्दुहरू क्रमशः जोड्दै जाँदा बन्ने चतुर्भुज समानान्तर चतुर्भुज हुन्छ भनी प्रमाणित गर्नुहोस् ।

By using vector method, prove that the quadrilateral formed by joining the midpoints of adjacent sides of a quadrilateral is a parallelogram.

33. दिइएको ग्राफमा त्रिभुज A को प्रतिबिम्ब A' र A' को प्रतिबिम्ब A" भए। The image of the triangle A is A' and image of A' is A" in the given graph.

(क) कुन स्थानान्तरणद्वारा त्रिभुज A को प्रतिबिम्ब A' हुन्छ ? कारणसहित लेख्नुहोस् । By what transformation the image of the triangle A is A'? Write with reason.

(ख) कुन स्थानान्तरणद्वारा त्रिभुज A' को प्रतिबिम्ब A" हुन्छ ? कारणसहित लेख्नुहोस् । By what transformation the image of the triangle A' is A"? Write with reason.

(ग) माथिका दुई स्थानान्तरणको संयुक्त स्थानान्तरणलाई जनाउने स्थानान्तरण कुन हुन्छ ? कारणसहित लेख्नुहोस् । Write the name of transformation which denotes the combined transformation of above two transformations? Write with reason.