Cardinal International Boarding School

Satikhel, Kathmandu

Subject : Optional Math				
Exam	**Time**	**Class**	**Full Marks**	**Pass Marks**
3rd Terminal 2073 Poush	**3 hrs**	**8 (G+W)**	**100**	**40**

Group A $[(8+8) * 2 = 32]$

1. (a) Define column matrix with an example.

(b) If A = $\begin{bmatrix} x-3 & 4 \\ 5 & y+2 \end{bmatrix}$ and B = $\begin{bmatrix} 0 & 4 \\ 5 & 3 \end{bmatrix}$ are equal matrices, find value of x and y.

2. (a) If A = $\{factors\ of\ 9\}$, B = $\{factors\ of\ 8\}$ then find n(A × A) and (B× A).

(b) Find the product of f(x) and g(x) where f(x) = x+3 and g(x) = x-5.

3. (a) Which one is greater $\sqrt{2}$ or $\sqrt[3]{8}$?

(b) Simplify: $4\sqrt{8} + 3\sqrt{18} + \sqrt{32}$

4. (a) Find the image of the point A (a,-b) under rotation about origin through 180°.

(b) If $\vec{a}$ = (2, 5), find the magnitude of $2\vec{a}$.

5. (a) Prove that $\frac{Cos\ A}{1-SinA} = \frac{1+sinA}{cosA}$

(b) Find the value of $3\tan^2 30° + 4\sin^2 30° + 2\cos^2 45°$

6. (a) Convert 24^g into radian.

(b) Express tanθ in terms of sinθ.

7. (a) If A=30°, prove that $\cos 2A = 2\cos^2 A - 1$

(b) Write the co-ordinate of any point on x-axis & specify quadrant of point A (-2,-3).

8. (a) Find the mid-point of the line AB joining the two points A (5,-1) and B (3,-7).

(b) If the slope of the line joining two points (2, y) and (3, 5) is 1, find the value of y.

Group B [$17 * 4 = 68$]

9. If $P = \begin{bmatrix} 3 & 0 \\ 0 & 3 \end{bmatrix}$ and Q = $\begin{bmatrix} 1 & 1 \\ 1 & 1 \end{bmatrix}$ and R = $\begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$ then find P + Q – 2R.

10. If A = $\begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$ and B = $\begin{bmatrix} 0 & 1 \\ 3 & 2 \end{bmatrix}$,verify that A + B = B+A and $(A+B)^T = A^T + B^T$

11. Simplify: $\frac{\sqrt{5}+\sqrt{3}}{\sqrt{5}-\sqrt{3}} + \frac{\sqrt{5}-\sqrt{3}}{\sqrt{5}+\sqrt{3}}$

12. Define the Cartesian Product. Find the relation R = { (x,y) : x < y} on A × A, where A= {2,4,6}.

13. If a relation R = $\{(1,2), (3,4), (6,7), (11,12), (15,16)\}$, find the domain, range and inverse relation.

14. Use the synthesis division method to find the quotient and remainder when the polynomial $2x^3 - 5x^2 - 8x + 11$ is divided by x-4.

15. Find $\overrightarrow{AB}$, $\overrightarrow{BA}$ and $\left|\overrightarrow{AB}\right|$ if A(3,2) and B (0,6)

16. Prove that : $\frac{1+\cos\theta}{\sin\theta} + \frac{\sin\theta}{1+\cos\theta} = 2\,\text{cosec}\theta$

17. Prove that : $\frac{1-sin^4A}{cos^4A} = 1 + 2tan^2A$

18. Factorize : $\tan^2\theta + 5\tan\theta + 6$

19. In a right angled Δ ABC , if $\prec B = 90°$, AC = 4cm and BC = $2\sqrt{3}$ cm, find other angles and sides.

20. Derive the Distance Formula from Pythagorean Theorem.

21. Prove that the points (1, 0), (2, 1) and (3, 0) are the vertices of the right angles isosceles triangle.

22. Find the ratio and value of 'a' if C (5, a) divides the line joining the points A (1, 5) and B (6,-5).

23. Two angles of a triangle are in the ratio 5:4 and the third angle is 90^g. Find all the angles in degree.

24. ABC is a triangle with vertices A(-2,2) ,B(2,2) and (2,6).Find the image of ΔABC under translation T = $\begin{bmatrix} 3 \\ -2 \end{bmatrix}$.

25. Find the co-ordinates of the image of ΔPQR with vertices P (1, 1), Q (3, 1) and R (3,-1) under the reflection on x-axis. Also show in the graph paper.