Symbol No: .....Date: 2080-03-27 **10:00am**

PABSON, Kathmandu
FIRST TERMINAL EXAM-2080
Opt I. Mathematics

Class: 10 Full Marks: 100
Time: 3 hrs.

Candidates are required to write their answers according to the instructions given.

Attempt all questions.

Group 'A' (1x10=10)

1. a) Define composite function.

   b) State remainder theorem.

2. a) Does inverse of matrix A exist if $A=\begin{bmatrix}1 & 4\\ 1 & 4\end{bmatrix}$

   b) If $A_{m\times n}$ and $B_{n\times p}$, what is the order of AB?

3. a) If $Sin\theta=\frac{1}{2}$ find the value of $\sin 3\theta$.

   b) Prove that: $1-\cos 2A=2\sin^2 A$.

4. a) If $Cos\frac{\theta}{2}=1$, find $\cos\theta$.

   b) If $Tan\frac{\theta}{3}=1$, Find $\tan\theta$.

5. a) If Slope $(m_1)=\frac{2}{3}$ and slope $(m_2)=\frac{k}{6}$ and they are parallel. Find k.

   b) If $mx^2-3xy-5y^2=0$ are perpendicular find m.

Date: 2080-03-27 **10:00am**

Group 'B' (2x13=26)

6. a) Write down the composite function gof if $f=\{(1,2), (3,4), (4,5)\}$ and $g=\{(2,6), (4,12), (5,15)\}$, show *gof* in arrow diagram.

   b) If $f(x)=\frac{3x-4}{7x+1}$ find $f^{-1}(x)$.

7. a) If $f(x)=kx^3+4x-10$, $d(x)=x+3$ where remainder is 5 when $f(x)$ is divided by d(x). Use remainder theorem and find the value of x.

   b) If $4x^2+kx+8$ has factor x-2. Find the value of K by using factor theorem.

8. a) If $A=\begin{bmatrix} x & 1 \\ 5 & -2 \end{bmatrix}$, $B=\begin{bmatrix} 2 & -1 \\ y & -3 \end{bmatrix}$ are inverse to each other. Find value of x and y.

   b) If $D=\begin{vmatrix} 3 & 4 \\ 2 & 5 \end{vmatrix}$, $D_x=\begin{vmatrix} 4 & 4 \\ -7 & 5 \end{vmatrix}$ and $D_y=\begin{vmatrix} 3 & 4 \\ 2 & -7 \end{vmatrix}$. Find the value of x using crammer's rule.

9. a) If $\text{SinA}=\frac{3}{5}$ find Sin2A.

   b) Prove that: $\frac{Sin5\theta}{Sin\theta}-\frac{Cos5\theta}{Cos\theta}=4Cos2\theta$

   c) Prove that: $\frac{1+SecA}{TanA}=Cot\frac{A}{2}$

10. a) Find the obtuse angle between the given lines $y=\sqrt{3x}$ and $\sqrt{3x}+y=-\sqrt{3}$.

    b) If the lines $kx+3y-10=0$ and $3x-5y+20=0$ are perpendicular to each other. Find the value of k.

11. a) Prove that equation $x^2-2xySec\alpha+y^2=0$ represent two separate equations.

    b) If $(k+2)x^2+3xy+4y^2=0$ represent the lines which are coincident. Find the value of k.

Symbol No: .....Date: 2080-03-27 **10:00am**

Group 'C' (4x11=44)

12. If $f(x)=\frac{4x+5}{9}$ and $g(x)=\frac{9x-5}{4}$ prove that fog(x) is an identity function.
13. If $f(x)=4x-17$ and $g(x)=\frac{2x+8}{5}$ and $fof(x)=g^{-1}(x)$ find the value of x.
14. Solve for y: $y^3-19y-30=0$
15. Solve by matrix method. $x-2y=-7$ and $\frac{3x}{5}+\frac{7y}{5}=1$.
16. Prove that: $\frac{Sec8\theta-1}{Sec4\theta-1}=\frac{Cot2\theta}{Cot8\theta}$
17. If $2\tan\alpha=3\tan\beta$. Prove that: $\tan(\alpha-\beta)=\frac{5\sin 2\beta}{5\cos 2\beta-1}$
18. Prove that: $\tan(45^0+\frac{\theta}{2})+\tan(45^0-\frac{\theta}{2})=2\sec\theta$
19. Prove that: $\frac{Sin2\theta}{1+Cos2\theta}.\frac{Cos\theta}{1+Cos\theta}=\tan\frac{\theta}{2}$
20. Find the equation of straight line passing through the intersection of two straight line $x-2y=-1$ and $2x-y=1$ and perpendicular to $3x-4y+5=0$
21. If ABCD is a rhombus where A (2,3) and C (4,5) are the points find the equation of diagonal BD.
22. Find the separate equations of straight lines passing through (1,-1) and perpendicular to the lines $x^2-6xy+8y^2=0$.

Group 'C' (5x4=20)

23. Find the value of a and b if $2x^3+ax^2+bx-2$ has factor $(x+2)$ and leaves remainder 7 when divided by 2x-3.
24. Find the maximum and minimum value of objective function F=2x+3y and subject to constrains $x+y\le 6, x-y\ge -2, x\ge 0$ & $y\ge 0$.

Date: 2080-03-27 **10:00am**

25. Prove that: $Sin^4\frac{\pi^C}{8}+Sin^4\frac{3\pi^C}{8}+Sin^4\frac{5\pi^C}{8}Sin^4\frac{7\pi^C}{8}=\frac{3}{2}$

26. Determine the equation of the straight lines through (1, -4) that make an angle of 45^0 with the straight line $2x+3y+7=0$.