Std. 12   Time : 3 hrs.

10-9-2014   Half Yearly Examination in **MATHEMATICS** **(Set - II)**   M. Marks : 100

General Instructions:
1.   Question nos. 1 to 6 carry 1 mark each.
2.   Question nos. 7 to 19 carry 4 marks each.
3.   Question nos. 20 to 26 carry 6 marks each.

SECTION – A

1.   Differentiate $\sqrt{4+\sqrt{4+x}}$ w.r.t x.

2.   Find the rate of change of volume of sphere with respect to its diameter.

3.   Find the value of k so that matrix $A = \begin{bmatrix} 2 & k \\ 3 & 1 \end{bmatrix}$ has no inverse.

4.   Evaluate : $\cos^{-1}(\cos 680°)$

5.   For any 2x2 matrix, if $A.(AdjA) = \begin{bmatrix} 10 & 0 \\ 0 & 10 \end{bmatrix}$ then find the value of $|A|$.

6.   Evaluate : $\int 5^{5^x}.5^x \, dx$

SECTION – B

7.   Show that $\begin{vmatrix} b+c & c+a & a+b \\ q+r & r+p & p+q \\ y+z & z+x & x+y \end{vmatrix} = 2\begin{vmatrix} a & b & c \\ p & q & r \\ x & y & z \end{vmatrix}$

8.   Solve : $\sin^{-1}(1-x) - 2\sin^{-1}x = \Pi/2$

9.   If $y = (\tan x)^{\log x} + \cos^2\left(\dfrac{\pi}{4}\right)$ find $\dfrac{dy}{dx}$

10.   Evaluate : $\int \dfrac{x^2}{(x-1)(x-2)} dx$

11.   Show that the curves $4x = y^2$ and $4xy = k$ cut at right angle if $k^2 = 512$.

12.   Evaluate $\int \dfrac{\sqrt{1-\sin x}}{1+\cos x} e^{-x/2} \, dx$

13.   Find inverse of matrix $A = \begin{bmatrix} 0 & 3 \\ 5 & 2 \end{bmatrix}$ using elementary transformation method.

14.   Find the approximate value of $\sqrt{0.037}$ using differential approximations.

15.   Simplify : $\tan^{-1}\left(\dfrac{\sqrt{1+x}+\sqrt{1-x}}{\sqrt{1+x}-\sqrt{1-x}}\right)$

16. Find the value of k so that function $f(x) = \begin{cases} \dfrac{1-\cos4x}{x^2}, & x < 0 \\ k, & x = 0 \\ \dfrac{\sqrt{x}}{\sqrt{16+\sqrt{x}} - 4}, & x > 0 \end{cases}$

    is continous at x=0.

17. Evaluate $\int \dfrac{dx}{\cos(x + \alpha)\sin(x + \beta)}$

18. Express A = $\begin{bmatrix} 2 & 1 & -3 \\ 0 & 1 & 2 \\ 1 & -1 & 0 \end{bmatrix}$ as sum of symmetric and skew symmetric matrix.

19. Find the intervals for which $f(x) = \dfrac{3}{10}x^4 - \dfrac{4}{5}x^3 - 3x^2 + \dfrac{36}{5}x + 11$ is increasing or decreasing.

SECTION – C

20. Find the equation of tangent line to the curve y = x² − 2x +7 which is
    a) Parallel to line 2x − y + 9 = 0
    b) Perpendicular to line 5y − 15x = 13

21. Prove that the radius of the right circular cylinder of greatest curved surface which can be inscribed in a given cone is half of that cone.

22. If $\sqrt{1-x^4} + \sqrt{1-y^4} = a(x^2-y^2)$ prove that $\dfrac{dy}{dx} = \dfrac{x}{y}\sqrt{\dfrac{1-y^4}{1-x^4}}$

23. Let $A = \begin{bmatrix} 0 & -\tan\alpha/2 \\ \tan\alpha/2 & 0 \end{bmatrix}$ and I be identity matrix of order 2. Show that

    I+A = (I − A) $\begin{bmatrix} \cos\alpha & -\sin\alpha \\ \sin\alpha & \cos\alpha \end{bmatrix}$

24. Evaluate $\int \dfrac{dx}{\sin x + \sin 2x}$

25. Evaluate $\int \sqrt{\cot x}\, dx$

26. Solve using matrix method
    x − y + z = 1; 2x + y − z = 2; 2x + y − 3 = 0

-x-x-x-x-x-x-