MODEL PRACTICE TEST PAPER - II
MATHEMATICS
CLASS 12 - CBSE 2011

Time : 3 hrs Max. Marks: 100

General Instructions:

1. All questions are compulsory
2. The question paper consists of 29 questions divided into three sections A,B and C. Section A contains 10 questions of 1 mark each, Section B contains 12 questions of 4 marks each and section C contains 07 questions of 6 marks each.
3.

Section – A
(Questions 1 – 10 carry one mark each)

1. $\int \frac{\log(sinx)}{tanx}\,dx$
2. Write the principal value of $\cos^{-1} cos(\frac{7\pi}{6})$
3. If $|\vec{a}| = \sqrt{3}$, $|\vec{b}| = 2$ and $\vec{a}.\vec{b} = 3$, find the angle between $\vec{a}$ and $\vec{b}$
4. Write down the equation of a line parallel to the line $\frac{x-2}{-3} = \frac{y+3}{2} = \frac{z+5}{6}$ and passing through the point (1,2,3).
5. If matrix A = (1 2 3), write AA', where A' is thr transpose of A
6. Evaluate $\int Sin4xcos3x\,dx$
7. Write the order and degree of differential equation$(\frac{d^2y}{dx^2})^2 + \left(\frac{dy}{dx}\right)^3 + 2y = 0$
8. Find the value of p if $(2\hat{\imath}+6\hat{\jmath}+27\hat{k}) \times (\hat{\imath}+3\hat{\jmath}+p\hat{k}) = \vec{0}$
9. Evaluate : $\begin{bmatrix} 2\,cos\theta & -2\,sin\theta \\ sin\theta & cos\theta \end{bmatrix}$
10. Form the differential equation of the family of curves y = a cos(x+b), where a and b are arbitrary constants.

Section – B
(Questions 11 – 22 carry four marks each)

11. Using the properties of determinants, prove the following : $\begin{bmatrix} 1 & 1+p & 1+p+q \\ 2 & 3+2p & 1+3p+2q \\ 3 & 6+3p & 1+6p+3q \end{bmatrix} = 1$
12. If y = $(sinx)^x + \sin^{-1}\sqrt{x}$, find $\frac{dy}{dx}$
13. Form a differential equation of the family of circles touching the x-axis at origin.
14. Solve the following for x : $\tan^{-1} x + 2\cot^{-1} x = \frac{2\pi}{3}$ or, Prove that $2\tan^{-1}\frac{1}{2} + \tan^{-1}\frac{1}{7} = \tan^{-1}\frac{31}{17}$
15. Find the value of α so that the lines $\frac{1-x}{3} = \frac{7y-14}{2\alpha} = \frac{5z-10}{11}$ and $\frac{7-7x}{3\alpha} = \frac{y-5}{1} = \frac{6-z}{5}$ are perpendicular to each other.
16. Find the equation of the tangent to the curve $x^2+3y = 3$, which is parallel to the line y-4x+5=0

    Or

    Find the intervals in which the function f given by f(x) = sinx + cosx, $0 \leq x \leq 2\pi$, is strictly increasing or strictly decreasing.

17. Using properties of definite integral, evaluate : $\int_0^{\pi} \frac{x\,sinx}{1+cos^2x}\,dx$, or, Evaluate $\int \frac{dx}{\sqrt{(5-4x-2x^2)}}$
18. Solve the differential equation : $\frac{dy}{dx}$ + y = cosx-sinx
19. If f: N→ N be defined by f(n) = $\frac{n+1}{2}$, if n is odd

    = $\frac{n}{2}$, if n is even

    Find whether the function f is bijective.
20. The scalar product of the vector $\vec{\imath} + \vec{\jmath} + \vec{k}$ with unit vector along sum of vectors $2\vec{\imath} + 4\vec{\jmath} - 5\vec{k}$ and $\mu\vec{\imath} + 2\vec{\jmath} + 3\vec{k}$ is equal to one. Find the value of μ
21. Let * be the Binary operation on N given by a*b = LCM of a and b. Find the value of 20*16. Is * (i) Commutative (ii) Associative.
22. Prove that the relation R in the set A = {1,2,3,4,5} given by R = {(a,b) : |a-b| is even}, is an equivalence relation.

Section – C
(Questions 23 – 29 carry Six marks each)

23. Find the point on the curve $y^2=2x$ which is at a minimum distance from the point (1,4)

24. Obtain inverse of the following matrix using elementary operations $\begin{bmatrix} 3 & 0 & -1 \\ 2 & 3 & 0 \\ 0 & 4 & 1 \end{bmatrix}$

25. Evaluate $\int_0^{\pi} \frac{x\,dx}{a^2\cos^2 x+b^2\sin^2 x}$

26. Find the area of the region enclosed between the two circles $x^2+y^2=9$ and $(x-3)^2 + y^2=9$

27. Evaluate $\int \frac{x^2}{x^4+x^2+1}dx$ or, Evaluate $\int_0^{\frac{\pi}{2}}(2\,logsinx - logsin2x)dx$

28. Find the equation of the plane through the point (-1,3,2) and perpendicular to each of the planes $x + 2y + 3z = 5$ and $3x + 3y + 3z = 0$

29. A diet is to contain atleast 80 units of vitamin A and 100 units of minerals. Two foods X and Y are available. Food X costs Rs.4 per unit and Food Y costs Rs.6 per unit. One unit of Food X contains 3 units of vitamin A and 4 units of minerals. One unit of Food Y contains 6 units of vitamin A and 3 units of minerals. Formulate this as a Linear Programming Problem and find graphically the minimum cost for diet that consists of mixture of these two foods and also meets the minimal nutritional requirements.