MODEL PRACTICE TEST PAPER - I
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. Find the slope of the tangent to the curve $y=3x^2+4x$, find the slope of the tangent to the curve at the point on it whose x-coordinate is -2.
2. Using principal values, evaluate the following :
   $\cos^{-1}(-\frac{1}{2}) + \sin^{-1}(-\frac{1}{2}) + \tan^{-1} 1$
3. Find the the projection of $\vec{a}$ on $\vec{b}$ if $\vec{a}.\vec{b}= 8$ and $\vec{b} = 2i + 3j + 6k$
4. The equation of a line is $\frac{2x-5}{4} = \frac{y+4}{3} = \frac{6-z}{3}$. Find the direction cosines of the line parallel to this line
5. If f : R → R defined as $f(x) = \frac{2x-7}{4}$ is an invertible function, find f^{-1}.
6. Evaluate $\int x\ log2x\ dx$
7. A matrix A, of order 3x3, has determinant 4. Find |3A|
8. Let * be a binary operation on the set Q of rational numbers given as $a*b=(2a-b)^2$, a,b∈Q. Find 3*5 and 5*3. Is 3*5 = 5*3 ?
9. Solve :$\begin{bmatrix} 1 & 2 & 1 \end{bmatrix} \begin{bmatrix} 1 & 2 & 0 \\ 2 & 0 & 1 \\ 1 & 0 & 2 \end{bmatrix} \begin{bmatrix} 0 \\ 2 \\ x \end{bmatrix} = 0$
10. Evaluate $\int \frac{cos(x+a)}{sin(x+b)}\ dx$

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

11. Using the properties of determinants, prove the following : $\begin{bmatrix} 1+a & 1 & 1 \\ 1 & 1+b & 1 \\ 1 & 1 & 1+c \end{bmatrix}$ = abc + ab + bc + ca
12. If $y = \sin^{-1}(\frac{5x+12\sqrt{(1-x^2)}}{13})$, Find $\frac{dy}{dx}$
13. Evaluate $\int_0^{\frac{\pi}{2}} \log sinx\ dx$
14. Let $A = \begin{bmatrix} 3 & 2 & 5 \\ 4 & 1 & 3 \\ 0 & 6 & 7 \end{bmatrix}$ Express A as the sum of the two matrices such that one is symmetric and the other is skew symmetric
15. Solve the following differential equation : $(x^2+1)\frac{dy}{dx} + 2XY = \sqrt{(X^2+4)}$
16. Find the equation of the perpendicular drawn from the point (2,4,-1) to the line $\frac{x+5}{1} = \frac{y+3}{4} = \frac{z-6}{-9}$
17. If $\vec{a}$ = 2i+2j+2k, $\vec{b}$ = -i+2j+k, $\vec{c}$ = 3i+j are such that $\vec{a} + \mu\vec{b}$ is perpendicular to $\vec{c}$. Find the value of μ
18. Form the differential equation representing the family of ellipses having faci on x-axis and centre at origin.
19. Solve the differential equation : $x\frac{dy}{dx} = y - x\tan(\frac{y}{x})$
20. On a multiple choice exam with three possible answers (out of which only one is correct) for each of the five questions, what is the probability that a candidate would get four or more correct answers just by guessing.
21. Find the intervals in which the function $f(x)=2x^3-9x^2+12x+15$ is (i) increasing (ii) decreasing
22. 12 cards, numbered 1 to 12, are placed in a box, mixed up thoroughly and then a card is drawn at random from the box. If it is known that the number on the drawn card is more than 3, Find the probability that it is an even number.

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

23. Using matrices, solve the following system of equations : 2x+3y+5Z=5, x=y+z=-2, x+2y-z=2

24. Find the equation of the plane determined by the points A(3,-1,2), B(5,2,4) and C(-1,-1,6). Also find the distance of the point P(6,5,9) from the plane.

25. Evaluate $\int_1^3 (x^2 + x)dx$

26. If the sum of the lengths of the hypotenuse and a side of a right angled triangle is given. Show that area of triangle is maximum when the angle between them is $\frac{\pi}{3}$

27. Evaluate $\int \frac{(tanx+tan^3x)}{(1+tan^3x)}$dx

28. A bag contains 4 red and 4 black balls. Another bag contains 2 red and 6 black balls. On of the bag is selected at random and a ball is drawn from the bag which is found to be red. Find the probability that the ball is drawn from first bag.

29. A manufacturer produces nuts and bolts. It taken one hour of work on machine A and three hours of work on machine B to produce a packet of nuts. It takes three hours on machine A and one hour on machine B to produce a packet of bolts. He earns a profit of Rs.17.50 per packet on nuts and Rs.7.00 per packet on bolts. How many packets of each should be produced each day so as to maximise his profit, if he operates each of the machines for utmost 12 hours a day? For an L.P.P. for the problem and solve graphically.

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