Series : PTS/06

Code No. 14/10/6

Roll No. | 2 | 1 | 4 | 1 | 2 | | |

Candidates must write the Code on the title page of the answer-book.

PLEASURE TEST SERIES XII – 06

Compiled By : OP Gupta | WhatsApp @ +91-9650 350 480

For various stuffs on Maths, visit at : www.theOPGupta.com

Time Allowed : 180 Minutes **Max. Marks : 100**

SECTION – A

Q01. If $f : R \to R$, $g : R \to R$ be defined by $f(x) = \frac{3x-7}{8}$, $g(x) = \frac{8x+7}{3}$ then, find $fog(7)$.

Q02. Find the cofactor of a_{12} in $\begin{vmatrix} 2 & 3 & 5 \\ 6 & 0 & 4 \\ 1 & 5 & -7 \end{vmatrix}$.

Q03. Evaluate $\int_0^{3/2} [x]dx$, where [.] represents a greatest integer function.

Q04. Find the tangent of the angle between $\hat{i} - \hat{j} + \hat{k}$ and $\hat{i} + \hat{j} - \hat{k}$.

Q05. Write the interval in which $f(x)$ is continuous where $f(x) = e^x \log |x|$.

Q06. Corner points of the feasible region determined by the system of linear constraints are A(0, 10), B(5, 5), C(15, 15), D(0, 20). Let Z = p x + q y, where p, q > 0. Write the condition(s) on p and q so that the maximum of Z occurs at both the points C and D.

SECTION – B

Q07. Prove that : $\tan^{-1}[x + \sqrt{1+x^2}] = \frac{\pi}{4} + \frac{1}{2}\tan^{-1} x,\ x \in R$.

OR Simplify the expression : $\sin(\cot^{-1} \cos \tan^{-1} x)$.

Q08. Define symmetric matrix and skew-symmetric matrix. Let $A = \begin{bmatrix} 3 & 2 & 5 \\ 4 & 1 & 3 \\ 0 & 6 & 7 \end{bmatrix}$. Express A as the sum of two matrices such that one is symmetric matrix while the other is skew-symmetric matrix.

Q09. Determine the value of k for which $f(x) = \begin{cases} 2x+1, \text{ if } x < 2 \\ k, \text{ if } x = 2 \\ 3x-1, \text{ if } x > 2 \end{cases}$ is continuous at x = 2.

Q10. Find the equation of normal to curve $x = \sin 3t,\ y = \cos 2t$ at $t = \pi/4$.

Q11. If x = a sin2t (1 + cos2t) and y = b cos2t (1 – cos2t), show that $\left(\frac{dy}{dx}\right)_{\text{at } t = \pi/4} = \frac{b}{a}$.

Q12. Solve the differential equation given as : $\cos^2 x\left(\frac{dy}{dx}\right) + y = \tan x$.

Q13. Evaluate the integral : $\int_0^{\pi/2} \frac{\sec^2 x}{\sec^2 x + \text{cosec}^2 x} dx$.

Q14. Find the particular solution of the differential equation : $(2y + x)dy - (2y - x)dx = 0,\ y(1) = 1$.

OR Solve the differential equation : $(x^2 - y^2)dx + 2xydy = 0$ given that y = 1 when x = 1.

Q15. Find a point on the line $\frac{x+2}{3} = \frac{y+1}{2} = \frac{z-3}{2}$ at a distance of $3\sqrt{2}$ units from the point (1, 2, 3).

www.theOPGupta.com (9650350480 | 9782240480)

Q16. If $\vec{a} = \hat{i} + \hat{j} + \hat{k}$ and $\vec{b} = \hat{j} - \hat{k}$ then, find a vector $\vec{c}$ such that $\vec{a} \times \vec{c} = \vec{b}$ and $\vec{a}.\vec{c} = 3$.

OR Show that if the vectors $\vec{a}, \vec{b}$ and $\vec{c}$ are coplanar vectors then $\vec{a} + \vec{b}$, $\vec{b} + \vec{c}$ and $\vec{c} + \vec{a}$ are also coplanar vectors.

Q17. Consider $f : R_+ \to [-5, \infty)$ given by $f(x) = 9x^2 + 6x - 5$. Show that f is an invertible function. Hence find f^{-1}.

Q18. Evaluate : $\int \sqrt{\frac{x}{a^3 - x^3}}\, dx$.

Q19. A pair of dice is thrown 4 times. If getting a doublet is considered a success, find the probability distribution of the number of successes.

OR Find $P(|x - 4| \leq 2)$ if x follows a Binomial Distribution with the mean 4 and variance 2.

SECTION – C

Q20. Find the area of the region bounded by the curve $y = x^2 + x$, x-axis and the line $x = 2$ and $x = 5$.

Q21. Using properties of determinant, prove that :

$$\begin{vmatrix} a^2 & a^2 - (b-c)^2 & bc \\ b^2 & b^2 - (c-a)^2 & ca \\ c^2 & c^2 - (a-b)^2 & ab \end{vmatrix} = (a-b)(b-c)(c-a)(a+b+c)(a^2+b^2+c^2).$$

Q22. Show that the height of a cylinder which can be inscribed in a cone of height h is h/3.

OR Find the maximum area of an isosceles triangle inscribed in the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ with its vertex at one end of major axis.

Q23. Evaluate : $\int_{-a}^{a} \sqrt{\frac{a-x}{a+x}}\, dx$.

Q24. An insurance company insured 2000 scooter drivers, 4000 car drivers and 6000 bus drivers. The probability of an accident involving a scooter, a car and a bus are respectively 0.01, 0.03 and 0.15. One of the insured persons meets with an accident. What is the probability that he is a scooter driver? Explain the importance of public transport system over private vehicles in two points.

Q25. A manufacturer of electronic circuits has a stock of 200 resistors, 120 transistors and 150 capacitors and is required to produce two types of circuits A and B. Type A requires 20 resistors, 10 transistors and 10 capacitors. Type B requires 10 resistors, 20 transistors and 30 capacitors. If the profit on type A circuit is ₹50 and that of type B circuit is ₹60, formulate this as a linear programming problem so that the manufacturer can maximize his profit. Also solve the L.P.P. graphically to find the maximum profit. The owner of this manufacturing unit is knowingly producing defective circuitries with an aim of earning more money. How would you stop him doing that by making him conscious of his wrong act?

Q26. Find the equation of the plane which passes through the points (3, 4, 1) and (0, 1, 0) and is parallel to the line : $\frac{x+3}{2} = \frac{y-3}{7} = \frac{z-2}{5}$.

OR Find the equation of a plane which is perpendicular to the planes $2x + 3y - 3z = 2$ and $5x - 4y + z = 6$ and passes through the point (–1,–1, 2).

Grab A Copy Of

MathsMania

A Question Bank Of CBSE Exams

[Containing Solved Papers Of CBSE Exams from 2010-2014 with Main Exams & Compartment Exams.]

Maths*Mania* is available @ just ₹220/- (Courier charges extra.)

For details about **Maths*Mania***, please visit at **www.theOPGupta.com/** or Call @ **+919718240480**.