SAMPLE TEST PAPER SET – B
By: OP GUPTA (+91–9650 350 480)

MATHEMATICS
CBSE EXAMINATIONS 2012-13

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

SECTION – A

Q01. If $f:\mathrm{R}\to\mathrm{R}$ be defined by $f(x)=\left(7-x^5\right)^{1/5}$, then find $fof(x)$.

Q02. Evaluate: $\int\frac{1}{\left[\sqrt{1-x^2}\left(16-\sin^{-1}x\right)^{1/2}\right]}dx$.

Q03. Write one of the range of $\mathrm{cosec}^{-1}x$ other than its principal branch.

Q04. In the matrix equation $\begin{pmatrix}11 & 16\\ 7 & 10\end{pmatrix}=\begin{pmatrix}2 & 3\\ 1 & 2\end{pmatrix}\begin{pmatrix}1 & 2\\ 3 & 4\end{pmatrix}$, apply $C_2\to C_2-C_1$ on both the sides.

Q05. Evaluate: $\begin{vmatrix}a+ib & c+id\\ -c+id & a-ib\end{vmatrix}$.

Q06. If $A=\begin{bmatrix}1\\2\\3\end{bmatrix}$ then, find AA'.

Q07. If $|\vec{a}|=3,|\vec{b}|=5,|\vec{c}|=7$ and $\vec{a}+\vec{b}+\vec{c}=\vec{0}$ then, find the angle between $\vec{a}$ and $\vec{b}$.

Q08. Evaluate: $\int_0^{3/2}\left[x\right]dx$, where $\left[x\right]$ represents a greatest integer function.

Q09. If '*' is a binary operation defined on R and if $a*b=\frac{ab}{2}$, write the value for (4*2)*6.

Q10. For a vector equiangular with the coordinate axis, write its direction cosines.

SECTION – B

Q11. Show that: $\tan^{-1}(1)+\tan^{-1}(2)+\tan^{-1}(3)=\pi=2\left(\tan^{-1}(1)+\tan^{-1}\left(\frac{1}{2}\right)+\tan^{-1}\left(\frac{1}{3}\right)\right)$.

OR Prove that: $\tan\left[\frac{\pi}{4}+\frac{1}{2}\cos^{-1}\frac{a}{b}\right]+\tan\left[\frac{\pi}{4}-\frac{1}{2}\cos^{-1}\frac{a}{b}\right]=\frac{2b}{a}$.

Q12. Using properties of determinants, evaluate: $\begin{vmatrix}(x-2)^2 & (x-1)^2 & x^2\\ (x-1)^2 & x^2 & (x+1)^2\\ x^2 & (x+1)^2 & (x+2)^2\end{vmatrix}$.

Q13. If $\sqrt{1-x^6}+\sqrt{1-y^6}=a^3\left(x^3-y^3\right)$ then, show that $\frac{dy}{dx}=\frac{x^2}{y^2}\sqrt{\frac{1-y^6}{1-x^6}}$.

OR If $y=x\log\left(\frac{x}{a+bx}\right)$, then show that $x^3\frac{d^2y}{dx^2}=\left(x\frac{dy}{dx}-y\right)^2$.

Q14. Prove that the sum of intercepts of the tangent to the curve $\sqrt{x}+\sqrt{y}=\sqrt{a}$ upon the coordinate axes is of constant length.

Q15. If $x^p.y^q=(x+y)^{p+q}$ then, prove that $\frac{dy}{dx}=\frac{y}{x}$. Hence show that $\frac{d^2y}{dx^2}=0$.

Q16. Evaluate: $\int_0^1\tan^{-1}\left(\frac{2x-1}{1+x-x^2}\right)dx$. **OR** Evaluate: $\int_0^1\cot^{-1}\left(1-x+x^2\right)dx$.

Q17. Solve: $y\sin x\frac{dy}{dx}=\cos x\left(\sin x-\frac{y^2}{2}\right),\ y\left(\frac{\pi}{2}\right)=1$.

Q18. 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 $(1,2,3)$.

Q19. **a)** Let $f:\mathrm{R}\to\mathrm{R}$ be given by $f(x)=\frac{x^2+4x+30}{x^2-8x+18}$. Is f a one- one function?

b) Find the range of $f(x)=\frac{|x-3|}{x-3}$.

Q20. Decompose the vector $6\hat{i}-3\hat{j}-6\hat{k}$ into the vectors which respectively are parallel and perpendicular to the vector $\hat{i}+\hat{j}+\hat{k}$.

OR 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 $\vec{a}.\vec{c}=3$.

Q21. Find $\mathrm{P}(|x-4|\le 2)$ if x follows a Binomial Distribution with the mean 4 and variance 2.

Q22. Solve: $\left(\frac{e^{-2\sqrt{x}}}{\sqrt{x}}-\frac{y}{\sqrt{x}}\right)\frac{dx}{dy}=1,\ x\neq 0$. **OR** Solve: $\frac{dy}{dx}+x\sin 2y=x^3\cos^2 y$.

SECTION – C

Q23. A point P is given on the circumference of a circle of radius *r*. A chord QR is parallel to the tangent line at P. Find the maximum area of the triangle PQR.

Q24. Solve the following system of equations using matrix:

$\frac{2}{x}+\frac{3}{y}+\frac{10}{z}=4,\ \frac{4}{x}-\frac{6}{y}+\frac{5}{z}=1,\ \frac{6}{x}+\frac{9}{y}-\frac{20}{z}=2;\ x,y,z\neq 0$.

OR Find the inverse of $\begin{bmatrix}1 & 3 & -2\\ -3 & 0 & -1\\ 2 & 1 & 0\end{bmatrix}$ using elementary transformations.

Q25. Using integration, find area of the triangle formed by positive *x*-axis and the tangent and the normal to the curve $x^2+y^2=4$ at $(1,\sqrt{3})$.

Q26. 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?

Q27. Find the distance of the point $\mathrm{P}(-2,3,-4)$ from the line $\frac{x+2}{3}=\frac{2y+3}{4}=\frac{3z+4}{5}$ measured parallel to the plane $4x+12y-3z+1=0$.

OR Find the distance of the point $\mathrm{P}(1,-2,3)$ from the plane $x-y+z=5$ measured parallel to the line $\frac{x}{2}=\frac{y}{3}=\frac{z}{-6}$.

Q28. There are two types of fertilizers F_1 and F_2. F_1 consists of 10% nitrogen and 6% phosphoric acid and F_2 consists of 5% nitrogen and 10% phosphoric acid. After testing the soil conditions, a farmer finds that she needs at least 14kg of nitrogen and 14kg of phosphoric acid for her crop. If F_1 costs Rs 6/kg and F_2 costs Rs 5/kg, determine how much of each type of fertilizer should be used so that nutrient requirements are met at a minimum cost. What is the minimum cost?

Q29. Evaluate: $\int\sqrt{\frac{1-\sqrt{x}}{1+\sqrt{x}}}dx$.

ANSWERS OF SAMPLE TEST PAPER SET – B

Q01. x **Q02.** $-2\sqrt{16-\sin^{-1}x}+k$ **Q03.** $\left[\frac{\pi}{2},\frac{3\pi}{2}\right]-\{\pi\}$ **Q04.** $\begin{bmatrix}11 & 5\\ 7 & 3\end{bmatrix}=\begin{bmatrix}2 & 3\\ 1 & 2\end{bmatrix}\begin{bmatrix}1 & 1\\ 3 & 1\end{bmatrix}$

Q05. $a^2+b^2+c^2+d^2$ **Q06.** $\begin{bmatrix}1 & 2 & 3\\ 2 & 4 & 6\\ 3 & 6 & 9\end{bmatrix}$ **Q07.** $\frac{\pi}{3}$ **Q08.** $\frac{1}{2}$ **Q09.** 12 **Q10.** $\pm\frac{1}{\sqrt{3}},\pm\frac{1}{\sqrt{3}},\pm\frac{1}{\sqrt{3}}$

Q12. -8 **Q16.** 0 **OR** $\frac{\pi}{2}-\log 2$ **Q17.** $y^2=\sin x$ **Q18.** $(-2,-1,3),\left(\frac{56}{17},\frac{43}{17},\frac{111}{17}\right)$

Q19.a) No **(b)** $\{-1,1\}$ **Q20.** $-\hat{i}-\hat{j}-\hat{k},\ 7\hat{i}-2\hat{j}-5\hat{k}$ **OR** $\frac{1}{3}\left(5\hat{i}+2\hat{j}+2\hat{k}\right)$

Q21. $\frac{119}{128}$ **Q22.** $y=\left(2\sqrt{x}+k\right)e^{-2\sqrt{x}}$ **OR** $2\tan y=x^2-1+ke^{-x^2}$ **Q23.** $\frac{3\sqrt{3}}{4}r^2$ *sq.units*

Q24. $x=2,y=3,z=5$ **OR** $\begin{bmatrix}1 & -2 & -3\\ -2 & 4 & 7\\ -3 & 5 & 9\end{bmatrix}$ **Q25.** $2\sqrt{3}$ *sq.units* **Q26.** $\frac{1}{52}$

Q27. $\frac{17}{2}$ *units* **OR** 1 *unit* **Q28.** Fertilizer F_1: $100kg$; fertilizer F_2: $80kg$; Minimum cost: Rs.1000

Q29. $\sqrt{1-x}\left(\sqrt{x}-2\right)-\sin^{-1}\sqrt{x}+k$

Hii,

This is the last sample paper I'm providing here for the benefit of the students of Maths of class XII for the session 2012-13. I hope that my efforts may have proved beneficial in your preparations for your Maths exam.

Dear students,

I want to ask you for a favour. I am a die-hard lover of Mathematics. Still there is something that is bothering me too much now since long. It is affecting me that much that I'm unsure of pursuing my teaching carrier any further. I'm sorry that I can't provide you the details here.

I just wish if you could take out 2 minutes out of your hectic schedule to pray to God to show me the right path! I hope you will understand my sentiments. Please help me if you think you should.

Always with you,
OP Gupta
+91-9650 350 480

Good luck & God bless you all!

For solved papers of previous years CBSE board exams, please visit:

Visit at: www.theOPGupta.WordPress.com