PLEASURE TEST REVISION SERIES
MATHEMATICS

CBSE
Examinations 2012-2013

Max. Marks: 100 | **By: OP GUPTA (+91-9650 350 480)** | **Time: 180 Minutes**

General Instructions:

a) Note that all the questions are compulsory.

b) The question paper consists of 29 questions divided into three sections A, B and C. Section A comprises of 10 questions of one mark each, Section B comprises of 12 questions of four marks each, and Section C comprises of 7 questions of six marks each. All question

c) ns in section A are to be answered in one word, one sentence or as per the exact requirements of the question.

d) There is no overall choice. However internal choice has been provided in some of the cases.

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: $\int_0^{3/2}[x]dx$, where $[x]$ 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 $x^p.y^q=\left(x+y\right)^{p+q}$ 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 $\left(1,2,3\right)$.

Q19. **a)** Let $f:\mathrm{R}\to\mathrm{R}$ be given by $f\left(x\right)=\frac{x^2+4x+30}{x^2-8x+18}$. 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 $\mathrm{P}\left(|x-4|\le 2\right)$ if x follows a Binomial Distribution with the mean 4 and variance 2.

Q22. Solve the differential equation: $\left(\frac{e^{-2\sqrt{x}}}{\sqrt{x}}-\frac{y}{\sqrt{x}}\right)\frac{dx}{dy}=1,\ x\neq 0$.

OR Solve the differential equation: $\frac{dy}{dx}+x\sin 2y=x^3\cos^2 y$.

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 $P(-2,3,-4)$ 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 $P(1,-2,3)$ 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 the integral: $\int\sqrt{\frac{1-\sqrt{x}}{1+\sqrt{x}}}dx$.

ANSWERS OF PLEASURE TES REVISION SERIES

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

May God bless you all... Good luck!

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