TARGET MATHEMATICS by Dr. AGYAT GUPTA

The Excellence Key...

(M.Sc, B.Ed., M.Phill, P.hd)

CODE:2701- AG-TS-4 **REGNO:-TMC -D/79/89/36/63**

General Instructions :-

(i) **All** Question are compulsory :

(ii) This question paper contains **29** questions.

(iii) Question **1-4** in **Section A** are very sort-answer type question carrying **1** mark each.

(iv) Question **5-12**in **Section B** are sort-answer type question carrying **2** mark each.

(v) Question **13-23** in **Section C** are long-answer-**I** type question carrying **4** mark each.

(vi) Question **24-29** in **Section D** are long-answer-**II** type question carrying **6** mark each

(vii) There is no overall choice. However, internal choice has been provided in 3 question of four marks and 3 questions of six marks each. You have to attempt only one lf the alternatives in all such questions.

(viii) Use of calculator is not permitted.

(ix) Please check that this question paper contains 6 printed pages.

(x) Code number given on the right hand side of the question paper should be written on the title page of the answer-book by the candidate.

PRE-BOARD EXAMINATION 2018-19

CLASS – XII **CBSE** **MATHEMATICS**

PART – A (Question 1 to 4 carry 1 mark each.)

Q.1	For what value of k, the matrix $\begin{pmatrix} 2k+3 & 4 & 5 \\ -4 & 0 & -6 \\ -5 & 6 & -2k-3 \end{pmatrix}$ is skew symmetric ?
Q.2	Find an angle β, which increases twice as fast as its sine **.**
Q.3	Find the value of m and n, where m and n are order and degree of differential equation $\dfrac{4\left(\dfrac{d^2y}{dx^2}\right)^3}{\dfrac{d^3y}{dx^3}} + \dfrac{d^3y}{dx^3} = x^2 - 1$.
Q.4	Write the equation of the plane containing the lines $\vec{r} = \vec{a} + \lambda\vec{b}$ & $\vec{r} = \vec{a} + \mu\,\vec{c}$. **OR** Find the coordinates of the point where the line through (5, 1, 6) and (3, 4, 1) crosses the YZ-plane.
	PART – B (Question 5 to 12 carry 2 mark each.)
Q.5	Let * be a binary operation Q^+ , the set of all positive integers, defined by $a*b=\dfrac{ab}{100}$, for a, b $\in Q^+$. Find the inverse of 0.1.
Q.6	If the value of third order determinant is 12, than find the value of the determinant formed by its cofactors .
Q.7	Evaluate: $\displaystyle\int_{-1}^{1} \frac{x+\lvert x\rvert+1}{x^2+2\lvert x\rvert+1}dx$.
Q.8	Evaluate: $\displaystyle\int \frac{1}{x^3(x^5+1)^{3/5}}dx$. **OR** Evaluate : $\displaystyle\int (2\sin 2x - \cos x)\left(\sqrt{6-\cos^2 x - 4\sin x}\right)dx$
Q.9	Obtain a differential equation of the family of circles touching the x-axis at origin.

Q.10	If a unit vector $\vec{a}$ makes angles $\frac{\pi}{4}$ and $\frac{\pi}{3}$ with x –axis and y – axis respectively and an acute angle θ with z-axis, then find θ and the (scalar and vector) components of $\vec{a}$ along the axes. **OR** Find the scalar m, such that the scalar product of $\hat{i}+\hat{j}+\hat{k}$ with the unit vector parallel to the sum of $2\hat{i}+4\hat{j}-5\hat{k}$ and $m\hat{i}+2\hat{j}+3\hat{k}$ is equal to unity.
Q.11	A card is drawn from a well shuffled pack of 52 cards. The outcome is noted and pack is again Reshuffled without replacing the card. Another card is then drawn. What is the probability that the first card is a spade and second is a black king. **OR** In a school, there are 1000 students, out of which 430 are girls. It is known that out of 430, 10% of the girls study in class XII. What is the probability that a student chosen randomly studies in Class XII given that the chosen student is a girl ?
Q.12	Three cards are drawn successively, without replacement from a pack of 52 well shuffled cards. What is the probability that first two cards are kings and the third card drawn is an ace?
	PART – C (Question 13 to 23 carry 4 mark each.)
Q.13	Prove that : $2\tan^{-1}\frac{1}{5}+\sec^{-1}\frac{5\sqrt{2}}{7}+2\tan^{-1}\frac{1}{8}=\frac{\pi}{4}$.
Q.14	If $p\neq 0, q\neq 0$ and $\begin{vmatrix} p & q & p\alpha+q \\ q & r & q\alpha+r \\ p\alpha+q & q\alpha+r & 0 \end{vmatrix}=0$, then, using properties of determinants, prove that at least one of the following statements is true (a) p,q,r, are in G.P.,(b) α is a root of the equation $px^2+2qx+r=0$.

Q.15	If $y=\frac{x\sin^{-1}x}{\sqrt{(1-x^2)}}+\log\sqrt{1-x^2}$. Prove that $\frac{dy}{dx}=\frac{\sin^{-1}x}{(1-x^2)^{3/2}}$. **OR** Is $f(x)=\lvert x-1\rvert+\lvert x-2\rvert$ continuous and differentiable at x = 1,2 .
Q.16	If x cos(a+y)= cos y then prove that $\frac{dy}{dx}=\frac{\cos^2(a+y)}{\sin a}$. Hence show that $\sin a\frac{d^2y}{dx^2}+\sin 2(a+y)\frac{dy}{dx}=0$.
Q.17	Find the interval in which f(x) = sin 3x – cos 3x , $x\in(0,\pi)$, is strictly increasing or strictly decreasing .
Q.18	Evaluate $\int_0^a \sin^{-1}\sqrt{\frac{x}{a+x}}dx$.
Q.19	Evaluate: $\int\frac{e^{\tan^{-1}x}}{(1+x^2)^2}dx$.
Q.20	From the point P (a, b, c), perpendiculars PL and PM are drawn to YZ and ZX planes respectively. Find the equation of the plane OLM .
Q.21	The volume of spherical balloon being inflated changes at a constant rate. If initially its radius is 3 units and after 3 seconds it is 6 units. Find the radius of balloon after t seconds. **OR** Find the particular solution of the differential equation $\frac{dy}{dx}+y\cot x=2x+x^2\cot x\,(x\neq 0)$ given that y = 0 when $x=\frac{\pi}{2}$.
Q.22	If $\vec{a},\vec{b},\vec{c}$ are unit vectors such that $\vec{a}.\vec{b}=\vec{a}.\vec{c}=0$ and the angle between $\vec{b}$ and

	$\vec{c}$ is $\frac{\pi}{6}$, then prove that (i) $\vec{a} = \pm 2(\vec{b}\times\vec{c})$, (ii) $[\vec{a}+\vec{b}\ \ \vec{b}+\vec{c}\ \ \vec{c}+\vec{a}] = \pm 1$.
Q.23	A binary operation * is defined on the set R of real numbers by $a*b = \begin{cases} a & if \quad b=0 \\ \lvert a\rvert + b & if \quad b \neq 0 \end{cases}$. If at least one of a and b is 0 , then prove that a*b = b*a . Check whether * is commutative . Find the identity element for * , if it exists. **OR** If $f: R-\left\{\frac{7}{5}\right\} \to R-\left\{\frac{3}{5}\right\}$ be defined as $f(x)=\frac{3x+4}{5x-7}$ & $g: R-\left\{\frac{3}{5}\right\} \to R-\left\{\frac{7}{5}\right\}$ be defined as $g(x)=\frac{7x+4}{5x-3}$. Prove that $gof = I_A$ & $(fog) = I_B$ where $B = R-\left\{\frac{3}{5}\right\}$ & $A = R-\left\{\frac{7}{5}\right\}$.Find also g^{-1}, f^{-1} & $(gof)^{-1}$.
	PART – D **(Question 24 to 29 carry 6 mark each.)**
Q.24	If $A = \begin{bmatrix} 3 & 1 & 2 \\ 3 & 2 & -3 \\ 2 & 0 & -1 \end{bmatrix}$, Using elementary row transformation find A^{-1}. Hence, solve the system of equations:3x+3y+2z = 1 ; x+2y =4 ;2x –3y–z =5 .
Q.25	A cubical shaped godown with square base is to be constructed. Three times as much cost per square meter is incurred for constructing the roof as compared to the walls. Find the dimensions of the godown if it is to enclose a given volume and minimize the cost of constructing the roof and the walls. **OR** A given rectangular area is to be fenced off in a field whose length lies along a straight river. If no fencing is needed along the river, show that the least length of fencing will be required when length of the field is twice its breadth.

Visit us at www.agyatgupta.com

Q.26	Find the area bounded by the curves $y=\sqrt{x}, 2y+3=x$ and x – axis. **OR** Using integration, find the area of the region bounded by the line $x-y+2=0$ the curve $x=\sqrt{y}$ and y-axis.
Q.27	A doctor is to visit a patient. From the past experience, it is known that the probabilities that he will come by train, bus, scooter or by other means of transport are respectively $\frac{3}{10}, \frac{1}{5}, \frac{1}{10}$ & $\frac{2}{5}$. The probabilities that he will be late are $\frac{1}{4}, \frac{1}{3}$ & $\frac{1}{12}$ if he comes by train, bus and scooter respectively, but if he comes by other means of transport, then he will not be late. When he arrives, he is late. What is the probability that he comes by train? Public transport should be encouraged.' Why?
Q.28	Find the equation of the plane passing through the line of intersection of the planes x - 2y +z = 1and 2x + y + z = 8 and parallel to the line with direction ratio 1,2,1. Also find the distance of P(1,-2,-2) from this plane measured along a line parallel to r = t (i – 2j – 5k) . **OR** Find the points on the lines $\frac{x-6}{3} = -(y-7) = (z-4)$ and $\frac{x}{-3} = \frac{y+9}{2} = \frac{z-2}{4}$ which are nearest to each other. Hence find the shortest distance between the given lines.
Q.29	A cooperative society of farmers has 50 hectare of land to grow two crops X and Y. The profit from crops X and Y per hectare are estimated as Rs 10,500 and Rs 9,000 respectively. To control weeds, a liquid herbicide has to be used for crops X and Y at rates of 20 litres and 10 litres per hectare. Further, no more than 800 litres of herbicide should be used in order to protect fish and wild life using a pond which collects drainage from this land. How much land should be allocated to each crop so as to maximize the total profit of the society?
	कम्फर्ट जोन से बाहर निकालिए, आप तभी आगे बढ़ सकते है जब आप कुछ नया आज़माने को तैयार है