Code No. **Series AG-FB** **TMG -D/79/89**

Year of Quality education 18th

- Please check that this question paper contains 3 printed pages.
- 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.
- Please check that this question paper contains 29 questions.

General Instructions: -

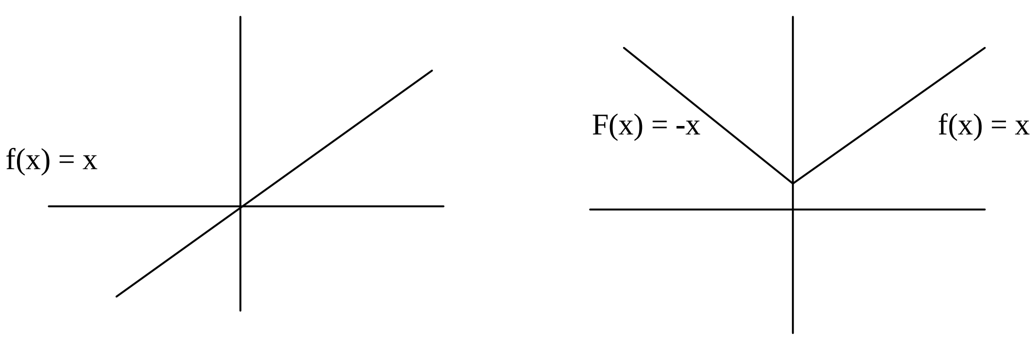
1. All questions are compulsory.
2. The question paper consists of 29 questions divided into three sections A, B and C. Section A contains 10 questions of 1 marks each, Section B is of 12 questions of 4 marks each and Section C is of 7 questions of 6 marks each.
3. Write the serial number of the question before attempting it.
4. If you wish to answer any question already answered, cancel the previous answer.
5. In questions where internal choices is provided. You must attempt only one choice.

Pre-Board Examination 2009 -10

Time: 3 hrs. ***M.M.: 100***

CLASS – XII *MATHEMATICS*

Section A

Q.1	If $A=\begin{bmatrix}1&1&1\\0&1&3\\1&K&1\end{bmatrix}$, *Find k, If Cofactor of* a_{11} *is twice the cofactor of* a_{23}
Q.2	Check the monotonocity i.e increasing & decreasing of $f(x)=\cos 2x, [\pi/2, \pi]$.
Q.3	*Let* $\vec{a}=5\vec{i}-\vec{j}+7\vec{k}$, $\vec{b}=\vec{i}-\vec{j}+\lambda\vec{k}$ *Find* λ *such that* $\vec{a}+\vec{b}$ *and* $\vec{a}-\vec{b}$ *are perpendicular.*
Q.4	Find $(\vec{i}\times\vec{j})\bullet\vec{k} + (\vec{k}\times\vec{j})\bullet\vec{i} - (\vec{i}\times\vec{k})\bullet\vec{j}$
Q.5	Which one of the following graphs represents an identity function? Why? 
Q.6	If $\lvert\vec{a}\times\vec{b}\rvert=4$, $\lvert\vec{a}.\vec{b}\rvert=2$, then find $\lvert\vec{a}\rvert^2\lvert\vec{b}\rvert^2$.
Q.7	Find the angle made by the vector i – 4j + 8k with the z – axis.

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Q.8	Given P(A) = 1/2, P(B) = 1/3 and P(A U B) = 2/3. Are the events A and B independent?
Q.9	If $\lvert A \rvert = 3$ *find the* $\lvert A^{-1} \rvert$.
Q.10	Find $\int_{-\pi}^{\pi} \left(\sin^{-93} x + x^{295} \right) dx$.
	Section B
Q.11	Let A = {-1, 0, 1, 2}, B = {-4, -2, 0, 2} and f,g ?A B be functions defined by $f(x) = x^2 - x, x \in$ A and $g(x) = 2\left\lvert x - \frac{1}{2} \right\rvert - 1, x \in$ A are f and g equal. Justify your answer.
Q.12	Prove that the curves $y^2 = 4ax$ and $x\,y = c^2$ cut at right angles if $c^4 = 32\,a^4$. Or Find the equation of tangent to the curve $y = \sqrt{3x-2}$ which is parallel to the line $4x - 2y + 5 = 0$.
Q.13	Prove that $\begin{vmatrix} a & b-c & c+b \\ a+c & b & c-a \\ a-b & b+a & c \end{vmatrix} = (a+b+c)(a^2+b^2+c^2)$.
Q.14	Evaluate : $\int_0^{\pi/2} \frac{x \sin x \cos x}{\sin^4 x + \cos^4 x} dx$.
Q.15	Show that the function $f(x) = \begin{cases} \dfrac{e^{\frac{1}{x}} - 1}{e^{\frac{1}{x}} + 1} & if \;\; x \neq 0 \\ 0 & if \;\; x = 0 \end{cases}$ is discontinuous at x = 0 .
Q.16	Form the differential equation of the family of circles touching the y axis at the origin. **Or** Solve the differential equation $\frac{dy}{dx}$ - 3y cotx = sin2x ; y = 2 when x = $\frac{\pi}{2}$.
Q.17	Evaluate : $\int_{-1}^{1} \{ x + [x] \} dx$.
Q.18	*A* speaks truth in 60% of the cases and *B* in 70% of the cases. In what percentages of cases they are likely to (i)contradict each other(ii) agree with each other, in stating same fact?
Q.19	If $\vec{a} = \vec{i} + \vec{j} + \vec{k}$, $\vec{c} = \vec{j} - \vec{k}$ are given vectors, find a vector $\vec{b}$ satisfying the equation $\vec{a} \times \vec{b} = \vec{c}$ and $\vec{a} \bullet \vec{b} = 3$. **or** Let $\vec{a} = 2\vec{i} + \vec{k}$, $\vec{b} = \vec{i} + \vec{j} + \vec{k}$ and $\vec{c} = 4\vec{i} - 3\vec{j} + 3\vec{k}$ be three vectors , find a vector $\vec{r}$ which satisfies $\vec{r} \times \vec{b} = \vec{c} \times \vec{b}$ and $\vec{r} \bullet \vec{a} = 0$.
Q.20	Prove that: $4\tan^{-1}\frac{1}{5} - \tan^{-1}\frac{1}{70} + \tan^{-1}\frac{1}{99} = \frac{\pi}{4}$. **Or** *Solve* $\sin^{-1} x + \sin^{-1}(1-x) = \cos^{-1} x$.

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Q.21	If $y=\log\left(\sqrt{x}+\frac{1}{\sqrt{x}}\right)$, prove that $\frac{dy}{dx}=\frac{x-1}{2x(x+1)}$.
Q.22	Find the vector equation of the line passing through (1,2,3) and parallel to the planes $\vec{r}\cdot(\hat{i}-\hat{j}+2\hat{k})=5$ and $\vec{r}\cdot(3\hat{i}+\hat{j}+\hat{k})=6$. **Or** Find the vector and Cartesian equation of the plane containing the two lines $\vec{r}=2i+j-3k+\lambda(i+2j+5k)$; $\vec{r}=2i+j-3k+\mu(3i-2j+5k)$. Also find the inclination of this plane with the XZ plane .
	Section C
Q.23	Find the inverse of the matrix $\begin{bmatrix}-1 & 2 & 5\\ 2 & -3 & 1\\ -1 & 1 & 1\end{bmatrix}$ using element y transformation.
Q.24	Suppose the reliability of HIV test is specified as follows. Of people having HIV, 90% of the test detects the disease but 10% go undetected. Of people not having HIV, 99% of the test is judged HIV –ve but 1% are diagnosed as showing HIV + ve. From a large population of which only 0.1% has HIV, one person is selected at random, given the HIV test, and the pathologist reports as HIV +ve. What is the probability that the person actually has HIV? **Or** A fair die is rolled. If 1 turns up, a ball is picked up at random from bag A, if 2 or 3 turns up, a ball is picked up at random from bag B, otherwise a ball is picked up from bag C. Bag A contains 3 red and 2 white balls, bag B contains 3 red and 4 white balls and bag C contains 4 red and 5 white balls. The die is rolled, a bag is picked up and a ball is drawn from it. If the ball is red, what is the probability that bag B was picked up?
Q.25	Evaluate: $\int\frac{x^2}{(x\sin x+\cos x)^2}dx.$
Q.26	Find the area of the region in the first quadrant enclosed by the line y = x and the circle $x^2+y^2=32$.
Q.27	Kellogg is a new cereal formed of a mixture of barn and rice that contain at least 88 gram of protein and 36 milligram of iron .knowing that barn contain 80 gram of protein and 40 milligram of iron per kg and that rice contain 100 gram of protein and 30milligram of iron per kg, find the minimum cost of producing this new cereal if bran cost Rs 5 per kg and rice cost Rs 4 per kg.
Q.28	Define the line of shortest distance between two skew lines .Find the magnitude and the equation of the line of the shortest distance between the following lines : $\frac{x}{2}=\frac{y}{-3}=\frac{z}{1}$ and $\frac{x-2}{3}=\frac{y-1}{-5}=\frac{z+2}{2}$. **Or** A variable plane which is at a constant distance p form the origin meets the coordinate axes in points A, B and C respectively. Through these points, planes are drawn parallel to the coordinates planes, show that locus of the point of intersection is $\frac{1}{x^2}+\frac{1}{y^2}+\frac{1}{z^2}=\frac{1}{p^2}$.
Q.29	Find the dimensions of the rectangle of perimeter 36cm which will sweep out a volume as large as possible when revolve about one of its sides. Also find the maximum volume.

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