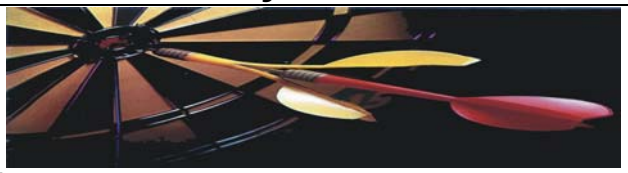

Year of Quality education 18th

Code No. **Series AG-F5** **TMG-D/79/89**

- 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

| | |
|---|---|
| **Q.1** | Find the value of k for which the matrix $\begin{pmatrix} k & 2 \\ 3 & 4 \end{pmatrix}$ has no inverse. |
| **Q.2** | *If* $Sin\left(\sin^{-1}\frac{1}{5}+\cos^{-1}x\right)=1$ *, then find the values of* $x$ *.* |
| **Q.3** | Evaluate: $\int \frac{e^{5\log x}-e^{4\log x}}{e^{3\log x}-e^{2\log x}}dx$ . |
| **Q.4** | Write the value of $\sin\left(\frac{\pi}{3}-\sin^{-1}\left(\frac{-1}{2}\right)\right)$. |
| **Q.5** | If the following matrix is skew symmetric, find the values of a, b, c. $A=\begin{bmatrix} 0 & a & 3 \\ 2 & b & -1 \\ c & 1 & 0 \end{bmatrix}$ |
| **Q.6** | Write the equation of plane passing through (1,2,3) and perpendicular to line $\frac{x-1}{1}=\frac{y-1}{1}=\frac{z-2}{-1}$ in vector form . |
| **Q.7** | The radius of a circular plate increases at the rate of 0.1 cm/sec. At what rate does the area increases when the radius of the plate is 25 cm? |
| **Q.8** | Evaluate : $\sec^2(\tan^{-1}2)+\text{cosec}^2(\cot^{-1}3)$ . |
| **Q.9** | If $x\begin{bmatrix}2\\3\end{bmatrix}+y\begin{bmatrix}-1\\1\end{bmatrix}=\begin{bmatrix}10\\5\end{bmatrix}$, Find x and y. |



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| | |
|---|---|
| **Q.10** | Show that the lines $\frac{x+3}{-3}=\frac{y-1}{1}=\frac{z-5}{5}$ and $\frac{x+1}{-1}=\frac{y-2}{2}=\frac{z-5}{5}$ are coplanar. |
| | **Section B** |
| **Q.11** | Find the domain and Range of the following function given by $f(x)=\frac{x}{x^2-3x+2}$. |
| **Q.12** | A bag contains 5 red, 6 white and 7 black balls. Two balls are drawn at random. What is the probability that both balls are different colour ? |
| **Q.13** | Evaluate: $\int x\left(\tan^{-1}x\right)^2 dx$ . |
| **Q.14** | Show that f(x) = $\lvert x-3\rvert, \forall x \in R$ , is continuous but not differentiable at x = 3. |
| **Q.15** | At what points on the curve $x^2+y^2-2x-4y+1=0$ ,is the tangent parallel to y-axis?<br>Or<br>For the curve $y=4x^3-2x^5$, find all point at which the tangent passes through origin. |
| **Q.16** | Solve the differential equation: $x\cos\frac{y}{x}\left(ydx+xdy\right)=y\sin\frac{y}{x}\left(xdy-ydx\right)$. |
| **Q.17** | Evaluate : $\int_{-5}^{0} f(x)\,dx$, where $f(x)=\lvert x\rvert+\lvert x+3\rvert+\lvert x+6\rvert$. |
| **Q.18** | If a, b, c are all positive and distinct, show that $\Delta=\begin{vmatrix} a & b & c \\ b & c & a \\ c & a & b \end{vmatrix}$ has a negative value. |
| **Q.19** | Using vectors prove that in a triangle ABC, cosA = $\frac{b^2+c^2-a^2}{2bc}$, a, b and c are sides opposite to A,B and C respectively.<br>Or<br>If $\vec{a}=\hat{i}-2\hat{j}+3\hat{k}$ & $\vec{b}=3\hat{i}+\hat{j}+2\hat{k}$, find a unit vector which is linear combination of $\vec{a}$ & $\vec{b}$ and is also perpendicular to $\vec{a}$. |
| **Q.20** | If $\cos^{-1}\frac{x}{a}+\cos^{-1}\frac{y}{b}=\alpha$ , prove that $\frac{x^2}{a^2}-\frac{2xy}{ab}\cos\alpha+\frac{y^2}{b^2}=\sin^2\alpha$ . |
| **Q.21** | Evaluate: $\frac{dy}{dx}$ if $y=\frac{x}{2}\sqrt{x^2-16}-8\log\left\lvert x+\sqrt{x^2-16}\right\rvert+C$.<br>Or<br>If $(x-a)^2+(y-b)^2=c^2$, for some c > 0, prove that $\frac{\left[1+\left(\frac{dy}{dx}\right)^2\right]^{3/2}}{\frac{d^2y}{dx^2}}$ is a constant independent of a and b. |
| **Q.22** | Find the equation of the line passing through the point P(4, 6, 2) and the point of intersection of the line $\frac{x-1}{3}=\frac{y}{2}=\frac{z+1}{7}$ and the plane x + y – z = 8 .<br>Or |



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Find the equation of the plane passing through the point $2\hat{i} - \hat{k}$ and parallel to the lines $\frac{x}{-3} = \frac{y-2}{4} = z+1$ and $x-4 = \frac{1-y}{2} = 2z$.

## Section C

**Q.23** If $A = \begin{pmatrix} 2 & -1 & 1 \\ -1 & 2 & -1 \\ 1 & -1 & 2 \end{pmatrix}$, verify that $A^3 - 6A^2 + 9A - 4I_3 = 0$. Hence find $A^{-1}$.

**Q.24** Two godowns A and B have grain capacity of 100 quintals and 50 quintals respectively. They supply to 3 ration shops D, E and F whose requirements are 60, 50 and 40 quintals respectively. The cost of transportation per quintal from godowns to the shops is given below:

| Transportation cost per quintal (in Rs) | | |
|---|---|---|
| From / To | A | B |
| D | 6 | 4 |
| E | 3 | 2 |
| F | 2.50 | 3 |

How should the supplies be transported in order that the transportation cost is minimum?

**Q.25** Evaluate (i) $\int \frac{dx}{\sqrt{\sin^3 x \sin(x+\alpha)}}$ (ii) $\int \frac{\sin x + \cos x}{\cos^2 x + \sin^4 x}\,dx$.

**Q.26** Find the area bounded by the curve $y^2 = 4a^2(x-1)$ and the lines x=1 and y=4a .

**Q.27** Three dice are thrown simultaneously. If X denotes the number of sixes, find the expectation of X.

Or

A card from a pack of 52 cards is dropped. From the remaining cards two cards are drawn and are found to be red. Find the probability that the dropped card is red .

**Q.28** Find the equation of the plane parallel to line $\frac{x}{1} = \frac{y-7}{-3} = \frac{z+7}{2}$ and containing the lines $\frac{x+1}{-3} = \frac{y-3}{2} = \frac{z+2}{1}$ in vector and Cartesian form ,also find distance of plane from origin .

**Q.29** A rectangular sheet of paper for a poster is 15000 sq. cm. in area. The margins at the top and bottom are to be 6 cm. wide and at the sides 4 cm. wide. Find the dimensions of the sheet to maximize the printed area.

Or

A square tank of capacity 250 cubic metres has to be dug out. The cost of the land is Rs 50 per sq meter. The cost of digging increases with the depth and for the whole tank it is Rs $400h^2$, where h metres is the depth of the tank. What should be the dimension of the tank so that the cost be minimum ?

_____x_____



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