



Year of Quality education  
**18<sup>th</sup>**  
**TMG-D/79/89**

Code No. **Series AG-F1**

- 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 30 questions.

**General Instructions: -**

1. All questions are compulsory.
2. The question paper consists of 30 questions divided into three sections A, B, C and D. Section A contains 10 questions of 1 marks each, Section B is of 5 questions of 2 marks each, Section C is of 10 questions of 3 marks each and Section D is of 5 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.: 80**

**CLASS - X**

**MATHEMATICS**

**Section A**

<b>Q.1</b>	In right triangle ABC, right-angled at B, if $\tan A=1$ , write the value of $\sin A \cos A$ .
<b>Q.2</b>	An arc of a circle is of length $6\pi$ and the sector it bounds has an area $30\pi\text{cm}^2$ . Find the radius of the circle.
<b>Q.3</b>	From a well shuffled pack of 52 cards, one card is drawn at random. Find the probability that it is neither king nor club.
<b>Q.4</b>	In the fig if $\angle P = \angle RTS$ , prove that $\Delta RPQ \sim \Delta RTS$ .
<b>Q.5</b>	For what value of k, the following pair of linear equations has infinitely many solutions. $10x+5y-(k-5)=0$ ; $20x+10y-k = 0$ .
<b>Q.6</b>	Find the values of x for which the distance between the point. P(2,-3) and Q(x,5) is 10 units.
<b>Q.7</b>	Find If $y = e^x \cdot \cos x$ , prove that $\frac{dy}{dx} = \sqrt{2} e^x \cdot \cos\left(x + \frac{\pi}{4}\right)$ .

Q.8	What is the median class for the following grouped data?						
	Class	128-135	135-142	142-149	149-156	156-163	163-170
	Frequency	8	5	9	12	5	1
Q.9	Evaluate: $\int \frac{(x+1)(x+\log x)^2}{x} dx$ .						
Q.10	For what value of k, are the roots of the quadratic equation $kx^2 + 4x + 1 = 0$ equal and real?						
<b>Section B</b>							
Q.11	If two zeroes of the polynomial $x^4 + 3x^3 - 20x^2 - 6x + 36$ are $\sqrt{2}$ and $-\sqrt{2}$ . Find the other zeroes of the polynomial.						
Q.12	Using Euclid's division algorithm find the H.C.F of 56, 96 and 404. Or Prove that $(3 - \sqrt{5})$ is an irrational number.						
Q.13	A piggy bank contains hundred 50 paise coins, fifty Rs. 1 coins, twenty Rs. 2 coins and ten Rs. 5 coins. If it is equally likely that one of the coins will fall out when the bank is turned upside down, what is the probability that the coin: (i) will be 50 paise coin?      (ii) will not be a Rs. 5 coin?						
Q.14	Find the area of Quadrilateral ABCD whose vertices are A(-5,-3) B (-4,-6) C(2,-1) and D(1,2)						
Q.15	Find the intervals in which $f(x) = \cos(2x + \frac{\pi}{4})$ is strictly increasing or decreasing function on $(0, \pi)$  <b>Or</b> Water is dripping out from a conical funnel, at a uniform rate of $2\text{cm}^3/\text{sec}$ through a tiny hole at the vertex at the bottom, when the slant height of the water is 4cm, find the rate of decrease of the slant height of the water, given that the vertical angle of funnel is $120^\circ$ .						
<b>Section C</b>							
Q.17	If the 8 <sup>th</sup> term of an A.P. is 37 and the 15 <sup>th</sup> term is 15 more than the 12 <sup>th</sup> term, find the A.P. Hence find the sum of the first 15 terms of the A.P.						
Q.18	Construct a $\Delta ABC$ in which $CA=6\text{cm}$ , $AB=5\text{cm}$ and $\angle BAC=45^\circ$ , then construct a triangle similar to the given triangle whose sides are $\frac{6}{5}$ of the corresponding sides of the $\Delta ABC$ (Write steps of Construction).						
Q.19	The mid-points of the sides of a triangle are (3, 4) (4, 1) and (2, 0). Find the coordinates of the vertices of the triangle.						

**Q.20**

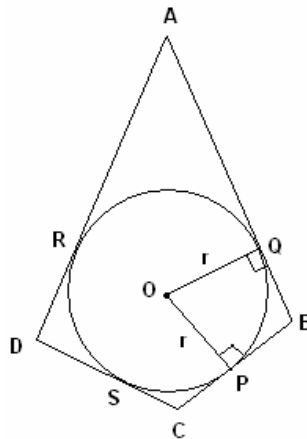
Prove that:  $\frac{\alpha^3}{2} \operatorname{cosec}^2\left(\frac{1}{2} \tan^{-1} \frac{\alpha}{\beta}\right) + \frac{\beta^3}{2} \sec^2\left(\frac{1}{2} \tan^{-1} \frac{\beta}{\alpha}\right) = (\alpha + \beta)(\alpha^2 + \beta^2)$ .

**Or**

Prove that  $\tan^{-1}\left(\sqrt{\frac{a-b}{a+b}} \tan \frac{\theta}{2}\right) = \frac{1}{2} \cos^{-1}\left(\frac{b + a \cos \theta}{a + b \cos \theta}\right)$ .

**Q.21**

In the given figure, a circle is inscribed in a quadrilateral ABCD in which angle B=90°. If AD=23 cm, AB=29 cm and DS=5 cm, find the radius of the circle.



**Q.22**

Prove that the image of the point (3,-2,1) in the plane  $3x - y + 4z = 2$  lies on the plane  $x + y + z + 4 = 0$ .

**Or**

Find the equation of the plane passing through the line of intersection of the planes  $x - 2y + z = 1$  and  $2x + y + z = 8$  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  $r = t(i - 2j - 5k)$ .

**Section C**

**Q.23**

If  $A = \begin{bmatrix} 0 & -\tan \frac{\alpha}{2} \\ \tan \frac{\alpha}{2} & 0 \end{bmatrix}$  and I is the identity matrix of order 2, show that

$$(I + A) = (I - A) \begin{pmatrix} \cos \alpha & -\sin \alpha \\ \sin \alpha & \cos \alpha \end{pmatrix}.$$

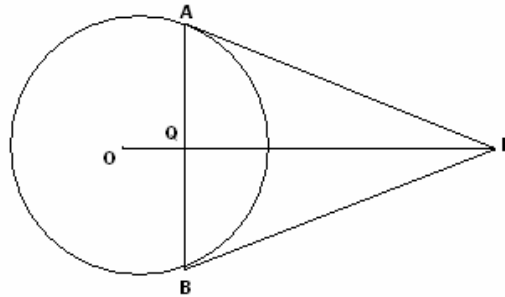
**Or**

Using elementary (row) transformation, find the inverse of a matrix

$$A = \begin{bmatrix} 2 & -3 & 3 \\ 2 & 2 & 3 \\ 3 & -2 & 2 \end{bmatrix}$$

<b>Q.24</b>	A diet for a sick person must contain at least 4000 units of vitamins, 50 units of minerals and 1400 calories. Two foods X and Y are available at a cost of Rs 4 and Rs 3 per unit respectively. One unit of food X contains 200 units of vitamins, 1 unit of minerals and 40 calories, whereas 1 unit of food Y contains 100 units of vitamins, 2 units of minerals and 40 calories. Find what combination of foods X and Y should be used to have least cost, satisfying the requirements. Make it an LPP and solve it graphically.																		
<b>Q.25</b>	Spherical marbles of diameter 1.4 cm each are dropped into a cylindrical beaker of radius 3.5 cm containing some water. Find the number of marbles that should be dropped in the beaker so that the water level in the beaker rises by 5.6 cm.  Or  A bucket is in the form of a frustum of a cone and holds 28.49 litres of milk. The radii of the top and bottom are 28 cm and 21 cm respectively. Find the height of the bucket.																		
<b>Q.26</b>	<b>Section D</b>																		
<b>Q.27</b>	The interior of building is in the form of a right circular cylinder of radius 7m and height 6m, surmounted by right circular cone of same radius and of vertical angle $60^\circ$ . Find the cost of painting the building from inside at the rate of Rs. 30 per $m^2$																		
<b>Q.28</b>	The following table shows the marks obtained by 100 students of class x in a school during a particular academic session. Find the mean and mode of this distribution  <table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;">Marks</th> <th style="text-align: left;">No. of students.</th> </tr> </thead> <tbody> <tr><td>Less than 10</td><td>7</td></tr> <tr><td>Less than 20</td><td>21</td></tr> <tr><td>Less than 30</td><td>34</td></tr> <tr><td>Less than 40</td><td>46</td></tr> <tr><td>Less than 50</td><td>66</td></tr> <tr><td>Less than 60</td><td>77</td></tr> <tr><td>Less than 70</td><td>92</td></tr> <tr><td>Less than 80</td><td>100</td></tr> </tbody> </table>	Marks	No. of students.	Less than 10	7	Less than 20	21	Less than 30	34	Less than 40	46	Less than 50	66	Less than 60	77	Less than 70	92	Less than 80	100
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<b>Q.29</b>	Prove that in a right triangle, the square on the hypotenuse is equal to the sum of the squares on the other two sides. Making use of the above, prove that following: In a rhombus ABCD, prove that $4AB^2 = AC^2 + BD^2$  OR Prove that the lengths of tangents drawn from an external point to a circle are equal. Making use of the above, prove the following:																		

From an external point P, two tangents PA and PB are drawn to a circle with centre O as shown in figure. Show that OP is the perpendicular bisector of AB.



From a point 100 m above a lake, the angle of elevation of stationary helicopter is  $30^\circ$  and angle of depression of the helicopter in the lake is  $60^\circ$ . Find the height of helicopter.

**OR**

The angle of elevation of an aeroplane from a point on the ground is  $60^\circ$ . After a flight of 15 seconds, the angle of elevation changes to  $30^\circ$ . If the helicopter is flying at a constant height of  $1500\sqrt{3}$  m, find the speed of aeroplane.

A person on tour has Rs 4,200 for his expenses. If he extends his tour for 3 days, he has to cut down his daily expenses by Rs 70. Find the original duration of the tour.