Class : 10
Date : January 21, 2008

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Mathematics
Section-A (40 marks) Answer all the questions in this section.

QI
a) The compound interest, calculated yearly on a certain sum of money for the second year is Rs. 880 and for the fourth year is Rs.1054.80. Calculate the rate of interest and the sum of money.
b) If $x^{2}+x-6$ is a factor of expression $x^{3}+a x^{2}+b x-12$, find the values of $a$ and $b$.
c) If $x \sqrt{a+b}+\sqrt{a-b}$

$$
\begin{equation*}
\frac{x}{y}=\frac{\sqrt{a+b}+\sqrt{a-b}}{\sqrt{a+b}-\sqrt{a-b}} \text {, prove that: } b x^{2}-2 a x y+b y^{2}=0 \tag{3}
\end{equation*}
$$

Time : 2 hr .30 min
Marks: 80
a) Solve the inequation.

$$
\begin{aligned}
& \text { Solve the inequation } \\
& -21 / 3+2 x \leqslant \frac{4 x}{5} \leqslant \frac{4}{3}+2 x, x \in W
\end{aligned}
$$

Graph the solution set on the number line.
b) Find the LCM and HCF of the polynomials: $24\left(2 x^{3}+3 x^{2}-2 x\right)$ and $\left(x^{4}+8 x\right)$
c) Mr Gupta has a Recurring Deposit Account of Rs 300 per month. If the rate of interest is $12 \%$ and maturity value of this account is Rs. 8100 , find the time (in years) of this Recurring Deposit Account.
$\begin{array}{rr}\text { Q 3. } \\ \text { a) }\end{array} \quad\left(\begin{array}{rr}8 & -2 \\ 1 & 4\end{array}\right) \mathrm{X}=\binom{12}{10}$, write down:
i) the order of matrix $X$.
ii) the matrix X .
b) Solve and find your answer correct to 2 decimal places.

$$
\sqrt{6} x^{2}-4 x=2 \sqrt{6}
$$

c) Construct a $\triangle \mathrm{ABC}$, such that $\mathrm{AB}=\mathrm{AC}=7 \mathrm{~cm}$ and $\mathrm{BC}=5 \mathrm{~cm}$. Draw a circle with center $A$ and radius $=4 \mathrm{~cm}$. Let this circle intersect $A B$ at $P$. Construct another circle which touches the circle drawn and BC .
Q4. Find $x$, if $\operatorname{Sin} 47^{\circ} \cdot \operatorname{Sec} 43^{\circ}+\operatorname{Cos} 43^{\circ} \cdot \operatorname{Cosec} 47^{\circ}-x \cos ^{2} 45^{\circ}=0$
b) In $\triangle A B C$, bisector of angle $\angle A$, meets $B C$ at $M$; prove that $A B: A C=B M: C M$
c) In the given figure, the diameter of the biggest semicircle is 108 cm and both the semicircles are equal in diameter. A circle is drawn which touches


## Section B (40 marks)

## Answer any four questions in this section.

Q 5.
a) Find the equation of the perpendicular bisector of the line segment joining the points $(4,-3)$ and $(3,1)$. This perpendicular bisector passes through (a, -1 ). Find a.
b) Prove that: $\frac{\tan A}{1-\cot A}+\frac{\cot A}{1-\tan A}=1+\tan A+\cot A$
c) From an exterior point $P$, a tangent PT and a secant PAB are drawn to a given circle. If $A$ and $B$ lie on the circumference of the circle, prove that:
$\mathrm{PA} \times \mathrm{PB}=\mathrm{PT}^{2}$.
Q 6.
a) A vessel is in the form of an inverted cone. Its height is 11 cm and the radius of its top, which is open, is 2.5 cm . It is filled with water upto the rim. When lead shots each of which is a sphere of radius 0.25 cm , are dropped into the vessel, $\frac{2}{5}$ of the water flows out. Find the number of lead shots dropped into the vessel.
b) Draw and give for the following distribution.
c)

| Income in Rs | $120-140$ | $140-160$ | $160-180$ | $180-200$ | $200-220$ | $220-240$ |
| :--- | :---: | :---: | :---: | :---: | :---: | :---: |
| No.of <br> employees | 30 | 72 | 90 | 80 | 70 | 28 |

Use the give drawn to determine:
i) the median income
ii) the number of employees whose income exceeds Rs. 190.

Q 7.
a) Calculate the mean, the median and the mode of the following distribution.

| Marks | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- |
| Frequency | 3 | 5 | 8 | 7 | 9 | 4 | 3 | 1 |

b) Rohit has a furniture shop in Delhi, He buys a dining table for Rs. 12,000 and sells it to a customer for Rs. 15,000 . Find the VAT paid by Rohit if the VAT rate is $10 \%$.
c) The difference between compound interest for a year payable half yearly and simple interest on a certain sum of money lent out at $10 \%$ for a year is Rs 45 . Find the sum of money lent out.
a) The point $P(5,-4)$ divides the line segment $A B$ in the ration 2:5. A and $B$ lies on $x$ - axis and $y$-axis respectively. Find the coordinates of points $A$ and $B$.
b) Use graph paper for the answer to this question:

Plot the points $A(8,2)$ and $B(6,4)$. These two points are the vertices of a figure which is symmetrical about $x=6$ and $y=2$. Complete the figure on the graph paper. Write down the geometrical name of the figure.
c) A trader bought a number of articles for Rs. 1200. Ten were darnaged and he sold each of the remaining articles at Rs. 2 more than what he paid for it, thus getting a profit of Rs, 60 on the whole transaction. Taking the number of articles he bought as $x$, form an equation in $x$ and solve it.
a) In the given figure, $A B$ is the diameter of the circle, with center $O$ and $A T$ is the tangent. Calculate the numerical value of $x$.

b) the angle of elevation of a stationary cloud from a point 25 m above a lake is $30^{\circ}$ and the angle of depression of its reflection in the lake is $60^{\circ}$. What is the height of the cloud above that lake level?
c) The points $P(4,1)$ and $Q(-2,4)$ are reflected in line $y=3$. Find the coordinates of $P^{1}$, the image of $P$ and $Q^{1}$, the image of $Q$. Hence find the length $P^{1} Q^{2}$
Q 10.
a) Mr Gupta has an annual income of Rs. 5,26,000. During the financial year, he invests Rs 55,000 in PPF and Rs 36,800 in LIC. For the same year, he pays (against the housing loan) Rs 43,500 as the principal amount and Rs. 82,840 as the interest on the loan. Calculate the tax to be paid by Mr Gupta at the end of the year if $\mathrm{Rs} 22,500$ is already paid as advance income tax.

Income Slab
Tax

1. Upto Rs. $1,00,000$

Rs. 1,00,000 to Rs. 1,50,000
Rs. 1,50,000 to Rs. 2,50,000
Above Rs. 2, 50,000
2. Deduction on savings (section 80 o )
3. Education Cess

No tax
: $10 \%$ of the income exceeding Rs. 1 lakh
: Rs. $5000+20 \%$ of the income exceeding Rs. 1.5 lakh
Rs. $25,000+30 \%$ of the income exceeding Rs 2.5 lakh
upto Rs. 1,00,000
b) A dividend of $9 \%$ was declared on Rs. 100 share selling at a certain price.

If the rate of retum is $7.5 \%$, calculate:
i) the market value of the share
ii) the amount to be invested to obtain an annual dividend of Rs 630 .
a) Construct a triangle ABC , with $\mathrm{AB}=7 \mathrm{~cm}, \mathrm{BC}=8 \mathrm{~cm}$ and $\angle \mathrm{ABC}=75^{\circ}$. Locate by construction, the point $P$ such that:
i) $P$ is equidistant from $B$ and $C$.
ii) $P$ is equidistant from $A B$ and $B C$.

Measure and record the length of PB .
b) Find the value of $x$ if $\mathrm{A}^{2}=\mathrm{B}$.

Given:

$$
A=\left(\begin{array}{ll}
2 & x  \tag{3}\\
0 & 1
\end{array}\right) \text { and } B=\left(\begin{array}{cc}
4 & 36 \\
0 & 1
\end{array}\right)
$$

c) The catalogue price of a computer set is Rs. 45,000 . The shopkeeper gives a discount of $7 \%$ on the listed price. He gives a further off-season discount of $4 \%$ on the balance. However, sales tax at $8 \%$ is charged on the remaining amount. Find: i) the amount of sales tax a customer has to pay, ii) the final price he has to pay for the computer set.

