

G. D. SOMANI MEMORIAL SCHOOL

PRELIM EXAMS

SUB: MATHEMATICS

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MARKS:80

DATE: 22/1/08

TIME:2½HRS

Answers to this Paper must be written on the paper provided separately. You will not be allowed to write during the first 15 minutes. This time is to be spent in reading the question paper. The time given at the head of this Paper is the time allowed for writing the answers.

Attempt all questions from Section A and any four questions from Section B.

All working, including rough work, must be clearly shown and must be done on the same sheet as the rest of the answer. Omission of essential working will result in the loss of marks.

The intended marks for questions or parts of questions are given in brackets []

Mathematical tables are provided.

SECTION - A [40 MARKS]

Attempt all questions from this Section.

Question: I

[A] Mrs. Shah has a recurring deposit account in a bank for 4 years at 10% p.a. simple interest. She gets Rs. 38,220/- at the time of maturity, find the monthly installment. [3]

[B] Use factor theorem to factorise completely $x^3 + x^2 - 4x - 4$. [3]

[C] The simple interest in 3 years and the compound interest in 2 years on a certain sum at the same rate are Rs.1200 and Rs.832 respectively. Find: [4]

- the rate of interest,
- the principal
- the difference between the C.I. and S.I. for 3 years.

Question: II

[A] Solve $x^2 + 7x = 7$ and give your answer correct to two decimal places. [3]

[B] Given $A = \begin{bmatrix} 1 & 1 \\ 8 & 3 \end{bmatrix}$, evaluate $A^2 - 4A - 5I$ where I is a unit matrix of order 2. [3]

[C] Manufacturer A sells a washing machine to a trader B for Rs. 12500. Trader B sells it to a trader C at a profit of Rs.800 and trader C sells it to a consumer at a profit of Rs.1300. If the rate of VAT is 8%, find: [4]

- the amount of tax (under VAT) received by the state government on the sale of this machine.
- the amount that the consumer pays for the machine.

Question: III

[A] If P is the solution set of $8x - 1 > 5x + 2$ and Q is the solution set of $7x - 2 > 3(x + 6)$; $X \in N$, find: [3]

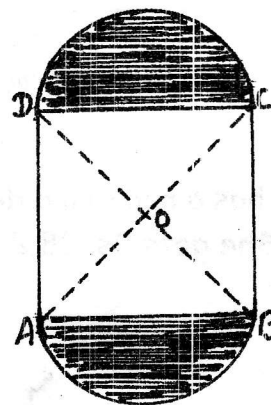
i. $P \cap Q$

ii. $P \cap Q'$

[B] If a, b and c are in continued proportion, prove that [3]

$$\frac{a^2 + b^2}{b(a+c)} = \frac{b(a+c)}{b^2 + c^2}$$

[C] In the adjoining figure, two circular flower beds have been shown on the two sides of a square lawn ABCD of side 56m. If the centre of each circular flower bed is the point of intersection O of the diagonals of the square lawn, find the sum of the areas of the lawn and the flower beds. [4]



[Take $\pi = \frac{22}{7}$]

Question: IV

[A] Find the HCF and LCM of the following: [3]
 $12(x^4 - 25)$ and $8(x^4 + 4x^2 - 5)$

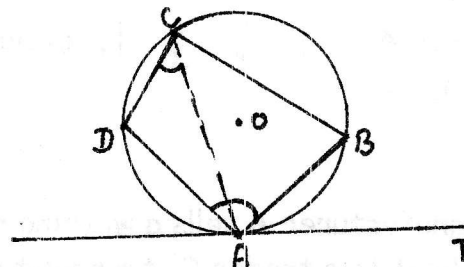
[B] The marks of 18 students in a science test were as follows: [3]
 10, 12, 6, 2, 9, 15, 18, 13, 12, 13, 7, 14, 19, 12, 5, 7, 11, 9.

Calculate:

(i) the mean (ii) the median (iii) upper quartile.

[C] In the adjoining figure, [4]
 AT is the tangent to the circle with centre O.
 If $\angle ACD = 44^\circ$, and $\angle DAB = 104^\circ$, find:

- i. $\angle ACB$ ii. $\angle AOB$
 iii. $\angle BAT$ iv. $\angle ABD$



SECTION - B**[Answer any four]****Question: V**

[A] Find the matrix A such that $\begin{bmatrix} 2 & -3 \\ 5 & 1 \end{bmatrix} A = \begin{bmatrix} 9 & 2 \\ 14 & 22 \end{bmatrix}$ [3]

[B] Prove that : $\frac{1 + \cos \theta}{1 - \cos \theta} = \frac{\tan^2 \theta}{(\sec \theta - 1)^2}$ [3]

[C] From a solid cylinder of height 12cm and base radius 5cm, a conical cavity of the same base and height is carved out. [4]

Calculate:

- the volume of the remaining solid.
- the total surface of the remaining solid.

Question: VI

[A] If the points A(7, 6) and C(-5, -6) are opposite vertices of a rhombus, find the equations of its diagonals. [3]

[B] Use a ruler and compass only in this question. [3]

- Construct the quadrilateral ABCD in which AB = 5cm, BC = 7cm and $\angle ABC = 120^\circ$, given that AC is its only line of symmetry.
- Write down the geometrical name of the quadrilateral.
- Measure and record the length of BD in cm.

[C] A function f is defined on the set of integers as follows: [4]

$$f(x) = \begin{cases} 3x + 2 & \text{if } -1 \leq x < 2 \\ 3 - 2x & \text{if } 2 \leq x < 5 \end{cases}$$

- Find the domain of the function
- Write f as a set of ordered pairs.
- Write the range of f
- State whether f is one-one or many one function.

Question: VII

[A] Mrs. Arora has an annual income of Rs.2,80,000 during year 2006-2007 from her business. During the year, her savings in terms of Public Provident Fund and LIC premium are Rs.35,000 and Rs.17,500 respectively. In the same year, she donated Rs.13,500 to a charitable trust and earns a relief of 50% of the donation from income. Calculate the income tax payable by her, when she has already paid an advance income tax of Rs.5,000 on 10-09-2006; Rs.5,000 on 11-12-2006 and Rs.7,000 on 15-03-2007. [6]

- | | |
|----------------------------|--|
| 1. Income Slab: | Tax: |
| Upto Rs.1,35,000 | : Nil |
| Rs.1,35,000 to Rs.1,50,000 | : 10% of the income exceeding Rs.1,35,000 |
| Rs.1,50,000 to Rs.2,50,000 | : Rs.1,500 + 20% of the income exceeding Rs.1.5 lakhs. |
| 2. Deduction on savings | : Upto Rs. 1,00,000 |
| 3. (i) Surcharge | : 10% of the income, if the income exceeds Rs.10,00,000. |
| (ii) Education cess | : 2% of the income tax after adding surcharge if any. |

[B] Point A(3, -2) on reflection in the X-axis is mapped as A' and point B on reflection in the Y-axis is mapped onto B' (-4,3). [4]

- Write down the coordinates of A' and B.
- Find the distance A'B.
- Find the slope of the line A'B, hence, find its inclination.

Question: VIII

[A] Use graph paper for this question. [6]

The marks obtained by 200 students in a science test are given in the table below. Draw an ogive for the given distribution. Use your ogive to estimate:

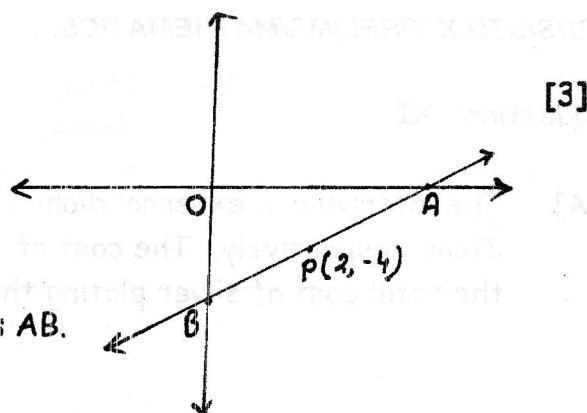
- The median.
- Lower quartile
- the number of students, who obtained more than 80% marks in the test.
- the number of students who did not pass the test if the pass percentage was 35.

Marks Obtained	No. of Students
0-10	5
10-20	10
20-30	11
30-40	20
40-50	27
50-60	38
60-70	40
70-80	29
80-90	14
90-100	6

[B] The angle of elevation of a helicopter from a point A on the ground is 45° . After 15 seconds flight, the angle of elevation changes to 30° . If the helicopter is flying at a height of 4000m, find the speed of the helicopter. [4]

Question: IX

- [A] The X-intercept of a line AB is double its Y-intercept. If it passes through $P(2, -4)$, find the coordinates of A and B. Hence (i) find the equation of AB (ii) find the ratio in which P divides AB.



- [B] A number of friends decided to go on a picnic and planned to spend Rs.384 on eatables. Four of them, however, did not turn up. As a consequence, the other ones had to contribute Rs.8 each extra. Find the number of those who joined the picnic. [3]
- [C] Mr. Singh invested Rs.8000 in 7% (Rs.100) shares at Rs.80. After a year he sold these shares at Rs.75 each and invested the proceeds in 15% (Rs.25) shares at Rs.41 each. [4]
- Find: (i) his gain or loss after a year.
 (ii) his income from the second investment.
 (iii) the percentage of increase in return on his original investments.

Question: X

- [A] Use ruler and compasses only to construct triangle ABC; given $BC = 4\text{cm}$. $\angle BCA = 45^\circ$ and the radius of the circumcircle of $\triangle ABC$ to be 3cm. Also, construct the circle touching BC at its mid point and also side AC of the triangle ABC. [5]
- [B] A page from the passbook of the saving bank account of Mrs. Sunita Patil is given below: [5]

Date -year 2006	Particulars	Withdrawals		Deposits		Balance	
		Rs.	P	Rs.	P	Rs.	P.
January 1	B/F		2200	00
January 8	By cash	...		800	00	3000	00
January 13	To cheque	600	00	...		2400	00
February 10	By clearance	...		500	00	2900	00
February 18	To cheque	300	00	...		2600	00
September 19	By cash	...		1400	00	4000	00
November 28	To self	1000	00	...		3000	00
December 12	By cash	...		500	00	3500	00

Calculate the interest due to her for the year 2006 at 4.5% p.a.

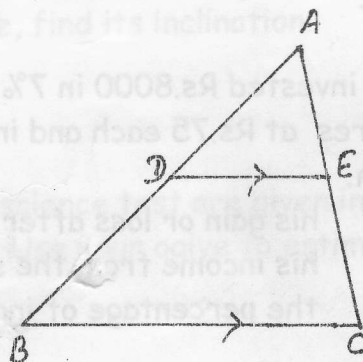
Question: XI

- [A] The internal and external diameters of a hollow hemispherical vessel are 14cm and 21cm respectively. The cost of silver-plating of 1cm^2 surface area is ₹0.40. Find the total cost of silver plating the vessel all over. [3]

- [B] Let $R = \{ (x + 1, y - 1) : x \in W, x < 6 \text{ and } y = x + 4 \}$ [3]
- List the elements of R.
 - List the domain and the range of the relation R.

- [C] In the adjoining figure, $DE \parallel BC$ [4]
- and $\frac{AD}{DB} = \frac{2}{3}$. Calculate the value of:

- $\frac{\text{area of } \triangle ADE}{\text{area of } \triangle ABC}$
- $\frac{\text{area of trapezium DBCE}}{\text{area of } \triangle ABC}$



Date	Particulars	Withdrawals	Deposits	Balance
Year 2000		****		
January 1	B/F			2500-00
January 8	By cash		800-00	3000-00
January 13	To cheque	500-00		2400-00
February 10	By clearance		500-00	2900-00
February 18	To cheque	300-00		2600-00
September 19	By cash		1400-00	4000-00
November 28	To self	1000-00		3000-00
December 12	By cash		500-00	3500-00

Calculate the interest due to her for the year 2000 at 4% p.a.