STD: X   MAX. MARKS: 80

DATE: 11.01.2016   TIME: 2 hrs 30 min.

MATHEMATICS

(Two hours and a half)

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 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 1

(a) The cost of an almirah is Rs. 5538, inclusive of Rs. 213 as the sales tax. Find :
     (i)   The marked price of almirah
     (ii)   The rate of sales tax.   [3]

(b) Solve the following inequation and write the solution set:

$$-2 \leq \frac{1}{2} - \frac{2x}{3} \leq 1\frac{5}{6} \, , \, x \in N$$

Represent the solution on a number line.   [3]

(c) Without using trigonometrical tables find the value of

$$\frac{5}{2} \, (\text{cosec}^2 30°) - \sin 21°. \sec 69° + \frac{\sin 43°}{\cot 47°}$$
                [4]

This paper consists of 6 printed pages.

Question 2

(a) Find the value of x and y, if $\begin{bmatrix} x+y & y \\ 2x & x-y \end{bmatrix}\begin{bmatrix} 2 \\ -1 \end{bmatrix} = \begin{bmatrix} 3 \\ 2 \end{bmatrix}$.

[3]

(b) John has a recurring deposit account in a bank for $3\frac{1}{2}$ years at $9\frac{1}{2}\%$ p.a. If he gets Rs. 78638 at the time of maturity; find the monthly installment.
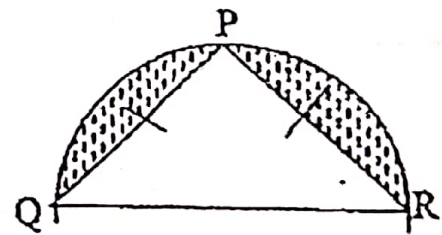
[3]

(c) In the given figure, AB is the diameter of the circle. Chord ED is parallel to AB and $\angle EAB = 63°$, calculate :

    (i) $\angle EBA$

    (ii) $\angle BCD$

    (iii) $\angle DEF$

    (iv) $\angle AOE$

[4]
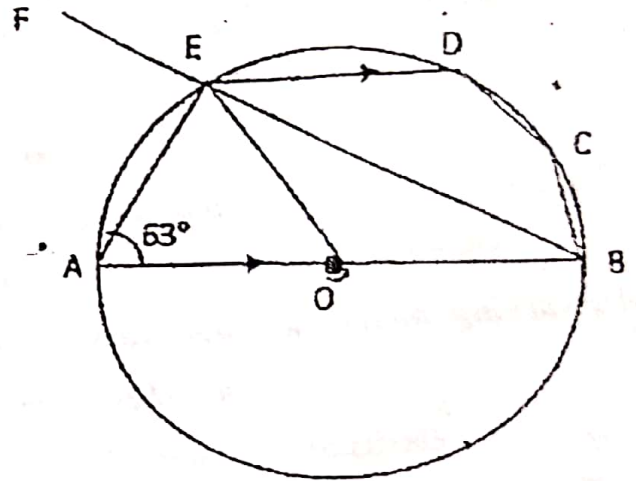
Question 3

(a) Find the area of the shaded region, if the isosceles $\triangle PQR$ is inscribed in the semi circle. $PQ = PR = 7$ cm
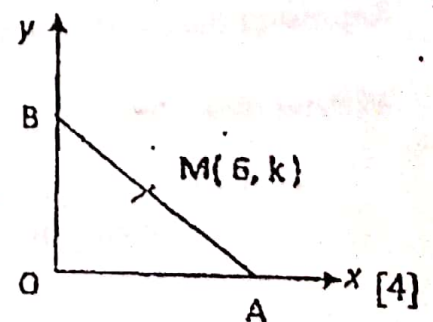
[3]

(b) Find the median price and the modal price of the following frequency distribution of price of some articles:

Price (Rs.)	115	120	130	140	145.
Number of articles	8	20	35	24	12

[3]

(c) M(6, k) is the mid-point of AB.

(i) Find the co-ordinates of A.

(ii) If the length of AB is 20 units, find the co-ordinates of B.

(iii) Find the ratio in which point P (3, 12) divides line AB.

[4]

Question 4

(a) A certain sum of money yields Rs. 927 as compound interest in 2 years time at 6% compounded yearly. Find the sum. [3]

(b) Solve for x using the quadratic formula. Write your answer correct to 2 significant figures:

$$(2x + 3)(3x - 2) + 4 = 0$$ [3]

(c) A die is rolled once. Find the probability of getting :
- (i) A perfect square
- (ii) A prime number
- (iii) A number less than 6
- (iv) A multiple of 3. [4]

SECTION B (40 Marks)

Attempt any four questions from this Section.

Question 5

(a) Use a graph paper for this question, [scale : 2cm = 1 unit on both the axes]
Plot the points A (0 , 4) and B (-3, 2).
(i) Reflect A and B in x-axis to get the images D and C respectively. Write the co-ordinates of C and D.
(ii) Reflect points B and C in line AD to get the image F and E respectively .
(iii) State the geometrical name for the figure ABCDEF.
(iv)Draw and label line/s of symmetry of the above geometrical figure.
(v)Write equation of any one line of symmetry of this figure. [5]

(b) Given below are the entries in Savings Bank A/c pass book of Mr. Jacob:

Date 2008	Particulars	Withdrawals Rs.	Deposits Rs.	Balance Rs.
JAN 4	By cash	-	1000	1000
JAN 11	By cheque	-	7500	8500
FEB 3	By cash	-	2500	11000
FEB 7	To cheque	5000	-	6000
MAR 3	By cash	-	1500	7500
MAY 25	By cash	-	1000	8500
JUN 7	By cash	-	3500	12000
AUG 29	To cheque	2000		10000

Mr. Jacob closes his account on 30th October. If rate of interest paid by the bank is 5 % p. a., find
- (i) the interest earned and
- (ii) the amount received by him. [5]

Question 6

(a) Solve for x using properties of proportions:

$$\frac{3x + \sqrt{9x^2 - 5}}{3x - \sqrt{9x^2 - 5}} = 5$$

[3]

Samuel bought 360, ten rupees shares of company A paying 8% per annum. He sold them when the price rose to Rs.21 and invested the proceeds in five rupees shares of company B paying 4.5% per annum at Rs. 3.50 per share. Find
   - (i) the sales proceeds on selling shares of company A
   - (ii) the change in Samuel's annual income
   - (iii) the rate of return in the case of company B correct to the nearest whole number.

[3]

(c) If the mean marks obtained by 50 students in a test is 18.10, find the value of 'a' and ' b':

Marks	0 - 5	5 - 10	10 – 15	15 – 20	20 – 25	25 – 30
No. of students	2	6	a	18	b	8

[4]

Question 7

(a) A sphere P and a cone both of radius 4 cm are melted to form another sphere Q. If the radius of the new sphere Q is 6 cm, find the height of the cone. [3]

(b) Prove that : $\tan^2 A - \sin^2 A = \tan^2 A \cdot \sin^2 A$ [3]

(c) (i) Use factor theorem to find,
for what value of 'a' is the polynomial ($4x^3 + 2ax^2 + 11x + a + 3$) exactly divisible by ($2x - 1$)?
(ii) Factorize the given polynomial ($4x^3 + 2ax^2 + 11x + a + 3$) completely after substituting the value of 'a' obtained in (i). [4]

Question 8

(a) The model of a ship is made to a scale of 1 : 250, find : [3]
   - (i) The length of the ship, if the length of its model is 1.2 m.
   - (ii) The area of the deck of the ship, if the area of the deck of its model is 1.6m².
   - (iii) The volume of its model, when the volume of the ship is 1km³.

(b) A manufacturer sells a TV set to a distributor for Rs. 42000 including sales tax. The distributor sells it to a retailer for Rs. 43000 excluding tax and the retailer sells it to the consumer for Rs.45000 plus tax. If the rate of VAT is 5%, find the
   - (i) The cost price of the TV set for the distributor
   - (ii) VAT paid by the distributor to the Government
   - (iii) Total VAT received by the Government on the sale of the TV. [3]

(c) In the triangle A(2,-3), B(6, 7), C(-8, 5), find the equation of
   - (i) the side BC
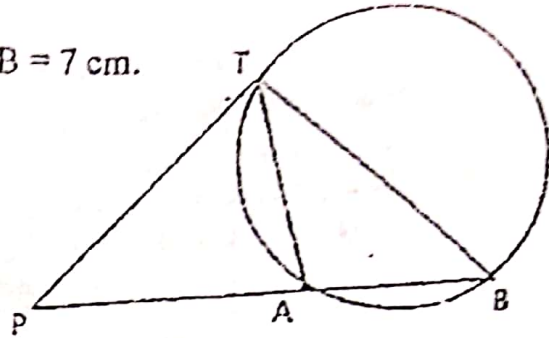   - (ii) the altitude through A

[4]

Question 9

(a) In the given figure, PAB is a secant to a circle and PT is a tangent at T.
(i) Prove that: $\triangle PAT \sim \triangle PTB$
(ii) Find length of tangent PT, if PA = 9cm   AB = 7 cm.

[3]

(b) Without solving the following quadratic equation, find the values of 'k' for which the given equation has equal roots:

$$kx^2 + kx + 1 = -4x^2 - x$$

[3]

(c) Find x, if

$$A = \begin{bmatrix} 1 & -1 \\ 2 & -1 \end{bmatrix}, B = \begin{bmatrix} x & 1 \\ 4 & -1 \end{bmatrix} \text{ and } (A + B)^2 = A^2 + B^2$$

[4]

Question 10

(a) A booster pump can be used for filling as well as for emptying a tank. The capacity of the tank is 2400 m³. The emptying capacity of the tank is 10 m³ per minute higher than its filling capacity and the pump needs 8 minutes lesser to empty than it needs to fill it. What is the filling capacity of the pump?

[4]

(b) The following table shows the distribution of the first round marks of a group of 100 students appearing at a General Knowledge competition:

Marks	Number of students
0 - 10	8
10 - 20	12
20 - 30	18
30 - 40	22
40 - 50	26
50 - 60	10
60 - 70	4

Draw an ogive of the given distribution on a graph sheet taking 2 cm = 10 marks on one axis and 2 cm = 10 students on the other axis. From the graph determine
(i) the median marks
(ii) the median class
(iii) the lower quartile
(iv) the percentage of students who qualify for the second round, if for qualifying to the second round one must score above 65.

[6]

Question 11

(a) Prove that the line passing through A(2 , -3) and B(-5 , 1) is parallel to the line passing through C (7 , -1) and D (0 , 3). [3]

(b) Using a ruler and compass only:
    (i)   Construct a triangle ABC with the following data:
        AB= 5.5 cm, BC = 6 cm and ∠ABC = 105°.
    (ii)   Construct a circle circumscribing ΔABC .
    (iii) In the same diagram , construct a cyclic quadrilateral ABCD so that D is equidistant from AB and BC. [3]

(c) As observed from the top of a 90m tall light house, the angles of depression of two ships on the same side of the light house in horizontal line with its base are 30° and 50° respectively. Find the distance between the two ships. Give your answer correct to the nearest meter. [4]