JANKIDEVI
PUBLIC SCHOOL

PRELIMINARY EXAMINATION 2018-2019
MATHEMATICS

STD: X | **DATE: 09.01.2019**
TIME: 2 ½ hrs. | **MARKS: 80**

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 [ ].
This question paper consists of four printed pages.
Nothing should be written on the question paper.

SECTION A (40 Marks)
Attempt all questions from this Section.

Question 1

(a) Find the value of a if the two polynomials $ax^3 + 3x^2 - 9$ and $2x^3 + 4x + a$ leave the same remainder when divided by $x + 3$. [3]

(b) The given numbers are arranged in descending order. Find the value of k if their median is 16. Also, find their mean. $24, 20, k+4, k+3, k-1, 12, 7, 2$. [3]

(c) The lines $2x + y - 6 = 0$ and $x - 2y + 2 = 0$ intersect at point P. Find the co-ordinates of point P. Also find the equation of the line through P and perpendicular to the line $x - 3y + 4 = 0$. [4]

Question 2

(a) A die is thrown two times and the total score in two throws is noted. Find the probability that the total score is (i) an even number (ii) six (iii) at least 10. [3]

(b) If $A = \begin{bmatrix} 1 & 0 \\ -1 & 7 \end{bmatrix}$, then find the value of K so that $A^2 = 8A + KI$, where I is a 2x2 identity matrix. [3]

(c) The radius of the base of a cone is 8cm. A sphere has the same radius and same volume as that of the cone. Calculate the (i) surface area of the sphere. (ii) height of the cone. (iii) slant height of the cone to the nearest integer. (π=3.14) [4]

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Question 3

(a) Find the solution set of the inequation and graph the solution on the number line. [3]

$$-2 < 3 - 2x \leq 5 \; ; \; x \in R.$$

(b) Prove that in a circle the angles in the same segment are equal. [3]

(c) A man invested ₹8000 in 7%, ₹100 shares at ₹80. After a year he sold these shares at ₹75 each and invested the proceeds (including dividend) in 18%, ₹25 shares at ₹41 each. Calculate: [4]

(i) dividend for the first year.

(ii) annual income on the shares in the second year.

(iii) the percentage increase in his return on his original investment.

Question 4

(a) Prove the identity : $1 - \frac{cos^2\theta}{1+sin\theta} = sin\theta$ [3]

(b) If the sum of the first 20 terms of an A.P is same as the sum of its first 28 terms, find the sum of its 48 terms. [3]

(c) On a graph paper, plot the triangle whose vertices are A(4,2), B(4,-1) and C(6,3).On the same graph paper, reflect the vertices of this triangle on the line $x = 2$ and name the points A' B' C'. Write the co-ordinates of A' B' C'. Mark any two points on the graph paper which are invariant under this reflection. Write the co-ordinates of the invariant points. [4]

SECTION B (40 Marks)

Attempt any four questions from this Section.

Question 5

(a) Solve the equation $x^2 - 3x - 9 = 0$ [3]
Give the answer correct to three significant figures.

(b) The first term of a G.P is 1. The sum of its first and fifth term is 90. Find the common ratio of the G.P. [3]

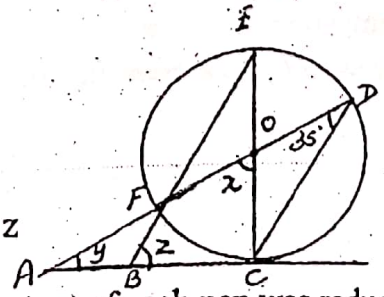
(c) If a, b, c and d are in proportion, prove that: [4]

$$\frac{5a^2 + 12c^2}{5b^2 + 12d^2} = \sqrt{\frac{3a^4 - 7c^4}{3b^4 - 7d^4}}$$

Question 6

(a) Find the matrix A if $\begin{bmatrix} 1 & 2 \\ 0 & 1 \end{bmatrix} A = \begin{bmatrix} 7 \\ 3 \end{bmatrix}$ [3]

(b) In the circle with centre O, $\angle ADC = 35^0$. Calculate the measures of x, y, z [3]



(c) Some pens were bought for ₹360. When the cost of each pen was reduced by ₹3, 6 more pens could be bought for ₹360. Find the original cost of the pen. [4]

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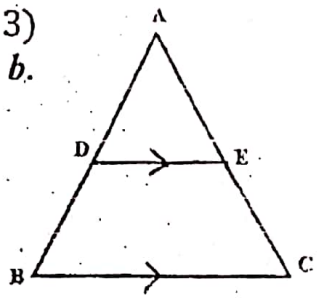
Question 7

(a) The midpoint of the line segment joining $A\ (4a, 2b-3)$ and $B(-4,3b)$ is $C(2,-2a)$. Find the values of a and b. [3]

(b) In the figure; DE is parallel to BC. [3]
If AD:DB = 3:2 and
Area of trapezium DBCE is 16 sq units,
Find (i) DE:BC (ii) Area of ΔADE



(c) Calculate the mean of the following data by step deviation method. [4]

Class Interval	20-30	30-40	40-50	50-60	60-70	70-80
Frequency	10	6	8	12	5	9

Question 8

(a) When a building under construction was observed from a point on the ground which is 120m away from its base, the angle of elevation of the top was 30^0. After its completion when it was again observed from the same point, the angle of elevation changed to 60^0. How much higher was the building raised, from the time it was first observed? Write the answer correct to the nearest whole number. [4]

(b) Attempt this question on the graph paper. [6]
Draw an ogive from the given table taking scale 2cm = 10 marks on one axis and 2cm = 20 students on the other axis. From the graph, find:
(i) Median (ii) Upper quartile. (iii) Number of students scoring above 65 marks.
(iv) If 10 students qualify for the scholarship, find the minimum marks required to qualify.

Marks	0-10	10-20	20-30	30-40	40-50	50-60	60-70	70-80	80-90	90-100
No. of Students	5	10	14	21	25	34	36	27	16	12

Question 9

(a) A man deposits ₹1500 every month for 2 years in State Bank of India as recurring deposit. If he receives ₹37,875 at the time of maturity, find the rate of interest. [3]

(b) Two chords AB and CD intersect at a point P inside the circle such that AB=12cm, AP=2.4cm and PD=7.2cm. Find the length of chord CD. [3]

(c) Draw a straight line ABC such that AB=4cm and BC=3cm. Using a ruler and compass only, find a point P which is equidistant from B and C and $\angle APC = 90^0$ [4]

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Question 10

(a) Prove that: $\sqrt{\frac{secA-1}{secA+1}} = \frac{1-\cos A}{\sin A}$ [3]

(b) A certain number of metallic cones each of radius 2cm and height 3cm are melted and recast into a solid sphere of radius 6cm. Find the number of cones used. [3]

(c) Using properties of proportion, solve for x. [4]

$$\frac{x^2-x+1}{x^2+x+1} = \frac{14(x-1)}{13(x+1)}$$

Question 11

(a) In a size transformation, the area of the image of an object of area $4.8m^2$ is $30cm^2$. Calculate the scale factor. Also find the volume of an object, if the volume of its image is $180cm^3$. [3]

(b) Without solving the quadratic equation, find the value of m for which the given equation has real and equal roots. $(m+6)x^2 + (m-2)x + 1 = 0$ [3]

(c) 125 marbles of diameter 1.2 cm are dropped into a beaker containing some water and are completely submerged. If the diameter of the beaker is 6cm, calculate the rise in the water level in the beaker. [4]

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