GREENWOOD HIGH
PRELIMINARY EXAMINATION -2, JANUARY 2020
SUBJECT – MATHEMATICS

Grade: 10
Date: 6/01/2020

Time: 2½ Hours
Max. Mark: 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.

Section A
(Attempt *all* questions from this section)

Question 1

(a) If $A = \begin{bmatrix} 3 & -1 \\ 0 & 2 \end{bmatrix}$, find matrix B such that $A^2 - 2B = 3A + 5I$ where I is a 2 x 2 identity matrix. (3)

(b) An integer is chosen at random from 1 to 50. Find the probability that the number is
(i) divisible by 5 (ii) a perfect square (iii) a prime number (3)

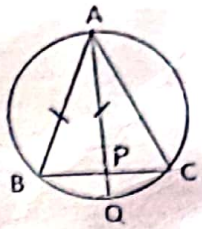
(c) Ajay deposited Rs.150 per month in a bank for 8 months under the recurring deposit scheme. What will be the maturity value of his deposit at the rate of 8% per annum? (4)

Question 2

(a) From a solid cylinder of height 12 cm and base radius 5 cm a conical cavity of same base and height is curved out. Find the volume and total surface area of the remaining solid. (3)

(b) Find the 30^{th} term of the sequence: $\frac{1}{2}, 1, \frac{3}{2}$.... Also, find the sum of the first ten terms. (3)

(c) In the following figure P is a point on the chord BC of a circle. such that AB = AP. Prove that CP = CQ



(4)

Question 3

(a) If x, y, z are in continued proportion. Prove that: $\frac{x^2+y^2}{y(x+z)} = \frac{y(x+z)}{y^2+z^2}$ (3)

(b) Prove that: $\frac{(\cos A - \sin A)(1+\tan A)}{2\cos^2 A - 1} = \sec A$ (3)

(c) Given that (x + 1) is a factor of the polynomial $2x^3 + ax^2 + bx - 2$ and when the polynomial is divided by (x + 2) the remainder is -12. Determine 'a' and 'b'. Hence, factorize the polynomial completely. (4)

Question 4

(a) Solve the following inequation if, $x \in N$ and write the solution in the set builder notation, $-3 \leq \frac{1}{2} - \frac{3x}{4} \leq 1\frac{5}{8}$. Also, represent the solution on a number line. (3)

(b) Solve the given quadratic equation $x^2 - 10x + 6 = 0$ and give your answer correct to two significant figures. (3)

(c) Find the coordinates of P, where P divides the line segment A(−2, 3) and B(3 ,− 4) in the ratio 2 : 3. Also, find the equation of the line through P whose gradient is $\frac{3}{2}$. (4)

Section B

(Attempt any *four* questions from this section)

Question 5

(a) Find the GP whose second term is $\frac{9}{4}$ and eighth term is $\frac{16}{81}$. (3)

(b) How much should a man invest in Rs.100 shares selling at Rs.110 to obtain an annual income of Rs.1680, paying a dividend of 12% per annum? (3)

(c) Use graph paper for this question. Plot the point A (6, 4) and B (0, 4)

(i) Reflect A and B in the origin and get A' and B'

(ii) State a name for the figure ABA' B'.

(iii) Find the perimeter of ABA'B'. (4)

Question 6

(a) Using the properties of proportion, solve for x: $\frac{x^3+3x}{3x^2+1} = \frac{341}{91}$ (3)

(b) If $A = \begin{bmatrix} 1 & 4 \\ 0 & -3 \end{bmatrix}$ and $B = \begin{bmatrix} 1 & 2 \\ 0 & -10 \end{bmatrix}$

Verify whether: $(A + B)^2 = A^2 + B^2 + 2AB$ (3)

(c) A dealer in Agra (UP) supplies goods (worth Rs.1000) to a dealer in Jhansi (UP). The dealer in Jhansi supplies the same goods to a dealer in Mumbai at a profit of Rs.600. Assuming that the dealer in Mumbai is the end-user of the product and the rate of GST is 12%, find:

(i) Input tax for the dealer in Jhansi. (ii) Output tax for the dealer in Jhansi.

(iii) Net GST payable by the dealer in Jhansi (iv) Total CP for the dealer in Mumbai (4)

Question 7

(a) For what value of k will the quadratic equation $(k + 1)x^2 - 4kx + 9 = 0$ have real and equal roots? Also, solve the equation so obtained. (3)

(b) Construct a triangle in which BC = 8 cm, AB = 6 cm and $\angle ABC = 60^0$. Mark a point P inside the triangle which is equidistant from AB, BC and B and C. Give the measurement of PB. (3)

(c) On a map drawn to a scale of 1 : 250000 a triangular plot of land has the following measures AB = 3 cm, BC = 4 cm and $\angle ABC = 90^0$. Calculate:

(i) the actual length of AB in km. (ii) the actual area of triangle ABC in sqkm. (4)

Question 8

(a) Find the ratio in which (4, p) divides the line joining the points (6, –2) and (–3,16). Also, find the value of p. (3)

(b) If the mean of the following distribution is 7.5, find the value of f. (3)

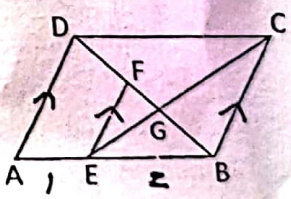
Variable	5	6	7	8	9	10	11	12
Frequency	20	17	f	10	8	6	7	6

(c) Draw a circle of radius 3.2cm. Take a point N at a distance of 5.7 cm from the centre of the circle. Construct the tangents to the circle from the point N. Find the length of the tangent. (4)

Question 9

(a) In the given figure ABCD is a parallelogram. CE intersects the diagonal BD at G. If EF || BC and AE : EB = 1 : 2, find:

(i) EF : AD (ii) area of $(\Delta BEF : \Delta ABD)$ (3)



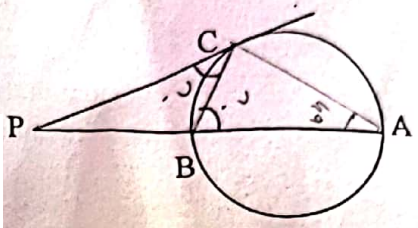
(b) If the straight line $3x - 4y = 7$ and $4x + ay + 9 = 0$ are perpendicular to each other, find the value of a. Also find the value of a if the lines are parallel. (3)

(c) A solid metallic sphere of radius 6 cm is melted and made into a solid cylinder of height 32 cm. Find: (i) the radius of the cylinder (ii) the curved surface area of the cylinder. (Take $\pi = 3.1$) (4)

Question 10

(a) A car covers a distance of 400 km at a certain speed. Had the speed been 12 km/hr more, the time taken for the journey would have been 1 hour 40 minutes less. Find the original speed of the car. (3)

(b) In the given figure AB is the diameter and tangent C meets AB at P. If $\angle CAB = 49^0$ find: (i) $\angle CBA$ (ii) $\angle PCB$ (3)



(c) Amal invested Rs.9600, on Rs.100 shares at Rs.20 premium, paying 8% dividend. He sold the shares when the price rose to Rs.160. He invested the proceeds (excluding the dividend) in 10% Rs.50 shares at Rs.40. Find :

(i) The original number of shares he purchased (ii) Sale proceeds

(iii) Number of shares he purchased (iv) His change in income (4)

Question 11

(a) Using a graph paper, draw an ogive for the following distribution. Use the scale 2cm=10 units on both axes.

Marks	0-10	10-20	20-30	30-40	40-50	50-60	60-70	70-80	80-90	90-100
Students	3	7	12	17	23	14	9	6	5	4

From the graph, find:

(i) the median mark.

(ii) the interquartile range

(iii) if 85% and above qualifies a student for a scholarship, find how many students qualified for the scholarship. (6)

(b) The angle of elevation of the top of a tower is observed to be 60°. At a point 30 m vertically above the first point, on observation, the angle of elevation is found to be 45°. Find

(i) the height of the tower (to the nearest m).

(ii) its horizontal distance from the points of observation. (4)