UNIVERSITY OF COLOMBO, SRI LANKA
FACULTY OF ARTS
SPECIAL DEGREE EXAMINATION IN ARTS (GEOGRAPHY)
SECOND SEMESTER END EXAMINATION – 2018
GYG 2225 – MATHEMATICS
(TWO HOURS)

Answer all the Questions.

Graph papers and Trigonometry tables will be provided.
Calculators may be used.

1. a. Solve the following simultaneous equations.

   i. $\dfrac{6}{x} - \dfrac{7}{y} = -23$

   $\dfrac{-7}{x} + \dfrac{5}{y} = 11$

   (4 Marks)

   ii. $-4x - 3y + 2z = -32$

   $x - 2y + 3z = -1$

   $-2x + 7y - z = 3$

   (6 Marks)

   b. Solve the following system of simultaneous equations using graphs.

   $2x + 3y = 4$

   $x - 2y = -5$

   (10 Marks)
   (Total Marks 20)

2. Solve the following quadratic equations using the given method.

   a. Completing the square

   i. $x^2 - x - 30 = 0$

   ii. $3x^2 + 8x - 16 = 0$ (6 Marks)

   b. Quadratic Formula

   i. $x^2 - 4x - 32 = 0$

   ii. $2x^2 + 11x + 5 = 0$ (6 Marks)
   (Total Marks 12)

3. Calculate the following using the P, Q, R and S matrices given below.

$$P = \begin{pmatrix} 2 & 0 & -1 \end{pmatrix}_{1 \times 3} \quad Q = \begin{pmatrix} 2 & -1 & 0 \\ 3 & 0 & 2 \\ -1 & -2 & 3 \end{pmatrix}_{3 \times 3} \quad R = \begin{pmatrix} -1 & 2 & -2 \\ 0 & -1 & 1 \\ 3 & 2 & 0 \end{pmatrix}_{3 \times 3} \quad S = \begin{pmatrix} -1 \\ 0 \\ 2 \end{pmatrix}_{3 \times 1}$$

   a. $P(Q + R)$ (3 Marks)

   b. $(Q - 2R)S$ (4 Marks)
   (Total Marks 7)

4. Solve the following system of equations using the 'Inverse Matrix' method.

$$2x + y + z = 6$$
$$x - y + 3z = -1$$
$$3x + y = 10$$

(15 Marks)
(Total Marks 15)

5. a. In an arithmetic series, the sum of the first term and the last term is 0. The term before the last term is 14 and the ninth term is 0. Find the sum of this series.

(5 Marks)

   b. In a geometric series, the product of the first term and the common ratio is -12. The sum of the second term and the third term is 60. Find the sum of the first 5 terms of this series.

(5 Marks)
(Total Marks 10)

6. A 50m tall, vertical flag pole is placed between point A and a vertical tower on the earth. The inclination angle from top of the flag pole to the top of the tower is 66^0 22'. The horizontal distance between point A and the bottom of the flag pole is 210m. The inclination angle from point A to the top of the tower is 33^0 11'.

Assuming that the point A, bottom of the flag pole and the tower on the earth are on the same plane, calculate the following :

   a. Vertical height of the tower   (6 Marks)

   b. The horizontal distance between the point A and the bottom of the tower.

(6 Marks)
(Total Marks 12)

7. The length of a side, of ABCD square is 14cm. If the diagonals AC and BD intersect at the point O, find the following

   a. area of the circle drawn through vertices A, B and the point O.

   (4 Marks)

   b. area of the circle drawn through vertices A, B, C and D of the square.

   (6 Marks)

   c. circumference of the escribed circle drawn to AOB triangle touching the side AB.

   (8 Marks)
   (Total Marks 18)

8. Differentiate the following functions with respect to x.

   a. $y = x^{3/4}$ (2 marks)

   b. $y = 6x^{2/3}$ (2 marks)

   c. $y = 3x^4 + 2x^3 + 5x^2 - 3x + 9$ (2 marks)
   (Total Marks 6)

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