

UNIVERSITY OF COLOMBO, SRI LANKA

FACULTY OF ARTS

2nd YEAR END EXAMINATION IN ARTS (ONLINE), SEMESTER I – 2020/2021

GYG 2125 : Mathematics

Instructions to Students:

- The question paper starts on page 2.
- All written assessments must be **handwritten**. Handwriting must be **clear and readable**.
- Answers should be written on an **A4 size paper** (ruled/lined paper/or otherwise), using a **black ball point pen**.
- The **index number must be written on the top right-hand side** of each page of the answer script. Do not write your name anywhere on the answer script.
- **Number the pages** of the answer script using the following format at the **bottom of the page**: E.g., if it consists of 5 pages 1/5, 2/5...etc.
- Use the **common front page** (provided on LMS) as the first page of the answer script. You may print, or hand write the front page which must be the first page of your assessment.
- The **total number of pages** should be indicated on the front page of the answer script.
- **Scan/take photos of the answer script and convert it to a single PDF file** in the order of the page numbers.
- The full page of the answer script must be properly covered in the scanned image, and the scanned image must be clear/readable.
- LMS does not permit individual pages to be uploaded separately.
- **The only acceptable file format is PDF. The PDF file should be named with your index number**, e.g. A 12345
- Uploading answer scripts as JPEG/JPG or any other form will not be permitted.
- Complete and upload the final version of the answer script to LMS **within the stipulated 5 hours**
- Once the answer script has been uploaded to LMS, take **a screen shot of the full page** of the LMS with the word ‘submitted’, as an acknowledgement and keep it with you.
- **If** there is an **unexpected technical issue** with the uploading of an answer script to LMS, you may send your answer script via email to exam2@arts.cmb.ac.lk immediately.

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SEMESTER I – 2020/2021

GYG 2125 : Mathematics

Duration: **5 hours** for completion and submission of answer scripts to LMS.

The question paper consists of eight (8) questions. Answer **ALL** questions.

1. a. Solve the following simultaneous equations

(i)
$$\frac{3}{x} + \frac{4}{y} = 8$$

$$\frac{5}{x} + \frac{6}{y} = 13$$

(4 marks)

(ii)
$$5x + 6y - 5z = -1$$

$$3x - 4y - 3z = 7$$

$$-2x + 5y + z = -4$$

(6 marks)

b. Solve the following simultaneous equation using graphs.

$$-5x + 3y = 8$$

$$4x + 9y = 5$$

(10 marks)

(Total Marks 20)

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

a. Completing the square

(i) $3x^2 - 10x - 8 = 0$

(ii) $5x^2 + 8x - 4 = 0$

(6 marks)

b. Quadratic formula

(i) $6x^2 - 7x + 2 = 0$

(ii) $4x^2 + 12x - 7 = 0$

(6 marks)

(Total Marks 12)

3. Calculate the following using A, B, C and D matrices.

$$\begin{matrix}
 \begin{pmatrix} 2 \\ -1 \\ 4 \end{pmatrix} \\
 \mathbf{A} \quad 3 \times 1
 \end{matrix}
 \quad
 \begin{matrix}
 \begin{pmatrix} -3 & 1 & 2 \\ 4 & -1 & 0 \end{pmatrix} \\
 \mathbf{B} \quad 2 \times 3
 \end{matrix}
 \quad
 \begin{matrix}
 \begin{pmatrix} 4 & 1 & -2 \\ 3 & 0 & 2 \end{pmatrix} \\
 \mathbf{C} \quad 2 \times 3
 \end{matrix}
 \quad
 \begin{matrix}
 \begin{pmatrix} 2 & -1 \\ 3 & 0 \end{pmatrix} \\
 \mathbf{D} \quad 2 \times 2
 \end{matrix}$$

a. $(2B - C)A$ (4 marks)

b. $D(C + 3B)$ (4 marks)

(Total Marks 8)

4. Solve the following system of simultaneous equations using 'Cramer's Method'.

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

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

$$3x - 5y + 4z = 7$$

(12 marks)

(Total Marks 12)

5. a. In an arithmetic series, when the first term is subtracted from the term before the last term, the answer is 119. The sum of the last 3 terms of this series is 168. If the third term is - 49, find the sum of the series and the tenth term of the series.

(6 marks)

- b. In a Geometric series, the fourth term is -81. The term before the last term is - 6561. When the last term is divided by the second term, the answer is -2187. Find the Sum of the series and sixth term of the series. (Hint: $3^7 = 2187$)

(6 marks)

(Total Marks 12)

6. A vertical flag pole of 12 meters high and a vertical tower are in the same plane on earth. The first rope has been tied on the tower at 80 meters high from the ground level and is drawn to the top of the flag pole by making a depression angle of $34^{\circ} 43'$ from the tower. The second rope which has a length of 175 meters, is drawn from the top of the tower to the top of the flag pole. Calculate the following.

(Important : Ignore the lengths of the ropes which have taken to be tied.)

- a. The horizontal distance between the bottom of the tower and the bottom of the flag pole.

(3 marks)

- b. The length of the first rope.

(3 marks)

- c. The depression angle of the second rope that makes with the top of the tower

(3 marks)

- d. The height of the tower

(3 marks)

(Total Marks 12)

7. In ABCD Rhombus, the diagonal AC is 56 cm. The diagonals AC and BD intersect at point E. The circumference of the circle drawn through vertices A, E and D is 110 cm. Calculate the following.

a. The perimeter and the area of the Rhombus. (5 marks)

b. The circumference and the area of the inscribed circle drawn to the triangle AED in the Rhombus.

(9 marks)

(Total Marks 14)

8. a. Differentiate the following functions with respect to x.

i. $y = x^{3/4}$ (1 mark)

ii. $y = \frac{4}{x^{1/4}}$ (2 marks)

iii. $y = 3x^5 - 5x^4 + 3x^3 + 8x^2 - 9x - 6$ (2 marks)

b. Integrate the following functions with respect to x.

i. $\int x^{2/3} dx$ (1 mark)

ii. $\int \frac{8}{x^{1/3}} dx$ (2 marks)

iii. $\int (6x^5 + 5x^4 - 8x^3 - 6x^2 + 8x + 5) dx$ (2 marks)

(Total Marks 10)

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