

2023 END OF FIRST SEMESTER EXAM – E_MATHS 2
ELECTIVE MATHEMATICS 2

FORM 2

Form 2

Time: 1hours 20 minutes

SECTION B

PART I

Answer **All** the questions in part I.

- 1) a) Indicate by shading the set of all points $P(x, y)$ in the Oxy plane that satisfies simultaneously the inequalities $2x + y \geq 8$, $x \geq y$, $2y - 1 \geq 0$ and $x \leq 4$.
b) Using your graph in (a), find
i) state the corner (or extreme) points,
ii) find the maximum value of $(10x + 7y - 5)$, stating the values of x and y for which it occurs.
- 2) a) Find the range of values of k for which $x^2 + 3x + 1 = kx$ has real roots.
b) The lines $3x + 2y = 8$ and $4x - 5y = 3$ intersect at Q . Find
i) the coordinates of Q ;
ii) the equation of the line through Q parallel to the line $3x - 4y + 7 = 0$.

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PART II

Answer only **two** questions from part II. **All** questions carry equal marks

- 3) a) Find the solution set of the equation $2^{2x+2} - 9(2^x) + 2 = 0$.
b) Find the equation of a circle whose centre is $(2, 1)$ and passes through the point $(4, -3)$.
c) Show that the line $y = 2x + 1$ is a tangent to the circle $x^2 + y^2 + 26x - 10y + 14 = 0$ and determine the coordinates of the point of contact.
- 4) a) The sum of the first n terms, S_n , of a linear sequence is given by $S_n = 4n^2 - 5n$. Find the n th term U_n of the sequence.
b) Find the sum of $12 + 19 + 26 + 33 + \dots + 215$.

- c) The 2nd, 4th and 8th terms of a linear sequence (A.P.) form three consecutive terms of an exponential sequence (G.P.). If the 10th term of the linear sequence is 25, find the sum of the first 15 terms of the linear sequence.

5) a) Find the limit of the function $\frac{h^2-3h-4}{2+h-h^2}$ as h tends to -1 .

b) Find from first principle with respect to x , the derivative of $x^2 + 5x$.

c) Differentiate, with respect to x and simplify

i) $(x^2 + 4x - 5)(x^2 - 3)$.

ii) $\frac{2x^2+3x+1}{1-x^2}$.

6) a) If $\sin A = \frac{4}{5}$ and $\cos B = \frac{5}{13}$, where A and B are acute angles, evaluate, without using tables or calculator, $\sin(A + B)$.

b) Find the truth set of the equation $6 \sin^2 x - \sin x - 1 = 0$, where $0^\circ \leq x \leq 360^\circ$, correct to the nearest degree.

c) Draw the graph of $f(x) = 4 + 2 \cos x$ for the values of x from 0° to 360° taking at interval of 45° . Use your graph to find the minimum value of $y = 4 + 2 \cos x$.

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