Answer four (04) questions only.   **Time: Two (02) Hours**
Calculators can be used.
This paper contains six (06) questions and three (03) pages.

1. a) Simplify.

   i) $\dfrac{x^3+1}{x^2-x+1} - \dfrac{4x^2-3x-1}{4x+1}$ ii) $(x+1)^2 + 5(x+1) - 4$

   iii) $(m-2n)(m^2 - 6mn - n^2)$

   b) Factorize the following expressions.

   i) $6x^2 - 7x - 20$ ii) $a^3 - 9ab^2$
   iii) $a^2 + a - 2ab - 2b$

   (15 Marks)

2. A box contains of 5 identical cards in shape and size, each of which has exactly one of the numbers 1, 2, 3, 4, 5 written on it. A student randomly draws out one card from the box. Without replacing the first card another is drawn randomly from the box.

   a) Draw a tree diagram indicating all the events and probabilities using the above information.

   b) Using the tree diagram that you have drawn, find the probability of the events given below.
       i)   Both cards being odd numbers
       ii)   First card being an odd number and the second card being an even number
   iii) Both cards being even numbers
       iv)   First card to be an even number and the second card to be written number 3
       v)   One card being an even number and the other card being an odd number

   (15 Marks)

3. a) To recruit personnel to the Teachers' Service, Health Service and Administrative Service, an examination was held under three sections A, B and C. The candidates should pass section A for the Teachers' Service, section B for the Health Service and section C for the Administrative Service. The number of candidates sat at the examination was 460. 100 passed sections A and C. 90 passed sections B and C. 50 passed only sections A and B.
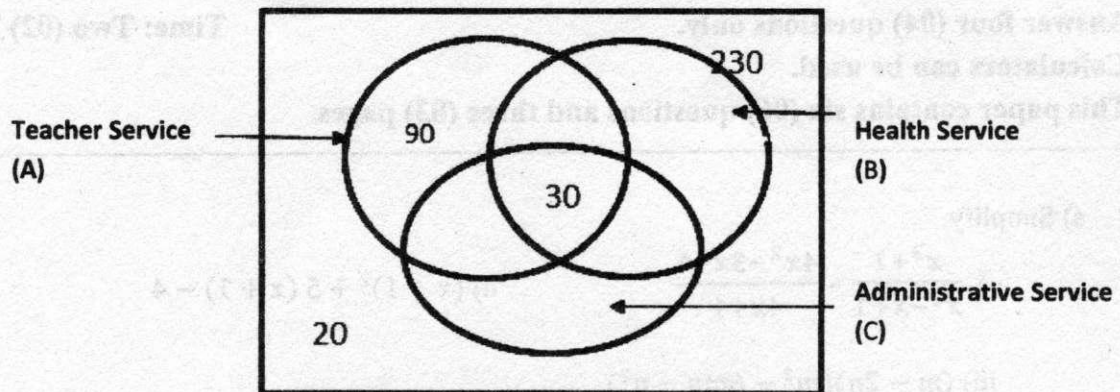
i) Copy the above Venn diagram and complete it with the given information.
ii) How many have passed both the sections of Teachers' Service and the Health Service?
iii) How many have passed only the Administrative Service?
iv) How many have failed all three sections?

b) Shade the regions given below using three (03) separate venn diagrams.
   i) $(A \cup B)$ ii) $(A \cap B)'$ iii) $(A \cup B')'$

(15 Marks)

4. a) Table given below provides the information about Nimal, Kumara and Rasika.

Name	No. of brothers	No. of sisters
Nimal	1	1
Kumara	0	2
Rasika	1	0

(i) Write the above information in a 3*2 matrix and name it as A.

(ii) if B=$\begin{pmatrix} 0 & 3 \\ 2 & 1 \\ 1 & 4 \end{pmatrix}$, find B-2A.

b) Solve the simultaneous equation given below using matrix.
   $$x + 3y = 38$$
   $$3x - y = 24$$

(15 Marks)

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5. a) Initial population of a certain area for the date 10.05.2006 is 520,000 and in the first 4 years the population has increased 1.6% annually in an arithmetic growth rate. In the next 6 years, the population has increased in 1.5% annually by geometric growth rate. Thereafter if the population has increased by 1.3% annually in an exponential growth rate, estimate the population of this area as at 04.06.2019.

b) Solve the following inequalities and draw them in a straight line.

   i) $z + 5 \geq 3$

   ii) $5(x + 2) - 3x \leq 4 + 2x + 3(x - 1)$

<div align="right">(15 Marks)</div>

6. a) Using the equation $x = \dfrac{-b \pm \sqrt{b^2 - 4ac}}{2a}$, solve the quadratic equations given below.

   i) $(x + 1)^2 - 5$

   ii) $3x^2 + 11x + 10$

b) Given below is an incomplete table prepared to draw the graph of the function $= 4 - 2x - x^2$.

x	-4	-3	-2	-1	0	1	2
y	-4	1		5		1	-4

   i) Find the values of y when $x = -2$ and $x = 0$.
   ii) Using suitable scales for x and y axes, draw the graph for the above function.
   iii) Using the graph, write the maximum value of the function and the equation of axis of symmetry.

<div align="right">(15 Marks)</div>