

Section 1**ALGEBRA****25 marks**

Q.1 Explain with an example of each, the difference between an expression and an equation. (2 marks)

Q.2 Expand and simplify the following (4 marks)

(a) $4 - 2x(x + 2)$

(b) $(x^2 + 4)(2x + 5)$

(c) $(2x - 4)^2$

(d) $(3x - y)^2$

Q.3 Transpose the following (2 marks)

(a) Make c the subject: $E = mc^2$

(b) Find r in terms of u and v : $\frac{1}{u} + \frac{1}{v} = \frac{2}{r}$

Q4. Factorise the following: (2 marks)

(a) $x^2 - 11x + 28$

(b) $12x^2 - 11x - 5$

Q5. For each of the following, determine the roots: (2 marks)

(a) Given that $(x + 3)$ is a factor of the quadratic equation $x^2 + 2x - 3 = 0$

(b) Given that $(x + 1)$ is a factor of the quadratic equation $x^2 + 4x + 3 = 0$,

Q6. Determine the roots of the following quadratic equations by formula and verify
(4 marks)

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

(b) $x^2 - 8x + 15 = 0$

(c) $x^2 + 4x + 13 = 0$

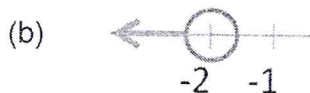
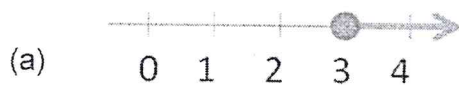
(d) $x^2 - 10x + 41 = 0$

Q7. Solve the following linear inequalities and verify
(2 marks)

(a) $2(x+4) < 2-x$

(b) $x-2 > 2x-3(x+3)$

Q8. State the inequality represented by the number lines shown:
(2 marks)



Q9. Solve the following simultaneous equations and verify

$3(x+1) = 2(2y+1)$ and $2(y+3) = 4(x+1)$
(2 marks)

Q10. Solve the following simultaneous equations and graphically interpret the result:
(3 marks)

$3x + 4y + 2z = 11$, $2x + 3y - z = 4$ and $5x + 5y - 3z = -1$

Section 2

STATISTICS

15 marks

Q.1 In a study of mobile phones used by 7200 college students, 2160 were found to have phones made by Apple, 1800 had a Samsung branded phone, 1584 had phones made by Sony, 1080 had Windows phones and the remainder were grouped as Other brands.

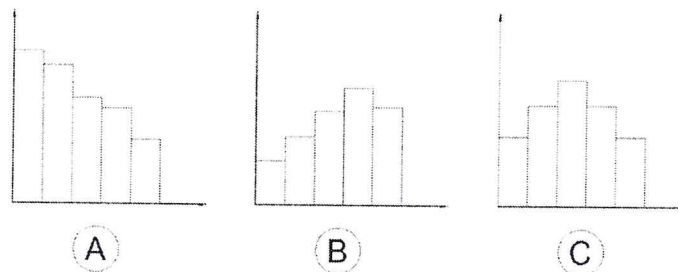
- (a) Display the results of the above survey on a Pie chart. (2 marks)
- (b) Express the numbers of students in each category as a percentage of the total. (2 marks)

Q.2 The number of sick days taken by students in a college were tabulated as follows:

No. of days	0-2	2-4	4-6	6-8	8-10
No. of employees	7	18	8	30	6

- (a) Construct a histogram from the above data. (2 marks)

Q.3 Consider the three histograms shown below:



- (a) Which of these distributions represents normal distribution? (1 mark)
- (b) Which distribution is skewed negatively? (1 mark)
- (c) Which distribution is positively skewed? (1 mark)
- (d) Which of the above represents the IQ of a large number of people. Why? (2 marks)

- Q.4 The combined results of a maths exam taken by several classes of college students are as follows:

90, 85, 45, 30, 44, 76, 86, 41, 53, 55, 62, 74, 37, 77, 88, 80, 59, 53, 62, 72,
66, 63, 55, 50, 88, 91, 75, 60, 51, 30, 79, 84, 66, 81, 73, 62, 59, 77, 63, 87

- (a) Display the results using a stem and leaf plot (2 marks)
(b) What inference can be made from the distribution? (2 marks)

Q1. Explain the concept of algorithms including an explanation of their relationship to functions (2 marks)

Q.2 Expand each of the following notations

(a) $\sum_{x=3}^8 x$ (1 mark)

(b) $\sum_{j=1}^3 \sum_{k=3}^5 (2,jk)$ (1 mark)

(c) $\prod_{k=5}^7 k$ (1 mark)

(d) $\prod_{x=2}^4 \prod_{y=3}^6 (5,xy)$ (1 mark)

Q.3 With the aid of a simple diagram, describe the divide and conquer approach in terms of algorithm solving? (2 marks)

Q.4 Consider the following array 5, 2, 4, 3, 1.

List the steps involved to rearrange this array in numerical order using the following sorting techniques:

(a) selection sort (2 marks)

(b) insertion sort (2 marks)

- Q.5 With regard to the same array in Q.4. above, write and run a program using the bubble sort algorithm to rearrange the given array in numerical order.
- (a) print and attach the code of the completed algorithm (4 marks)
- (b) by comparison, which was the most effective of the sorting techniques used. Why? (2 marks)
- Q.6 If a list of the 32 counties in Ireland was arranged in alphabetical order, how many items in the array would a binary search have to examine to find the location of a specified county, in the worst case?
- at most 1
 - at most 6
 - at most 16
 - at most 32
- (a) specify your answer (1 mark)
- (b) explain your answer (1 mark)