FOUNDATION MATHEMATICS

1st JUNE 2013

Examination Paper

Answer ALL questions.

Clearly cross out surplus answers.

Time: 2 hours

Any reference material brought into the examination room must be handed to the invigilator before the start of the examination.

Candidates are allowed to bring in a scientific calculator for this module.

Graph paper will be provided by the Centre.

YOU MUST SHOW YOUR WORKINGS

CANDIDATES MUST ANSWER ALL QUESTIONS

QUESTION 1 **Marks**

a) Simplify the following.

i) $a^3 \times a^5 \div a^2$ **1**

ii) $x^8 \times x^{-4}$ **1**

iii) $\frac{a^3}{a} \times a^{-1}$ **1**

iv) $(3x^2y^4z)^2$ **1**

b) Simplify the following.

i) $4a^3b^2 \div 5ab$ **1**

ii) $(5cd) \times (-2c^2)$ **1**

iii) $3(2x + y) + 5(3x + y)$ **1**

iv) $7a \div (-11b)$ **1**

c) Factorise the following.

i) $3abc + 12abde$ **2**

ii) $x^2 + 6x + 8$ **2**

d) Simplify the following.

i) $\frac{2x}{5} - \frac{x}{3}$ **2**

ii) $\frac{(2x+2)}{6} + \frac{(x+1)}{3} - \frac{x-1}{2}$ **2**

e) Transpose the following formulae to make x the subject.

i) $y = 2(x + z)$ **2**

ii) $7y - x^2 = 14$ **2**

Total 20 Marks

QUESTION 2 **Marks**

a) Solve the following equations and find the value of x.

i) $22 - 2x = 4(1 + x)$ **2**

ii) $\frac{x+3}{2} + \frac{2x-4}{3} = 6$ **2**

b) Solve the following quadratic equation by factorising. **2**

$x^2 + 3x - 10 = 0$

c) Solve the following quadratic equation by using the Quadratic Formula. **2**

$2x^2 - 3x - 4 = 0$

(You may leave your answer in surd form.)

d) Solve the following simultaneous equations and find the value of x.

i) $5x + 2y = 14$ and $3x - 4y = 24$ **2**

ii) $7x - 4y = 23$ and $4x - 3y = 11$ **2**

e) For the following data set:

7 12 5 10 16 10

i) Calculate the range. **1**

ii) Calculate the mean. **1**

iii) Calculate the median. **1**

iv) Find the mode. **1**

f) The number of people living in 25 households is recorded as follows.

2	1	3	5	4
3	1	4	2	1
2	2	3	3	3
3	3	2	3	2
2	3	1	3	4

i) Summarise this data as a frequency distribution table. **2**

ii) Calculate the mean number of people living in a household. **2**

Total 20 Marks

QUESTION 3 **Marks**

a) **i)** Calculate the gradients of the following curve at the point where $x = 3$ using differentiation. **3**

$y = x^3 - 4x$

ii) Calculate the gradient of the following curve where $x = 2$ and $y = \frac{4}{x^2}$ **3**

b) A ball has a velocity of v m/s^2. After t seconds the velocity is $v = 9 + 12t - t^2$

i) Find the acceleration after t seconds. **2**

ii) What is the acceleration after 4 seconds? **1**

iii) At what time, t, is the acceleration zero? **2**

c) **i)** Using differentiation, find the coordinates of the turning point on the curve $y = (x + 2)^2$ **4**

ii) Construct a table of values for the curve $y = (x + 2)^2$ for $-5 \leq x \leq 1$ **5**

Use these values to plot a graph of the curve $y = (x + 2)^2$ and identify the turning point found in part (i) as either a maximum or minimum turning point.

Total 20 Marks

QUESTION 4

a) Integrate the following expression. **2**

$3x^5 - \frac{1}{x^2}$

b) The gradient of the curve which passes through the point (1, 2) is given by $2x^2 + 1$. Find the equation of the curve. **3**

c) Evaluate the definite integral: **3**

$$\int_1^2 (3x^2 + 4x + 1)\, dx$$

d) **i)** Find the area bounded by the curve $x^2 - 2x + 3$, the x-axis and the lines $x = -1$ and $x = 3$ **3**

ii) Find the area bounded by the curve $y = 5 + 6x - 3x^2$**,** the x-axis and the lines $x = 0$ and $x = 2$ **3**

e) **i)** The acceleration of a moving body at the end of t seconds from the commencement of motion is $(10 - t)$ metres per second. Find the velocity at the end of 10 seconds if the initial velocity is 8 metres per second. **3**

ii) Find the distance travelled by the body at the end of 2 seconds. **3**

Total 20 Marks

QUESTION 5 **Marks**

a) A shop noted the colours of t-shirts sold during one week. The results are shown in the table below. **4**

T-shirt colour	Number of t-shirts sold
Black	8
Red	15
Green	10
Yellow	6
Blue	12

Construct a bar chart to illustrate this data.

b) The number of goals scored in 20 soccer matches is shown below.

Number of goals	0	1	2	3	4
Frequency	4	6	7	2	1

i) Calculate the mean. **2**

ii) Calculate the mean deviation. **2**

c) Lisa and Sarah are taking a history exam. The probability that Lisa will pass is 0.9. The probability that Sarah will pass is 0.6.

i) Draw a probability tree diagram to show all the possible outcomes of their history exam. **8**

ii) Use your tree diagram to find out the probability that only one passes the test. **2**

iii) Use your tree diagram to find out the probability that at least one passes the test. **2**

Total 20 Marks

END OF PAPER

