MASENO UNIVERSITY

UNIVERSITY EXAMINATIONS 2015/2016

FIRST YEAR FIRST SEMESTER EXAMINATIONS FOR THE DEGREE OF BACHELOR OF SCIENCE, BACHELOR OF ARTS AND BACHELOR OF EDUCATION WITH INFORMATION TECHNOLOGY

MAIN CAMPUS

MMA 106: MATHEMATICS I

Date: 15th January, 2016

Time: 2.30 - 4.30 pm

INSTRUCTIONS:

- Answer question ONE and any other TWO questions.
- Observe further instructions on the answer booklet.

ISO 9001:2008 CERTIFIED

QUESTION 1. [20 Marks]

(a) Simplify $\frac{\sqrt{10}}{\sqrt{5}-\sqrt{2}} - \frac{\sqrt{10}}{\sqrt{5}+\sqrt{2}}$ [3 Marks]

(b) The second term of an AP is 15 and the sixth term is 23. Find the first term, common difference. [4 Marks]

(c) (i) Find the quotient when $2x^3 + 7x^2 + 2x - 3$ is divided by $x + 3$ and hence.

(ii) Factorize $2x^3 + 7x^2 + 2x - 3$ completely.

[6 Marks]

(d) In the Binomial expansion of $\left(x^2 + \frac{1}{2x}\right)^9$, find

(i) the coefficient of the term containing x^6.

(ii) the constant term. [6 Marks]

(e) Show that $\frac{\cot A - \tan A}{\csc A - \sec A} = \cos A + \sin A$ [4 Marks]

(f) Solve the equation $2^{(2x+1)} - 3 \times 2^{(x+1)} + 4 = 0$ [5 Marks]

(g) Given that $\log 3 = 0.4771$ and $\log 5 = 0.6990$. Use the law of logarithms to find $\log 45$ to 4 decimal places. [2Marks]

QUESTION 2. [20 Marks]

(a) (i) Show that $\log_b X = \frac{\log_a X}{\log_a b}$.

[10 Marks]

(ii) Solve $3 \log_2 x + 5 \log_x 2 - 16 = 0$.

(b) (i) Solve $\sqrt{(2x+7)} - \sqrt{x} = 2$.

(ii) A committee of 5 people one of whom is to be a treasurer is to be chosen from a group of 11 people. If only 3 of the 11 people qualify for

the position of a treasurer, how many such committees can be chosen.

[5Marks]

(c) Find the value of k such that the series below is an A. P. Hence find the

sum of the first ten terms. $(k - 1) + (k + 3) + (3k - 1) + \cdots$

[5 Marks]

QUESTION 3.   [20 Marks]

(a) (i) Express in factorial form. $n(n - 1)(n - 2)$.

(ii) Find total number of permutations of the letters in the word

KANYAMKAGO

(iii) Solve to 3 decimal places. $3^{2x} - 2(3^{x+1}) + 5 = 0$

[10 Marks]

(b) (i)Expand $(1 - 2x)^{10}$ in ascending powers of x up to the term having x^4

(ii) Using expansion in (i),approximate $(1.002)^{10}$ to 4 decimal places.

[4 Marks]

(c) Consider the series $6 + 18 + 54 + \cdots$.

Find the smallest number of terms of the series that will give a total

greater than 6,200,000 .   [6 Marks]

QUESTION 4.   [20 Marks]

(a) Consider the following set of data of marks for eleven candidates scored in

a quiz: 40 , 45, 60, 53 , 71, 60, 53 , 62 , 48 , 60 , 70 . Find

(i) the mode. (ii) the median. (iii) the mean score.   [7 marks]

(b) For the frequency distribution given below, use the assumed mean of 117

to calculate,

(i) the mean score. (ii) the standard deviation

X	100-104	105-109	110-114	115-119	120-124	125-129	130-134
f	1	15	22	31	8	3	20

[13 Marks]

QUESTION 5.   [20 Marks]

(a) Suppose that $S = \{ E_1, E_2, E_3, E_4, E_5, E_6 \}$ is a sample space where the

simple events $E_1, E_2, .., E_6$ are equally likely .

Let $A: = \{ E_1, E_3, E_5 \}$ and $B: = \{ E_1, E_2, E_3 \}$.

Find the following probabilities;

     (i) P(A),   (ii) P(B),   (iii) P(A and B), (iv) P (A or B).

[9 Marks]

(b) Two dice were tossed together. What is the probability that the sum of the
two upper faces will be 9 or 10 ?   [4 Marks]

(c) Let $\log H = 2 \log t - \log(1 + t^2)$. .

    (i) Make t the subject of the formula.

    (ii) Show that if $H = \frac{1}{4}$, then $t = \frac{1}{3}\sqrt{3}$ [7 Marks]

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