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University Examinations 2012/2013

FIRST YEAR, FIRST SEMESTER EXAMINATIONS FOR CERTIFICATE IN ELECTRICAL INSTALLATION AND CERTIFICATE IN AUTOMOTIVE TECHNOLOGY

SMA 0001: MATHEMATICS 1

DATE: AUGUST 2012 **TIME: 1½HOURS**

INSTRUCTIONS: *Answer question **one** and any other **two** questions*

QUESTION ONE – (30 MARKS)

a) $\left(\frac{81^{\frac{1}{4}}\times 9^{\frac{1}{2}}}{3^2\times 27^{\frac{2}{3}}}\right)^{-1}$ (3 Marks)

b) Express $\log 450$ in terms of $\log 2$, $\log 3$ and $\log 5$. (3 Marks)

c) Make V the subject of the formula $E = \frac{V^2 t}{R}$. (3 Marks)

d) Simplify the expression $\frac{a^2b+a^3b}{a^2b^2}$. (3 Marks)

e) The resistance R of a piece of wire is inversely proportional to the square of the diameter d, of is cross-section. If R = 0.8Ω when d=5cm, find value of R when d=4.(4 Marks)

f) Solve the simultaneous equations $2y = 3x - 16$ and $x + y = 7$ by substitution method. (3 Marks)

g) Rationalize the denominator of the fraction $^4/_{\sqrt{3}}$. (3 Marks)

h) Factorize the expression $x^2 + 7x + 12$. (3 Marks)

i) Solve $^2/_3 + {}^b/_4 = 6$ and $^a/_6 - {}^b/_8 = 0$ simultaneously. (5 Marks)

QUESTION TWO

a) Make a the subject of the formula $y = \frac{a^2m-a^2n}{x}$. (3 Marks)

b) A drill is to have 8 speeds ranging from 50rpm to 1000rpm, if the speeds form a geometric progression determine their values each correct to nearest whole number. (6 Marks)

c) Simplify $(3c + 2c)(4c + c) \div (5c - 8c)$. (2 Marks)

d) Solve $7x - 2y = 26$ and $6x + 5y = 29$ simultaneously. (4 Marks)

QUESTION THREE (15 MARKS)

a) Solve the equation ${}^{2}/_{a-3} = {}^{3}/_{2a+1}$. (3 Marks)

b) The final length l_2 of a piece of wire heated through $\theta°C$ is given by the formula $l_2 = l_1(1+\propto \theta)$. Make the coefficient of expansion $\propto$ the subject. (4 Marks)

c) Simplify $\frac{\log 9 - \log 3 + \frac{1}{2}\log 81}{2\log 3}$. (4 Marks)

d) The sum of 13 terms in an arithmetic series is 286 and the common difference is 3. Determine the first term of series. (4 Marks)

QUESTION FOUR (15 MARKS)

a) The equation of a straight line of gradient *m* and *y* intercept c is $y = mx + c$, if a straight line passes through a point where $x = 1$ and $y = -2$, and also through the point where $x = 3.5$ and $y = 10.5$, find the values of m and c. (5 Marks)

b) Ohm's Law states that the current flowing in a resistor is directly proportional to the applied voltage. When 60 volts is applied across a resistor the current flowing through it is $4.2 \times 10^{-3} Amperes$. Determine the constant of proportionally, the current when the voltage when the current is $6.5 \times 10^{-3} amperes$. (6 Marks)

c) Simplify $\log\left(\frac{125 \times \sqrt[3]{8}}{\sqrt[4]{81^3}}\right)$. (4 Marks)