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University Examinations 2014/2015

FIRST YEAR, FIRST SEMESTER EXAMINATION FOR CERTIFICATE IN ELECTRICAL
INSTALLATION, CERTIFICATE IN MOTOR VEHICLE MECHANICS

SMA 0001: MATHEMATICS I

DATE: DECEMBER 2014

TIME: $1\frac{1}{2}$ HOURS

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

QUESTION ONE (30 MARKS)

a) Simplify the following expressions

(i) $\frac{16a^4bc^2}{4a^2b^3}$ (2 marks)

(ii) $\sqrt[3]{\frac{8x^4y^6}{xy^3}}$ (3 marks)

b) Evaluate

(i) $64^{\frac{2}{3}}$ (2 marks)

(ii) $\log_3 27 - \log_3 3$ (3 marks)

(iii) $\log_2 8^2 + \log_2 4$ (3 marks)

c) Solve for x

(i) $(3^{2x})^3 = 243$ (3 marks)

(ii) $1 + \log_5 x = \log_5 12$ (3 marks)

d) Find the sum of the first 8 terms of the arithmetic progression 2+8+14..... (2 marks)

e) The first term of a geometric progression is 5. If the common ratio is 3, find the greatest number of terms that can yield a sum of less than 200 (3 marks)

f) Simplify the following algebraic expression $\frac{x^2 + 5x + 6}{x + 2}$ (3 marks)

g) A girl and a boy shared money at the ratio of 7:2. If the boy got 15000 ksh, determine the total amount that was shared (3 marks)

QUESTION TWO (15 MARKS)

a) Using logarithms solve the problem $\sqrt[3]{\frac{246 \times 0.0489}{(0.064)^2}}$ (5 marks)

b) Simplify $4\log_a 3 + \log_a 4 - 2\log_a 6$ (4 marks)

c) Find the value of x in the equation $\log_x 625 = 4$ (3 marks)

d) Solve the simultaneous equation (3 marks)

$$\log_x y = 2$$

$$xy = 8$$

QUESTION THREE (15 MARKS)

a) Solve for x in the equation $\frac{x^3 + 9x}{x + 9} = 4$ (4 marks)

b) Express as a single fraction $\frac{x + 2}{4} - \frac{3x - 1}{5}$ (3 marks)

c) Solve the following simultaneous equation (4 marks)

$$3x + 2y = 16$$

$$x + 3y = 10$$

d) Express the following equation in terms of a

$$\frac{1}{b} = \frac{1}{c} + \frac{1}{a} \quad (4 \text{ marks})$$

QUESTION FOUR (15 MARKS)

a) p varies directly as q. When p is 10, q is 15. Determine the constant of proportionality (3 marks)

b) Ten men working three hours a day take 12 days to complete a job. How long will it take 8 men working 6 hours a day to complete the same job (3 marks)

c) The height of a box of constant volume is inversely proportional to its cross sectional area. When the area is 500cm^2 the height is 25cm. Determine the cross-sectional area when the height is 30cm. (4 marks)

d) Given that $E = V + Ir$ and that $E = 1.5$ when $I = 0.5$ and $E = 2$ when $I = 0.8$. Find I when $E = 3$ (5 marks)

QUESTION FIVE (15 MARKS)

- a) The sum of the first 7 terms of an arithmetic series is 126. If the first is 3, determine the common difference (3 marks)
- b) The annual salary of a worker increases by 15% annually. If the first salary is sh. 20000, what will be his salary in the 10th year? (4 marks)
- c) If the 2nd and 3rd terms of an arithmetic progression are the 1st and 2nd terms of a geometric progression, determine the common ratio (4 marks)
- d) A man saves on monthly basis. He saves ksh. 1000 in the 1st year and increases the monthly saving by ksh.200 every month. how long will it take for his savings to reach sh.22000 (4 marks)