



TECHNICAL UNIVERSITY OF MOMBASA

FACULTY OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING

UNIVERSITY EXAMINATION FOR:

CERTIFICATE IN ELECTRICAL ENGINEERING

AMA 1150 : ENGINEERING MATH 1

END OF SEMESTER EXAMINATION

SERIES: DECEMBER 2016

TIME: 2 HOURS

DATE: Pick Date Select Month Pick Year

Instructions to Candidates

You should have the following for this examination

-Answer Booklet, examination pass and student ID

This paper consists of Choose No questions. Attempt Choose instruction.

Do not write on the question paper.

Question ONE

a) Evaluate without using calculator

i) $\frac{2^3 x 3^5 x (7^2)^2}{7^4 x 2^4 x 3^3}$ (2marks)

ii) $\frac{4^{1.5} x 8^{\frac{1}{3}}}{2^2 x 32^{\frac{-2}{5}}}$ (3marks)

b) Solve $6x^2 - 13x + 2 = 0$ by factorisation (4marks)

c) Calculate the volume and total surface area of cone of radius 5cm and perpendicular height 12cm (5marks)

d) Simplify $(a^3 \sqrt{b} \sqrt{c^5})(\sqrt{a^3} \sqrt{b^2} c^3)$ and evaluate when $a = \frac{1}{4}$, $b = 64$, $c = 1$ (4marks)

e) The electrical resistance R of a piece of wire is inversely proportional to the cross sectional area A when $A = 5 \text{ mm}^2$, $R = 7.02 \text{ ohms}$. Determine

i) coefficient of proportionality (2marks)

ii) cross sectional area when resistance is 40 ohms (2marks)

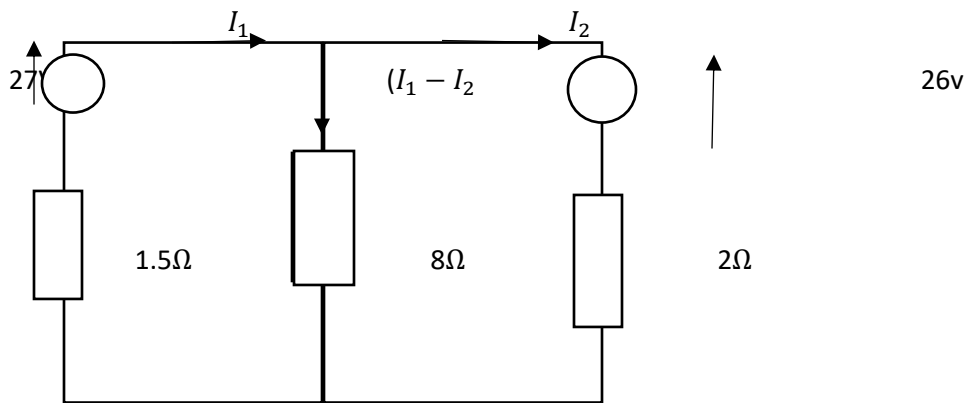
f) Solve $\frac{x}{8} + \frac{5}{2} = y$

$13 \frac{y}{3} = 3x$ (5marks)

g) Find the sum of the first 7 terms of the series $\frac{1}{2}, 1\frac{1}{2}, 4\frac{1}{2}, 13\frac{1}{2}$

Question TWO

a) When kirchoff laws are applied to electrical circuit shown below, the current I_1 and I_2 are connected by the equation

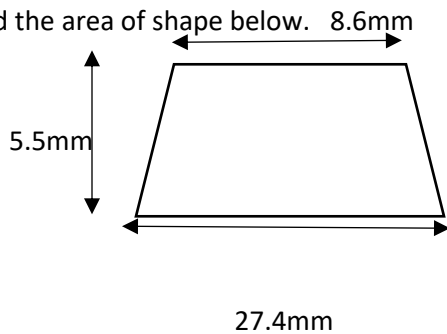


$27 = 1.5I_1 + 8(I_1 - I_2)$

$-26 = 2I_2 - 8(I_1 - I_2)$ Find the value of I_1 and I_2 (5marks)

b) Solve $4x^2 + 8x + 3 = 0$ by factorisation (3marks)

c) Find the area of shape below. (3marks)



d) Calculate the magnitude and direction of resultant of three velocities given (7marks)

$$V_1 = 10 \text{ units at } 20^\circ$$

$$V_2 = 15 \text{ units at } 90^\circ$$

$$V_3 = 7 \text{ units at } 190^\circ$$

e) Evaluate $16^{\frac{-1}{4}}$ (2marks)

Question THREE

a) Solve $4x^2 + 7x + 2 = 0$ giving the roots correct to 2 decimal places (5marks)

b) A ball falls vertically after being dropped. The ball falls distance d metres in time t seconds. d is directly proportional to the square of t . The ball falls 20 metres in time of 2 seconds

i) Find formula for d in terms of t (1mark)

ii) Calculate the distance the ball falls in time of 3 seconds (2marks)

iii) Calculate the time the ball takes to fall 605m (2marks)

c) Solve $\log(x-1) + \log(x+1) = 2 \log(x+2)$. (5marks)

d) Determine the diameter and circumference of circle if an arc of length 4.75 cm subtend an angle of 0.91 radian (3marks)

e) Convert 0.749 radians into degrees and minutes (2marks)

Question FOUR

a) Find the sum of the first 9 terms of the series 72, 57.6, 46.08. (3marks)

b) A rivet consist of cylindrical head of diameter 1cm and depth 2mm and shaft of diameter 2mm and length of 1.5. Determine volume of metal in 2000 such rivets (5marks)

c) Solve the simultaneous equation (4marks)

$$5x + 7y = 19$$

$$6x + 3y = 12$$

d) Express the following with positive indices

i) $\frac{2b^{-3}x^2}{7c^{-4}y^2}$

ii) $\frac{\sqrt[3]{y^{-c}}}{\sqrt[3]{y^2}}$

e) Rationalise $\frac{\sqrt{3}+1}{\sqrt{3}-4}$

Question FIVE

a) Solve the simultaneous equation (6marks)

$$2.5x + 0.75 - 3y = 0$$

$$1.6 = 1.08 - 1.2y$$

b) Evaluate $\frac{\sqrt{2}}{6+\sqrt{2}}$ (4marks)

c) Find the value of x given $3.72 = \ln\left(\frac{5.14}{x}\right)$

d) A drilling machine is to have 6 speeds ranging from 50 rev/min to 750 rev/min. If the speeds form geometric progression, determine their values correct to nearest whole number (7marks)

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