



TECHNICAL UNIVERSITY OF MOMBASA
FACULTY OF APPLIED AND HEALTH SCIENCES
DEPARTMENT OF MATHEMATICS & PHYSICS
UNIVERSITY EXAMINATION FOR:

DIPLOMA IN NAUTICAL SCIENCE DNSC

AMA 2113: MATHEMATICS I

SPECIAL/ SUPPLIMENTARY EXAMINATIONS

SERIES: SEPTEMBER 2018

TIME: TWO HOURS

DATE: SEPTEMBER 2018

Instructions to Candidates

You should have the following for this examination

-Answer Booklet, examination pass and student ID

This paper consists of FIVE questions. Attempt question one and any other two questions

Do not write on the question paper.

Question ONE

a) Differentiate between a scalar quantity and a vector quantity a vector quantity
(2mk)

b) Solve for x in the following equation

$$5.4^{x+3} \times 8.2^{2x-1} = 4.8^{3x} \quad (7\text{mks})$$

c) For the series below, determine

$$120+116+112+108+\dots$$

i. U_{10} (2mks)

ii. S_{10} (3mks)

d) The 6th term of an AP is -23 and the 10th term is -35

Find the first term, the common difference, and the sum of the first 15 terms of the series. (6mks)

e) A quadrilateral ABCD, has P and Q as the midpoints of the diagonals AC and BD respectively.

Show that $\overline{AB} + \overline{AD} + \overline{CB} + \overline{CD} = 4\overline{PQ}$ (10mks)

Question TWO

a). Solve for the unmounts in the equations below

$$\frac{2x-1}{5} + \frac{x-2y}{10} = x + \frac{1}{4} \dots\dots\dots(i)$$

$$\frac{3y+2}{3} + \frac{4x-3y}{2} = 5x + \frac{4}{4} \dots\dots\dots(ii)$$

(8mk)

b). Show that the sum of the first a terms of a G.P is given is by

$$sn = \frac{a(1-r^n)}{1-r} \quad (6mks)$$

c). The lengths (in mm) of 40 spindles were measured with the following results obtained.

- 20.90 20.57 20.86 20.74 20.82 20.63 20.53 20.89 20.75 20.65
- 20.71 21.03 20.72 20.41 20.94 20.75 20.79 20.65 21.08 20.89
- 20.51 20.88 20.97 20.78 20.61 20.92 20.07 21.16 20.80 20.77
- 20.82 20.72 20.60 20.90 20.86 20.68 20.75 20.88 20.56 20.94

Arrange the values into 8 equal classes (6mks)

Question three

- a) Find the vector sum $\overline{AB} + \overline{BC}$ (1mk)
b) Transpose the formula given below, and make f the subject

$$\frac{R}{r} = \sqrt{\frac{f+p}{f-p}}$$

(6mks)

- c) If $V = \frac{3.14b}{12} (D^2 + Dd + d^2)$ find V if $b = 1.46$, $D = 0.864$, $d = 0.517$ (3mks)

- d) Solve the following, by completing the square

$$2x^2 + 10x - 7 = 0$$

(5mks)

- e) List any 4 laws of indices (4mks)

- f) Given the following equation

$$rq = k - pq^2$$

Make q the subject of the formula

(1mk)

Question four

- a) Simplify the following

$$F = 3\sqrt[6]{ab^3} \div \sqrt[9]{a^4 b^6} \times \left(4\sqrt[6]{a^6 b^2}\right)^{-\frac{1}{2}}$$

(4mks)

- b) Solve the equation below

$$12^{2x} = 35.4$$

(4mks)

- c) Solve the pair of equations

$$2(x+2y) + 3x-y = 38$$

$$4(3x+2y) + 3(x+y) = -8$$

(6mks)

- d) Insert three geometric means, A, B and C between 56 and 896 (5mks)

- e) Solve for x below

$$x^2 = 7$$

(1mk)

Question five

- a) The 6th term of an AP is -23 and the 10th term is -35.
Find the first term, the common difference, and the sum of the first 15 terms of the series. (5mks)
- b) Determine the following antilogarithms to the base stated.
- i. Antilog 3.2684 (base10) (1mk)
 - ii. Antilog 2.8623 (base e) (1mk)
 - iii. Antilog $\bar{4}.3257$ (base10) (1mk)
 - iv. Antilog 2.4572 (base 6) (1mk)
- c) Rewrite the following without logarithms
- i. $\log_w = 2(\log_A + \log_w) - (\log_{32} + 2\log_{II} + 2\log_r + \log_c)$ (1mk)
 - ii. $\log_s = \log_k - \log_2 + 2\log_{II} + 2\log_n + \log_y + \log_r + 2\log_L - 2\log_h - \log_g$ (1mk)
 - iii. $\log_I = \ln_{(2r)} - \text{Ln}k (kr+r) - (\text{Ln}k + kl)$ (1mk)
- d) Measurement in millimeters of 60 bolts gave the following frequency distribution.

| | | | | | | | |
|---------------|------|------|------|------|------|------|------|
| Length x (mm) | 30.2 | 30.4 | 30.6 | 30.8 | 31.0 | 31.2 | 31.4 |
| frequency | 3 | 7 | 12 | 17 | 11 | 8 | 2 |

Find the mean, of the data (5mks)

- e) Find $\text{Log}_7 83.64$ (3mks)