TECHNICAL UNIVERSITY OF MOMBASA

FACULTY OF ENGINEERING & TECHNOLOGY

DEPARTMENT OF ELECTRICAL & ELECTRONIC ENGINEERING

UNIVERSITY EXAMINATION FOR:

CERTIFICATE IN TECHNOLOGY ELECTRICAL AND ELECTRONIC ENGINEERING

AMA 1250 : ENGINEERING MATHEMATICS III

END OF SEMESTER EXAMINATION

SERIES : JULY 2019

TIME: 2 HOURS

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:

i. Determine the area enclosed by y=2x+3, the x-axis and ordinates x=1 and x=4.

(4marks)

Draw the graph to illustrate.

(2marks)

ii. Differentiate the following with respect to x.

(a) y = $5x^2$ – 4x + 9

(b) y = x4 – 3x2-2 x^4– $3x^2$ − 2 (5 marks)

iii. Given $y = 2(x-1)^2$ find $\frac{dy}{dx}$

(3 marks)

iv. A craftsman and 4 labourers together earn £865 per week, whilst 4 craftsmen and 9 labourers earn £2340 basic per week. Determine the basic weekly wage of a craftsman and a labourer.

(3 marks)

iv. Find the value of $23 - 4(2 \times 7) + \frac{(144 \div 4)}{(14 - 8)}$

(3 marks)

Question TWO

a) Resolve the acceleration vector of 17 m/s2 at an angle of 120◦ to the horizontal into a horizontal and a vertical component.

(6 marks)

b) Calculate the resultant force of the two forces given in question (a) above.

(4 marks)

c) Given Z1 = 2 + j4 and
Z2 = 3 – j

Determine i) Z1 + Z2
ii) Z1 – Z2
iii) Z2 – Z1
and show the results on an Argand diagram.

(10 marks)

Question THREE

a) Calculate the resultant of
(i) v1 − v2 + v3

(ii) v2 − v1 − v3

when v1 = 22 units at 140◦,
v2 = 40 units at 190◦ and

v3 = 15 units at 290◦

(10 marks)

b) Solve the equations,

i) $x^2 + 4 = 0$
j) $2x^2 + 3x + 5 = 0$

(5 marks)

c) Two sides of a triangular plot of land are 52.0m and 34.0m respectively. If the area of the plot is 620m2 find:-

i) The length of fencing required to enclose the plot.

ii) The angles of the triangular plot.

(5 marks)

Question FOUR

i. If y = $5x^4 - 3x^3 + 2x^2 - 6x + 5$

Find a) $\frac{dy}{dx}$

b) $\frac{d^2y}{dx^2}$

(6 marks)

ii. Power in a d.c. circuit is given by P = $\frac{V2}{R}$ here V is the supply voltage and R is the circuit resistance.
Find the supply voltage if the circuit resistance is 1.25Ω and the power measured is 320W

(3 marks)

iii. a) $\int_1^3 (t^2 - 2t)dt$

(3 marks)

b) $\int_{-1}^2 (2x^3 - 3x^2 + 2)dx$

(4 marks)

iii. Solve the equations,

a) $x^2 + 4 = 0$

b) $2x^2 + 3x + 5 = 0$

(4 marks)

Question FIVE

a) Solve triangle DEF and find its area given that :-
EF=35.0mm, DE=25.0mm and∠E=64◦

(5marks**)**

b) Without plotting a graph, determine the gradient and Y – axis intercept values of the following:-

i) 3y = -6x +2 (3 marks)

ii) 2x + 9y + 1 = 0 (3 marks)

c) Determine the following:

(i) (2 − 3x + 5x2)dx (3 marks)

d) Evaluate:

i) $\int (x2 + 4)dx$

ii) $\int \frac{1}{x3} dx$

(6marks)