



TECHNICAL UNIVERSITY OF MOMBASA

Faculty of Applied & Health Sciences

DEPARTMENT OF MATHEMATICS & PHYSISCS

DIPLOMA IN BUILDING & CIVIL ENGINEERING (DBCE Y3 S1)

AMA 2551: ENGINEERING MATHEMATICS V

END OF SEMESTER EXAMINATION

SERIES: APRIL 2015

TIME ALLOWED: 2 HOURS

Instructions to Candidates:

You should have the following for this examination

- *Answer Booklet*
- *Mathematical Table*

This paper consist of **FIVE** questions

Answer question **ONE (COMPULSORY)** and any other **TWO** questions

Maximum marks for each part of a question are as shown

This paper consists of **FOUR** printed pages

Question One (Compulsory)

a) Expand the following binomial expressions:

(i) $(1+x)^6$ (3 marks)

(ii) $(1+2x^2)^6$ (3 marks)

(iii) $\left(\frac{1}{1-x}\right)$ up to the 6th term (3 marks)

b) Evaluate, using binomial expansion $\frac{1}{1.02}$ to 6 decimal places (4 marks)

c) Find the number of ways can 11 players be chosen from 16 players if:
(i) The captain must be present (2 marks)
(ii) No restrictions (2 marks)

d) The salary of maids in a certain estates is normally distributed round a mean of kshs 4000 montly and a standard deviation of kshs 1000. Determine the probability of obtaining a male who earns more than kshs 3000 (3 marks)

e) A fair coin is tossed 10 times, determine the probability of obtaining more than 8 heads. (3 marks)

f) Customers arrive at departmental store in a Poisson manner at the rate of 6.5 customer per hour. Find the probability that in any given day more than 2 customers arrive (4 marks)

g) A bag contains 6 white balls and 4 green balls. One ball is drawn from the bag randomly without replacement. Determine the probability that the first three balls drawn are of the same colour. (3 marks)

Question Two

a) Marks of students in a class were tabulated as follows:

Class	No. of students
0 – 10	4
10 – 20	8
20 – 30	11
30 – 40	15
40 – 50	12
50 – 60	6
60 – 70	2
70 – 80	1
80 – 90	0

Required:

(i) The arithmetic mean

(ii) The standard deviation

(iii) Inter-quartile range

(12 marks)

b) (i) Differentiate type I and type II error

(2 marks)

(ii) The Quality Control Manager tested two yarns A and B of the same count of strength. He got the following results:

Mean	No. in the sample	Standard Deviation
45	10	7
55	5	6

The management wanted to determine if the difference is significant required:

(i) Set out the hypotheses

(2 marks)

(ii) Test the hypothesis at 0.05 significant level

(4 marks)

Question Three

a) Two different models are available for the same machine the production statistics (No of units produced per hour) of these two models are given below which was collected in different days:

Day		1	2	3	4	5	6
Model	A	180	176	184	181	190	
Model	B	195	194	190	192	181	187

Required:

(i) Determine the mean and standard deviation for each model

(8 marks)

(ii) Would you conclude that model A and Model B have the same productivity at 0.05 level of significance

(6 marks)

$$(1 + 2x)^5$$

b) Expand Hence evaluate $(0.98)^5$

(6 marks)

Question Four

a) Given the following data:

%ge debt of capitalization	0 – 10	10 – 20	20 – 30	30 – 40	40 – 50	50 – 60
No. of Companies	15	17	19	27	19	12
Required						

(i) Arithmetic mean and median

(8 marks)

(ii) Standard deviation

(5 marks)

(iii) The skewness of data using Pearson's index

(3 marks)

$$\left(x - \frac{1}{x}\right)^6$$

c) Expand hence determine the constant term

(4 marks)

Question Five

a) In car dealers records, the following data was extracted:

		Mode of Payment		
		Cash	Credit	Total
Type of Car Purchased	New	12	30	42%
	Old	20	38	58%
%		32%	68%	

Determine a conditional probability that a used car purchase will pay cash. **(5 marks)**

b) The mean expenditure of University students on telephone is kshs 100 daily. A student researcher who was curious collected a random sample of 25 students and found that the mean was kshs 95 with a standard deviation of kshs 10. What did the student researcher conclude **(5 marks)**

$$\sqrt{(0.96)}$$

c) Evaluate to four decimal places by binomial expansion **(5 marks)**

d) A certain team in the English premier leagues wins 60% of the games it plays. Determine the probability of winning more than 5 games when the team plays a total of 7 games. **(5 marks)**