TECHNICAL UNIVERSITY OF MOMBASA

FACULTY OF APPLIED AND HEALTH SCIENCES

DEPARTMENT OF MATHEMATICS AND PHYSICS

UNIVERSITY EXAMINATION FOR:

DIPLOMA IN MARINE ENGINEERING

EMR 2211: ENG MATHS IV.

END OF SEMESTER EXAMINATION

SERIES: MAY 2016

TIME: TWO HOURS

DATE: MAY 2016

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**.
Do not write on the question paper.

Question ONE

(a) Use binomial theorem to evaluate $\sqrt{26}$ (3mks)
(b) From 7 consonants and 4 vowels how many words containing 3 consonants and 2 vowels be formed? (3mks)
(c) In how many ways can letters of the word LEADER be arranged?   (3mks)
(d) Solve $\int (x2 \sqrt{1-x2})$ (3mks)
(e) Find $\frac{dy}{dx}$ if   y= $(x^2 + 1)^{17}$ (4mks)
(f) Find the derivative of $\frac{2x3}{4-x}$ (4mks)
(g) For a certain type of computer, the length of time between charges of the battery are normally distributed with a mean of 50 hours and standard deviation of 15 hours. Find the probability that the length of charging will be between 50 hours and 70 hours   (4mks)
(h) The table below shows the number of defective bolts from a sample of 40

No of bolts	0	1	2	3	4	5
Frequency	20	8	6	4	1	1

Calculate the standard deviation of the data above   (4mks)

Question TWO

(a) Determine the critical points and locate any relative maxima, minima and saddle point of the function defined by $f(x,y) = 2 - x^2 - y^2 - yx$ (7mks)

(b) Use binomial theorem to solve $\sqrt[5]{33}$ (5mks)

(c) Use first principles to find derivative of $f(x) = 1 - x^2$ (5mks)

(d) The life span of a machine is normally distributed with mean 0f 12months and standard deviation 2months. Find the probability of lasting less than 7 months (3mks)

Question THREE

(a) The annual salary of employee in an EPZ are approximately normally distributed with a mean of 50,000 shillings and standard deviation of 20,000 shillings

(i) What percentage of works earn less than 40,000 shillings (3mks)

(ii) What percentage of works earn between 45,000 and 65,000 (4mks)

(iii) What percentage of works earn more than 40,000 shillings (3mks)

(b) A particle **K** moves a long a straight line 50 cm long. At time **t** = 0, **k** is at **A** and **t** seconds later its velocity **v cm/s** is given by **v = 15 + 4t − 3t².**

a) Write down the expression for;

i) The acceleration of **K** at time **t** seconds. (1mk)

ii) The distance of **K** from **A** at time **t** seconds. (2mks)

iii) Find **t** when **K** is instantaneously at rest. (2mks)

iv) How far is **K** from **A** at this time? (3mks)

(v) Find the period of time during which the acceleration of **P** is positive. (2mks)

Question FOUR

(a) Find the integral of (5mks)
$$\frac{X^3}{(1+x^4)^{1/3}}$$

(b) Find $\frac{dy}{dx}$ of the function $\frac{x^3(3x+1)}{X^4+2}$ (7mks)

(c) Evaluate $\int \sin(2x+4)dx$ (4mks)

(d) In a conference of 9 schools, how many inter conferences football games are played during a season if the teams play each other exactly once (4mks)

Question FIVE

(a) 20 sheets of Aluminum alloy are examined for flaws. The table below is a summary of the results

No of flaws	0	1	2	3	4	5	6
Frequency	4	3	5	2	4	1	1

Find the probability assuming it's a poison distribution that any randomly chosen sheet contains 3 or more flaws   (8mks)

(b) A manufacturing firm of metal pistons finds that on average 12% of pistons are rejected because they are either oversize or undersize. What is the probability that a bunch of 10 pistons will contain
   (i) no more than 2 rejects (4mks)
   (ii) At least 2 rejects   (4mks)

(c) Distinguish between kurtosis and skewness   (2mks)

(d) Evaluate $\int_0^1 (3x2 + 4x + 5)dx$ (2mks)