TECHNICAL UNIVERSITY OF MOMBASA

Faculty of Applied & Health Sciences

DEPARTMENT OF MATHEMATICS & PHYSISCS

DBCE 12M

AMA 2350: ENGINEERING MATHEMATICS V

END OF SEMESTER EXAMINATION
SERIES: APRIL 2014
TIME ALLOWED: 2 HOURS

Instructions to Candidates:

You should have the following for this examination

- *Answer Booklet*
- *Calculator*

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) Define the following:

(i) Subset **(1 mark)**

(ii) Mutually exclusive events **(2 marks)**

(iii) Sampling design **(2 marks)**

(iv) Null hypothesis **(2 marks)**

b) Consider the sets below"

$U = \{1,2,2,4,5,6,7,8,9,10\}$

$A = \{1,2,3\}$

$B\{5,6\}$

Find: (i) $A \cap B$ **(2 marks)**

(ii) $A \cup B$ **(2 marks)**

c) Highlight the main properties of normal distributions. **(4 marks)**

d) An event has the probability $P = \frac{3}{8}$ find the complete binomial distribution for n = 5 trials. **(4 marks)**

e) Every year Salim Engineering works puts in a bid for an annual service contract. The probability that it wins the contract is 0.75. What is the probability that the company wins the contract at least once in the next two years? **(5 marks)**

f) (i) How many numbers of two different digits can be formed with figures:
1, 2, 3, 4, 5, 6? **(3 marks)**

(ii) In how many ways six persons can be chosen out of eight. **(3 marks)**

Question Two

a) Figures kept by Classic Butchery for the past five years show that the weight of cattle bought has a mean of 950kg and the standard deviation of 150kg. What proportion of the cattle have weights.

(i) More than 1250kg? **(3 marks)**

(ii) Less than 850kg? **(3 marks)**

(iii) Between 1, 100kg and 1250kg? **(4 marks)**

(iv) Between 800kg and 1300kg? **(4 marks)**

b) (i) A bag contains 6 black balls and some brown ones. If a ball is picked at random the probability that it is black is 0.25. Find the number of brown balls. **(3 marks)**

(ii) A boy threws a fair coin and a regular tetrahedron with its four faces marked 1, 2, 3 and 4. Find the probability that he gets a 3 on the tetrahedron and a head on the coin. **(3 marks)**

Question Three

a) (i) What is sampling? **(2 marks)**

(ii) State THREE types of probability sampling. **(3 marks)**

b) The screws produced by a certain machine were checked by examining number of defectives in a sample of 12. The following table shows the distribution of 128 samples according to the number of defective items they contained.

No of Defectives in a Sample of 12	0	1	2	3	4	5	6	7
No of Samples	7	6	19	35	30	23	7	1

(i) Fit a binomial distribution and find the expected frequencies if the change of machine being defective is ½ **(9 marks)**

(ii) Find the mean and standard deviation of the fitted distribution. **(6 marks)**

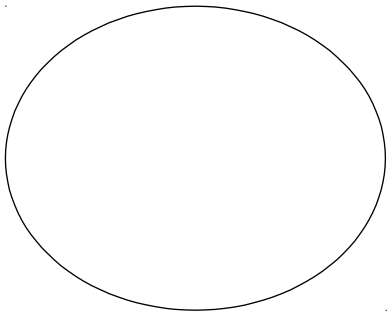
Question Four

a) What is Poisson distribution? State its characteristics. Give examples where it can be applied. **(6 marks)**

b) (i) The following table gives the number of days in a 50 days period during which automobile accidents occurred in a city. Fit Poisson distribution of the data. **(9 marks)**

2	4	2	0	2	6	3	5	1	0
1	0	2	1	0	3	1	4	0	1
2	3	4	0	5	0	2	1	2	2
2	1	3	2	4	3	5	3	1	0
0	2	1	2	0	0	1	1	2	1

(ii) In the figure below the area of the bigger circle is 25 π cm2 and that of the smaller circle is 5 π cm^2. A point is selected at random inside the bigger circle. What is the probability that it lies inside the smaller circle? **(5 marks)**



Question Five

a) State Baye's Theorem. **(3 marks)**

b) The probability that a contractor will get a plumbing contract is 2/3 and the probability that he will not get an electric contract is 5/9. If the at least one contract is 4/5, what is the probability that he will get both? **(6 marks)**

c) Given that $A = \{1,3,5,7,9,11,13\}$ $B = \{5,9,13,17\}$ find (i) $A \cap B$ **(2 marks)**
(ii) A _ B **(3 marks)**

d) Using relevant examples, explain the importance of normal distributions. **(6 marks**)