**P425/2**

**APPLIED**

**MATHEMATICS**

**PAPER2**

**JUNE 2015**

**3HRS**

**Uganda Advanced Certificate of Education**

**MUKONO KAYUNGA JOINT MOCK EXAMINATIONS BOARD.**

**APPLIED MATHEMATICS**

**PAPER 2**

**3hours**

**Instructions to candidates**

* *Answer* ***ALL*** *the* ***eight*** *questions in* ***Section A*** *and any* ***FIVE*** *from* ***Section B.***
* *In numerical computations use g = 9.8ms-2 ,unless specified by the question*
* *Begin each solution to a new question on a fresh page.*
* *Mathematical tables with a list of formulae and squared papers may be conveniently used where applicable.*
* *Draw double margins on each of the answer sheets / page to be used.*
* *Include the allocation table on your answer sheet.*

**SECTION A (40 MARKS)**

1. A random variable X has the probability distribution

P(X=1) = 2, find P(x).

2. A random variable X is normally distributed with mean 5 and standard deviation 2. Find P (.

3. Use trapezium rule with six ordinates to evaluate to 3 significant figures.

4. Find the position vector of the centre of gravity of three particles of weight 7N, 9N and 4N with position vectors

5. A 500g particle stands on a smooth horizontal plane inclined at 600 to the horizontal. Find the;

(i) Least horizontal force which prevents it from sliding.

(ii) Reaction between the particle and the plane.

6. The table below gives the value of a number and its corresponding logarithms in base 10 multiplied by 104.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| X | 1.00 | 1.02 | 1.04 | 1.06 | 1.08 |
| 10X | 10 | 86 | 170 | 258 | 334 |

Use linear interpolation, estimate the values of;

(i) Log 1.07

(ii) Antilogarithm of 186.

7. A box contains 16 components. This box was dropped on transit. Consequently six components become defective but not visibly defective. *(Assume that the selections are without replacement)*, find the probability that;

(i) All the three components selected at random are good.

(ii) The fourth component tested in a series of four in independent tests is good.

8. A particle is projected with a velocity (10.30) ms-1. Find the angle through which the particle is projected, if the particle took 3 seconds to land.

**SECTION B (60 MARKS)**

9. A random variable X has probability density function given by;

 =

Where k is a constant.

Find;

(i) F(x) interms of k. Hence determine the value of k.

(ii) P(X

(iii) E(x) and Var(x).

10. Marks obtained in a statistics test in senior six were observed to be normally distributed with mean 48% and standard deviation 3%.

a) Given that 40% is the pass mark, find the probability that a student chosen ar random passed.

b) If 100 students got with 1.3 standard deviations of the average mark, what is the total number of students who did the exam?

c) If three students are chosen at random, what is the probability that two of them scored above 50%.

11.a) Show that the Newton Raphson Formula for approximating the root of the equation .

b) Draw a corresponding flow chart that;

 (i) Reads the initial approximation X0

 (ii) Counts the number of interactions as 4.

 (iii) Computes the root to two decimal places.

 (iv) Prints the root. Hence perform a dry run taking X0 as 1.13.

12. A uniform beam of weight W and length 2b in equilibrium with one end, A, against a smooth vertical wall and the other end, B on a rough horizontal floor. The plane through AB meets the line of intersection of the wall and the floor at point O.

 (i) Calculate the normal reactions at A and B.

 (ii) Show that frictional force is , where is the angle the beam makes with the horizontal.

 (iii) If the beam slips when a man of weight 2W climbs , find the coefficient of friction between the floor and the beam.

13. An aircraft A is 8km due north of another aircraft B. Both are flying at the same height with a constant velocity 150kmh-1 due west and 200kmh-1 N300W respectively, after what time will the aircraft be closest together and how far apart will they then be?

14.a) Show that the equation has real root between Hence using linear interpolation find the root to two decimal places.

b) The values x and y are measured with maximum error E1 and E2 respectively. Given that, find the expression for the maximum absolute error in Z. Given that x= 27.2 and y = 6.42, find the range in which Z lies.

15. A particle executing simple harmonic motion about the centre O has maximum speed of 1ms-1 and its speed when at a distance of 0.30m rom an extreme end is . Find;

(i) The amplitude and period of the motion,

(ii) The speed when at a distance of 0.25cm from 0.

(iii) Its displacement from O when its velocity is 0.6ms-1.

16. The table below shows the distribution of marks of 80 students in S.6 mock examination.

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Marks  | 10-<20 | 20-<30 | 30-<40 | 40-<50 | 50-<60 | 60-<70 | 70-<80 | 80-<90 | 90-<100 |
| No.of students | 2 | 3 | 9 | 10 | 14 | 19 | 11 | 8 | 4 |

a) Calculate

(i) Mean

(ii) Standard deviation

b) Plot an ogive for the distribution and use it to estimate;

 (i) Median

 (ii) Pass mark if 60 students passed.

END