P425/2

APPLIED MATHEMATICS

Paper Two

JULY/AUG

3hours



KAYUNGA SECONDARY SCHOOLS HEAD TEACHERS AND PRINCIPALS’ ASSOCIATION (KASSHPA)

JOINT MOCK EXAMINATIONS, 2023

Uganda Advanced Certificate of Education

**APPLIED MATHEMATICS**

PAPER TWO

3HOURS

**INSTRUSTIONS TO CANDIDATES**

* ***Answer*** *all eight questions in section****A****and any five from section* ***B.***
* ***Any additional*** *question(s) answered will* ***not*** *be marked.*
* ***All necessary working must be shown clearly.***
* *Begin each answer on a fresh page.*
* *Silent non programmable calculators and mathematical table with a list of formulae may be used.*
* *In numerical work, take acceleration due to gravity g to be 9.8ms-2*

**P.T.O**

1. Find the median and semi interquartile range for the set of integers:

8, 3,5,7,11,9,7,6,7,5,8,11. (05 marks)

1. A car of mass 1.2 tones travelling along a straight horizontal road accelerates uniformly from 10ms -1 to 15ms -1 in a distance of 200m. If the thrust of the engine is 500N, find the resistance to motion (05 marks)
2. If *x*=5.95 and y=3.103 are each rounded off to the given numberof decimal places. Find the percentage error in estimating the value of Correct to three significant figures. (05mark)
3. Two particle of mas 4kgs and 2kg are connected by a light string passing over smooth fixed pulley. The particle hangs freely and is released from rest. find the:
4. Acceleration of the particle.
5. Reaction at the axle of the Pulley. (05 marks)
6. Three boxes A, B, and C contain 2 white and 2 black balls, 3 white and 2 black balls, and, 4 white and 2 black balls. A ball is drawn unseen from A and placed in B and then a ball is drawn from B and placed in C. if a ball is now drawn from C, Find the probability that will be black. (05 marks)
7. The table below shows an extract from the table of Cos x

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| 80. | 0 1 | 10 1 | 20 1 | 30 1 | 40 1 | 50 1 |
|  | 0.1736 | 0.1708 | 0.1679 | 0.1650 | 0.1622 | 0.1593 |

Use interpolation or linear extrapolation to determine.

1. 800 70 1
2. -1 0.1685 (05 marks)
3. ABC is an equilateral triangle of side **a** meters. Forces of 10N, 6N and 10N act along AB,CB and AC respectively their directions are in order of the letters. Find the magnitude and direction of the single force equivalent to this system and find where its line of action cuts AB (5 marks)
4. The discrete random variable X has probability density function (p.d.f) given by P(X=)=K for K=1,2,3,4,5,6.Find
5. The value of K
6. E(4+3x) (05marks)

**SECTION B (60 MARKS)**

**Answer any five from this section.**

1. Batteries for a transistor radio have a mean life under normal usage of 160 hours with a standard deviation of 30 hours. Assuming the battery life follows a normal distributions,
2. Calculate the percentage of batteries which have a life between 150 hours and 180 hours. (06marks)
3. If a radio takes four of these batteries and requires all of them to be working. Calculate the probability that the radio will run for at least 135 hours.(06 marks)
4. a) Use the trapezium rule with six ordinates to estimates. Correct to 3 decimal places. (06 marks)
5. Hence find the absolute error made in your estimate and suggest how it can be reduced.

(06 marks)

1. A uniform ladder of mass 30kg and length 10m has its base resting on rough horizontal ground and its top against a smooth vertical wall. The ladder rests in equilibrium, at 600.to the horizontal, with a man of mass 90kg standing on the ladder at a point 7.5m from its foot.
2. Find the magnitude of the normal reaction and of the frictional force of the ground.(06marks)
3. Find the minimum value for the coefficient of friction between the ladder and the ground that would enable the man to climb to the top of the ladder. (06 marks)
4. a) The marks of 10 pupils in French and German tests are as follows.

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| French, X | 12 | 8 | 16 | 11 | 7 | 10 | 13 | 17 | 12 | 9 |
| Germany, Y | 6 | 5 | 7 | 7 | 4 | 9 | 8 | 13 | 10 | 11 |

Calculate the spearman rank correlation coefficient and comment on your answer at 5% level of significance. (06marks)

b) The table below shows the frequency distribution of marks obtained by a group of students in paper two mathematics examinations.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Marks | 10- | 20- | 35- | 45- | 65- | 80- | 90- |
| Frequency Density | 1.8 | 2.4 | 5.8 | 3.3 | 1.2 | 0.4 | 0 |

Draw a cumulative frequency curve and use it to estimate the 10th to 60th percentile range. (06marks)

1. A car of Mass 800kgs moves up a slope inclined at angle to the horizontal, where sin= ,at a steady speed of 25ms -1. the road resistance is 100N
2. Calculate the power being used
3. If the car now travel down this slope, with the same resistance and using the same, power what would be its acceleration when the speed is 25ms -1? (12marks)
4. A particle of mass 5kg is initially at rest at the point A(-2, 1,-3) meters . The particle is acted upon by a force of F= N, where t is time in seconds.

Find the,

1. Acceleration at time t (02marks)
2. Speed of the particle after 3s. (05marks)
3. Distance of the particle after 3 seconds. (05marks)
4. a) Locate graphically the smallest positive real root of (5marks)

b) Use the Newton Raphson formula to approximate this root of the equation in (a) above, correct to 3 decimal points. (7marks)

1. The continuous random variable X has probability density function f(x) where

f(x)= (x+2)2 -2

4 0 11/3,

0 otherwise.

1. Find the value of the constant
2. Sketch f (x)
3. find
4. P(
5. E(X) (12marks)

**END**