**P425/2**

**APPLIED**

**MATHEMATICS**

**Paper 2**

**August, 2019**

**3 HOURS**

***🕮***

***🖎***

**Community**

UNNASE MOCK EXAMINATIONS

***Uganda Advanced Certificate of Education***

**APPLIED MATHEMATICS**

**PAPER 2**

**3 HOURS**

**INSTRUCTIONS TO CANDIDATES**

*Answer* ***all*** *the* ***eight*** *questions in Section* ***A*** *and any* ***Five*** *from Section* ***B.***

*All necessary working* ***must*** *be shown clearly.*

*Begin each answer on a fresh page.*

*In numerical work****,*** *take* ***g*** *to be *

*Silent, non-programmable scientific calculators and mathematical tables with a list of formulae may be used.*

**SECTION A: (40 MARKS)**

Answer **all** the questions in this section**.**

1. Given that **P(A) = 0⋅59, P(B) = 0⋅45** and **P(A n B) = 0⋅15,** find**:**

(i) **P(A U B)**

(ii) *(05 marks)*

2.A particle moving with **S⋅H⋅M** has velocity  when at

a distance **x** from the centre of its path **O.** Find the

**(i)** amplitude and period of its motion

**(ii)** speed as it passes **O** *(05 marks)*

3.Use the trapezium rule with **4** ordinates to evaluate the integral of

 between **60°** and **90°** correct to **4** decimal places *(05 marks)*

4.A uniformly distributed **r⋅v** **X** on the interval **[α, β]** is illustrated as

follows**:**

***α***

***β***

***x***





***f(x)***

Given that **X** has a lower quartile of **5** and an upper quartile of **9,** use a

graphical procedure tofind the values of and *(05 marks)*

5.Forces of magnitude **5N** and **PN** are acting away from each other at

an angle of **60°.** Given that their resultant is **7N,** find the**:**

(i)value of **P**

(ii)angle **P** makes with the resultant *(05 marks)*

6. The table below shows the prices of itemsfor the years **2016** and **2017**

|  |  |  |  |
| --- | --- | --- | --- |
| **Item** | **PRICE (£)** | | **Weights** |
| **IN 2016** | **IN 2017** |
| **A** | **25** | **28** | **5** |
| **B** |  |  | **3** |
| **C** | **30** | **36** | **2** |

Given that the simple aggregate price index and weighted mean price

index for **2017** based on **2016** are **120** and **119** respectively**,** find the

values of  and .*(05 marks)*

7. The iterative formula or  is to

be used as a solution to an equation**.** Using show without

iterating that one of the choices is not suitable *(05 marks)*

8.At **10:30 am,** the position vector of ship **P** relative to ship **Q** at time

**t** hours is

(i) Write down the velocity of **P** relative to **Q** *(01 mark)*

(ii) Find the time at which the ships are closest together**.**  *(04 marks)*

**SECTION B (60 Marks)**

*Answer any* ***five*** *questions in this section****.***

*All questions carry equal marks.*

9.The weights in kg of **25** boys were as follows**:**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Weights** | **20 − 24** | **25 − 29** | **30** | **31 − 34** | **35 − 49** |
| **Frequency** | **3** | **5** | **2** | **6** | **9** |

(a) Calculate the**:**

(i) mean weight *(03 marks)*

(ii) number of boys weighing between **26⋅5kg** and **32⋅5kg** *(02 marks)*

(b) Display the data on a histogram and use it to estimate the mode

*(07 marks)*10.A car of mass **mkg** has a maximum speed of  up a hill

inclined at an angle **θ** to the horizontal**.** It attains a maximum speed

of when descending the same hill with the engine cut off**.**

If the resistance to motion is proportional to the square of the speed**,**

(i) Show that the power output of the engine is 

(ii)Find the power output of the engine if **m = 900kg,** 

and *(12 marks)*

11. (a)The lower limit of a measurement is **4⋅05** and its upper limit is

**6⋅75.** Find therelative error of the measurement *(05 marks)*

(b) A decimal number **x** was approximated with an error **Δx.** Show

that therelative error in  is Hence if **x = 2⋅50,** find

the percentage error in  *(07 marks)*

12.A ball projected at an angle with a speed of  from the top of a tower **200m** high hits the ground at a point **200m** away from the foot of the tower**.**

(i) Show that the two possible directions of projection are at right

angles to each other *(06 marks)*

(ii) Find the two possible times of flight*(06 marks)*

13.A continuous r⋅v **X** has the following p⋅d⋅f

****

(a)Find the**:**

(i)Value of  *(04 marks)*

(ii)Cumulative distribution function of **X** *(04 marks)*

(b) Show that the median of **X** lies between **2⋅70** and **2⋅75** *(04 marks)*

14. (a) Use Newton Raphson formula to show that the root of the equation

 is  *(02 marks)*

(b) Draw a flow chart that**:**

(i)Reads the initial approximation 

(ii)Computes and prints the root in **(a)** above correct to **3** decimal places

*(06 marks)*

(c) Perform a dry run for your flow chart using *(04 marks)*

15.A uniform ladder **PQ** of length **2a** and weight **w** is inclined at an angle of  to the horizontal with its end **Q** resting against a smooth vertical wall and end **P** on a rough horizontal ground with which the coefficient of friction is  If a boy of weight **W** can safely ascend a distance **x** up this ladder before it slips**,**

(i) show that  *(09 marks)*

(ii) deduce that the boy can only reach the top of the ladder if **W = 2w**

*(03 marks)*

16. (a)A family has **25** children**.** The probability of having a boy is **0⋅64.**

Find the probability of having more girls than boys *(05 marks)*

(b)A random sample of **50** readings taken from a normal population

gave the following data**:**  and **.** Calculate the**:**

(i) unbiased estimate for the population variance  *(02 marks)*

(ii) **99%** confidence interval for the population mean *(05 marks)*

**\*\*\*\* END \*\*\*\***