Edukamer

UNEB UACE APPLIED MATHS 2017

SECTION A

Answer all the questions in this section

1. A particle is projected from a point ***O*** with speed 20m/s at an angle of 600 to the horizontal. Express in vector form its velocity ***v*** and its displacement ***r***, from ***O*** at any time ***t*** seconds.

2. The probability that a patient suffering from a certain disease recovers is 0.4. If 15 people contracted the diseases, find the probability that:

a. more than 9 will recover.

b. between five and eight will recover.

3. The table below gives values of x and the corresponding values of f (x).

x	0.1	0.2	0.3	0.4	0.5	0.7
f(x)	4.2	3.83	3.25	2.85	2.25	1.43

Use linear interpolation/ extrapolation to find
f(x) when ***x*** =0.6
the value of x when ***f(x)*** = 0.75

4. In a square *ABCD*, three forces of magnitudes 4N, 10N and 7N act along *AB*, *AD* and *CA* respectively. Their directions are in the order of the letters. Find the magnitude of the resultant force.

5. A box A contains 1 white ball and 1 blue ball. Box B contains only 2 white balls. If a ball is picked at random, find the probability that it is:

a. white

b. from box A given that it is white.

6. Given that and ***x*** = 2.4 correct to one decimal place, find the limits within which ***y*** lies.

7. The table below shows the retail prices (Shs) and amount of each item bought weekly by a restaurant in 2002 and 2003.

Item	**Price (Shs)**		**Amount bought**
	2002	**2003**	
Milk (per liter)	400	500	200
Eggs (per tray)	2,500	3,000	18
Cooking oil (per liter)	2,400	2,100	2
Baking flour (per packet)	2,000	2,200	15

a. Taking 2002 as the base year, calculate the weighted aggregate price index.

b. In 2003, the restaurant spent Shs450,000 on buying these items. Using the weighted aggregate price index obtained in (a), calculate what the restaurant could have spent in 2002.

8.The engine of a lorry of mass 5,000kg is working at a steady rate of 350Kw against a constant resistance force of 1,000N. The lorry ascends a slope of inclination $\#^0$ to the horizontal. If the maximum speed of the lorry is 20ms-1, find the value of #.

SECTION B

Answer any five questions from this section.

9. A discrete random variable ***X*** has a probability distribution given by

$$P(X=x) = \begin{cases} kx, & x = 1,2,3,4,5. \\ o, & \text{Otherwise,} \end{cases}$$

where k is a constant.

Determine;the value of k.

a. P(2<X<5)
b. Expectation, E (X)
c. Variance, Var (X).

10. A particle of mass 3 kg is acted upon by a force $F = 6i - 36t^2j + 54tk$ Newtons at time t. At time t = 0, the particle is at the point with a position vector $i - +5j - k$ and its velocity is $3i + 3jm/s$. Determine the

a. position vector of the particle at time t = 1 second.
b. distance of the particle from the origin at time t = 1 second.

11. A student used the trapezium rule with five sub- intervals to estimate $\int_2^3 \frac{x}{(x^2-3)}\,dx$ correct to three decimal places.

Determine;

a. the value the student obtained.
b. the actual value of the integral
c. i) the error the student made in the estimate
   ii) how the student can reduce the error.

12. The times taken for 55 students to have their lunch to the nearest minute are given in the table below.

Time (minutes)	3 - 4	5-9	10-19	20-29	30-44
Number of students	2	7	16	21	9

a. Calculate the mean time for the students to have lunch.
b. i) Draw a histogram for the given data
   ii) Use your histogram to estimate the modal time for the students to have lunch.

A non-uniform rod *AB* of mass 10kg has its centre of gravity at a distance 1#4*AB* from B. The rod is smoothly hinged at *A* .It is maintained in equilibrium at 60^0 above the horizontal by a light inextensible string tied at *B* and at a right angle to *AB*. Calculate the magnitude and direction of the reaction at *A*.

14. By plotting graphs of $y = x$ and $y = 4$ sin x on the same axes, show that the root of the equation x – 4 sin x= 0 lies between 2 and 3.
Hence use Newton Raphson's method to find the root of the equation correct to 3 decimal places.

15. The number of cows owned by residents in a village is assumed to be normally distributed. 15% of the residents have less than 60 cows. 5% of the residents have over 90 cows.

a. Determine the values of the mean and standard deviation of the cows.
b. If there are 200 residents, find how many have more than 80 cows.

16. At 12 noon a ship *A* is moving with constant velocity of 20.4kmh^{-1} in the direction N#^{0}E, where tan##= 1#5. A second ship *B* is 15km due north of *A*. Ship B is moving with constant velocity of 5kmh^{-1} in the direction S#^{0}W, where tan# =3#4.If the shortest distance between the ships is 4.2km, find the time to the nearest minute when the distance between the ships is shortest.

END