

GHS

END OF YEAR EXAMNATIONS
APPLIED MATHEMATICS

S.5

NOVEMBER 2024

Paper 2

3 HOURS

INSTRUCTIONS:

Answer all the 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 sheet of paper.

Graph paper is provided.

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

In numerical work, take acceleration due to gravity g , to be 9.8 ms^{-2} .

SECTION A (40 MARKS)

Answer all questions in this section.

1. Two events A and B are such that $P(A) = 0.6$, $P(B) = 0.3$ and $P(A \cup B) = 0.8$. Find the;

(i) $P(A \cup B')$

(ii) $P(B'/A')$

(05 marks)

2. The table below shows the depression caused by masses placed at the midpoint of a stretched elastic string.

Mass (kg)	0.01	0.02	0.03
Depression (cm)	0.40	0.64	0.96

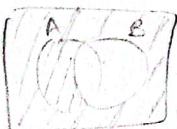
Use linear estimation to find the:

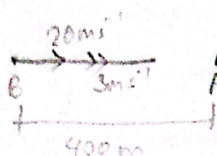
- (a) Depression when the mass is 0.028 kg

(03 marks)

- (b) Mass when the depression is 1.02 cm .

(02 marks)





$$V^2 = u^2 + 2as$$

$$20^2 = 0 + 2 \times 3 \times s$$

$$20 = 0$$

3. A lorry starts from a point A and moves along a straight horizontal road with a constant acceleration of 2 ms^{-2} . At the same time, a car moving with a speed of 20 ms^{-1} and a constant acceleration of 3 ms^{-2} is 400 m behind the point A and moving in the same direction as the lorry. Find how far from A the car overtakes the lorry.

(05 marks)

4. A discrete random variable X has a probability distribution function given by

$$f(x) = \begin{cases} \frac{1}{28}x^2 & ; x = 1, 2, 3 \\ \frac{1}{28}(7-x)^2 & ; x = 4, 5, 6 \\ 0 & ; \text{otherwise.} \end{cases}$$

- (i) Determine the cumulative distribution function, $F(x)$ (01 mark)
- (ii) Sketch the graph, $F(x)$ (02 marks)
- (iii) Calculate the semi-interquartile range of the distribution (02 marks)
5. Given that $x = 1.5$ and $y = 3.23$, all numbers rounded off to the given number of decimal places. State the interval within which the exact value of $\frac{x+y}{xy}$ lies, correct to **three** decimal places. (05 marks)
6. A particle of mass 2 kg resting on a smooth inclined plane of 1 in 14 is connected by a light inextensible string passing over a smooth fixed pulley at the top of the plane to a mass of 5 kg hanging vertically at the end of the other side of the string. Calculate the tension in the string. (05 marks)
7. Tom's chance of passing an examination is $\frac{9}{20}$. If he sits for **ten** examinations, find the; $X \sim B(10, \frac{9}{20})$
- (a) **Most likely number** of examinations passed
- (b) Probability that more than half of the examinations (05 marks)
8. A particle of weight 50 N is supported by two inextensible strings of lengths 8 m and 13 m attached to two fixed points, 15 m apart on a horizontal beam. Find the tension in each string if the system is in equilibrium. (05 marks)

