END OF APRIL TEST 2019

SENIOR FIVE

APPLIED MATHEMATICS

P425/2

Duration: 1½ hours

Attempt all questions

1. **(a)** For a given set of 9 values, $\sum(x-\bar{x})^2 = 60$ and $\sum x^2 = 285$. Find the mean of the values. **(03 marks)**

   (b) Below are times (minutes) taken by 150 buses to travel from Kampala to Jinja over a certain period of time.

Time (Minutes)	Number of buses
80 – 84	10
85 – 89	25
90 – 94	60
95 – 99	100
100 – 104	128
105 – 109	143
110 – 114	147
115 – 119	149
120 – 124	150

   Construct a frequency distribution table and use it to calculate the;

   (i) Mean time,

   (ii) Modal time,

   (iii) Standard deviation of the distribution

   (09 marks)

2. **(a)** A and B are events such that B is twice as likely to occur as A. Given that $P(A \cap B) = 0.2$ and $P(A^I \cap B^I) = 0.3$. Find $P(A \cap B^I)$. **(04 marks)**

   (b) The probability that a star player of a football team will play in any game is 0.8. The probability that the team wins a game when that star player is in the team is 0.75, otherwise it is 0.5. Find the probability that the team will win the game. **(04 marks)**

(c) Events X and Y are such that P(X) = 0.75P(Y), P(X U Y) = 0.7 and P(X / Y) = $\frac{7}{12}$. Calculate;

(i) P(Y),

(ii) $P(X \cap Y)$.

(04 marks)

3. **(a)** The resultant of vectors $\mathbf{F}_1$, $\mathbf{F}_2$ and $\mathbf{F}_3$ is $(15\mathbf{i} - 7\mathbf{j})$. Given that; $\mathbf{F}_1 = -4\mathbf{i} + (a - 2b)\mathbf{j}$, $\mathbf{F}_2 = (3a - b)\mathbf{i} + 5\mathbf{j}$ and $\mathbf{F}_3 = 7\mathbf{i} - \mathbf{j}$. Find the;

(i) Values of a and b,

(ii) Magnitude and direction of $\mathbf{F}_1$.

(b) Find the angle between vectors of magnitude 7 units and 4 units if their resultant is of magnitudes 9 units. Hence find the angle the resultant makes with the smaller vector.

(12 marks)

4. The brakes of a train, which is travelling at 108kmh^{-1}, are applied as the train passes point A. The brakes produce a constant retardation of magnitude 3β ms^{-2} until the velocity of the train is reduced to 10ms^{-1}. The train travels at this velocity for a certain distance and is then uniformly accelerated at 12960β kmh^{-2} until it again reaches a velocity of 108kmh^{-1} as it passes point B. The time taken by the train in travelling from A to B, a distance of 4km, is 4 minutes.

(a) Sketch a velocity – time graph for this motion.

(b) Determine the;

(i) Value of β,

(ii) Distance travelled at 10ms^{-1},

(iii) Average speed during the retardation stage of motion.

(14 marks)

END