#1/ NEATLY write your full name AS ON ROLLS:	TTC 2016/IITG Mathematics Evaluation II 8th JAN 2016

INSTRUCTIONS: This is a fully-objective/multiple-choice type of test. Questions marked with ► may have more than one answer correct. You need to indicate your answer by bubbling the box to the left of the correct answer. Use only a ball–point pen. The right way to fill a bubble like ☐ is as in ■. **No overwriting, no rewriting, no erasing and no cancellation**. Use supplementary sheets ONLY FOR ROUGH WORK. {Note: $\mathbb{N}, \mathbb{Z}, \mathbb{Q}$ and $\mathbb{R}$ denote the sets of natural numbers, integers, rational numbers and real numbers respectively.}

|Q-1⟩ Odometer is a device which measures distance covered by a vehicle. The odometer reading of an aircraft flying straight at various times are given as:

Time (seconds)	Odometer (metres)
0	120
1	335
0.1	142.1
0.01	122.22
0.001	120.2227
0.0001	120.02229
0.00001	120.0022296

From the given data, what is the best approximate to the speed of the aircraft in metres/second at time 0?

☐ 120 ☐ 215 ☐ 220 ☐ 221 ☐ 223 ☐ 225

|Q-2⟩ We want to make 12-digit natural numbers in which odd digits are in the odd positions (from left) and even digits are in the even positions. How many such numbers are there which contain all the digits?

☐ $\left(6\frac{6!}{2!}\right)^2$ ☐ $\frac{12!}{2!2!}$ ☐ $\left(5\frac{6!}{2!}\right)^2$ ☐ $\frac{12!}{2!2!2!}$

|Q-3⟩ Let $A \subset \mathbb{R}$ and $f : A \to \mathbb{R}$ be defined by

$$f(x) = \begin{cases} \frac{x-5}{x-2} & \text{if } x \neq 2 \\ 1 & \text{if } x = 2. \end{cases}$$

Which of the following is true?

☐ f is one-one but not an onto mapping
☐ f is a bijective mapping
☐ Domain(f)=$\mathbb{R}$ and Range(f)= $\mathbb{R} - \{1\}$
☐ f is not one-one but an onto mapping
☐ Domain(f)=$\mathbb{R} - \{2\}$ and Range(f)= $\mathbb{R} - \{1\}$

► |Q-4⟩ Balls are placed in an urn according to the following experiment: Pick one chit at random among 6 chits numbered 1,2,3,4, 5 and 6. If the number drawn is 1,2,3 or 4, then 2 black balls and 4 white balls are kept in the urn, otherwise 3 black balls and 2 white balls are kept in the urn. Balls are drawn at random repeatedly, and with replacement from this urn (after

the balls are placed once and for all).
Let A_1, A_2 be the events that the the ratio of black balls to white balls in the urn is $2:4$, $3:2$, respectively. Let B_i be the event that the i-th ball drawn is black.
Which of the following are TRUE?

- ☐ $\lim_{n\to\infty} P(A_2|B_1 \cap B_2 \cap .. \cap B_n) = 1$, $\lim_{n\to\infty} P(B_{n+1}|W_1 \cap W_2 \cap .. \cap W_n) = \frac{2}{6}$
- ☐ $\lim_{n\to\infty} P(A_1|B_1 \cap B_2 \cap .. \cap B_n) = 0$, $\lim_{n\to\infty} P(W_{n+1}|W_1 \cap W_2 \cap .. \cap W_n) = \frac{4}{6}$
- ☐ $\lim_{n\to\infty} P(A_1|W_1 \cap W_2 \cap .. \cap W_n) = 1$, $\lim_{n\to\infty} P(W_{n+1}|W_1 \cap W_2 \cap .. \cap W_n) = \frac{4}{6}$
- ☐ $\lim_{n\to\infty} P(A_1|B_1 \cap B_2 \cap .. \cap B_n) = 0$, $\lim_{n\to\infty} P(W_{n+1}|B_1 \cap B_2 \cap .. \cap B_n) = \frac{2}{5}$
- ☐ $\lim_{n\to\infty} P(A_2|B_1 \cap B_2 \cap .. \cap B_n) = 0$, $\lim_{n\to\infty} P(W_{n+1}|W_1 \cap W_2 \cap .. \cap W_n) = \frac{4}{6}$
- ☐ $\lim_{n\to\infty} P(A_1|B_1 \cap B_2 \cap .. \cap B_n) = 1$, $\lim_{n\to\infty} P(W_{n+1}|W_1 \cap W_2 \cap .. \cap W_n) = \frac{4}{6}$

|Q-5⟩ What does the equation $x^2 + 4y^2 + 2x + 16y + 3 = 0$ represent?

- ☐ Ellipse with focus $(-1, -2)$
- ☐ Ellipse with centre $(1, -2)$
- ☐ Ellipse with focus $(1, -2)$
- ☐ Ellipse with centre $(-1, -2)$

► |Q-6⟩ If c is a real number such that the function $\cos(x) + \cos(x + c)$ can take a value 2, then which of the following is/are POSSIBLE value(s) of c?

☐ 0 ☐ $\frac{\pi}{2}$ ☐ 46π ☐ π ☐ $-\pi$

#2/ NEATLY write your full name AS ON ROLLS:

TTC 2016/IITG Mathematics
Evaluation II
8th JAN 2016

INSTRUCTIONS: This is a fully-objective/multiple-choice type of test. Questions marked with ► may have more than one answer correct. You need to indicate your answer by bubbling the box to the left of the correct answer. Use only a ball–point pen. The right way to fill a bubble like ☐ is as in ■. **No overwriting, no rewriting, no erasing and no cancellation**. Use supplementary sheets ONLY FOR ROUGH WORK. {Note: $\mathbb{N}, \mathbb{Z}, \mathbb{Q}$ and $\mathbb{R}$ denote the sets of natural numbers, integers, rational numbers and real numbers respectively.}

|Q-1⟩ Odometer is a device which measures distance covered by a vehicle. The odometer reading of an aircraft flying straight at various times are given as:

Time (seconds)	Odometer (metres)
0	120
1	335
0.1	142.1
0.01	122.22
0.001	120.2227
0.0001	120.02229
0.00001	120.0022296

From the given data, what is the best approximate to the speed of the aircraft in metres/second at time 0?

☐ 120 ☐ 215 ☐ 220 ☐ 221 ☐ 223 ☐ 225

|Q-2⟩ We want to make 12-digit natural numbers in which odd digits are in the odd positions (from left) and even digits are in the even positions. How many such numbers are there which contain all the digits?

☐ $\left(6\frac{6!}{2!}\right)^2$ ☐ $\frac{12!}{2!2!}$ ☐ $\left(5\frac{6!}{2!}\right)^2$ ☐ $\frac{12!}{2!2!2!}$

|Q-3⟩ Let $A \subset \mathbb{R}$ and $f : A \to \mathbb{R}$ be defined by

$$f(x) = \begin{cases} \frac{x-5}{x-2} & \text{if } x \neq 2 \\ 1 & \text{if } x = 2. \end{cases}$$

Which of the following is true?

☐ Domain(f)=$\mathbb{R}$ and Range(f)= $\mathbb{R} - \{1\}$
☐ Domain(f)=$\mathbb{R} - \{2\}$ and Range(f)= $\mathbb{R} - \{1\}$
☐ f is a bijective mapping
☐ f is one-one but not an onto mapping
☐ f is not one-one but an onto mapping

► |Q-4⟩ Balls are placed in an urn according to the following experiment: Pick one chit at random among 6 chits numbered 1,2,3,4, 5 and 6. If the number drawn is 1,2,3 or 4, then 2 black balls and 4 white balls are kept in the urn, otherwise 3 black balls and 2 white balls are kept in the urn. Balls are drawn at random repeatedly, and with replacement from this urn (after

the balls are placed once and for all).
Let A_1, A_2 be the events that the the ratio of black balls to white balls in the urn is $2:4$, $3:2$, respectively. Let B_i be the event that the i-th ball drawn is black.
Which of the following are TRUE?

- ☐ $\lim_{n\to\infty} P(A_1|B_1 \cap B_2 \cap .. \cap B_n) = 0$, $\lim_{n\to\infty} P(W_{n+1}|B_1 \cap B_2 \cap .. \cap B_n) = \frac{2}{5}$
- ☐ $\lim_{n\to\infty} P(A_1|B_1 \cap B_2 \cap .. \cap B_n) = 1$, $\lim_{n\to\infty} P(W_{n+1}|W_1 \cap W_2 \cap .. \cap W_n) = \frac{4}{6}$
- ☐ $\lim_{n\to\infty} P(A_2|B_1 \cap B_2 \cap .. \cap B_n) = 0$, $\lim_{n\to\infty} P(W_{n+1}|W_1 \cap W_2 \cap .. \cap W_n) = \frac{4}{6}$
- ☐ $\lim_{n\to\infty} P(A_1|W_1 \cap W_2 \cap .. \cap W_n) = 1$, $\lim_{n\to\infty} P(W_{n+1}|W_1 \cap W_2 \cap .. \cap W_n) = \frac{4}{6}$
- ☐ $\lim_{n\to\infty} P(A_2|B_1 \cap B_2 \cap .. \cap B_n) = 1$, $\lim_{n\to\infty} P(B_{n+1}|W_1 \cap W_2 \cap .. \cap W_n) = \frac{2}{6}$
- ☐ $\lim_{n\to\infty} P(A_1|B_1 \cap B_2 \cap .. \cap B_n) = 0$, $\lim_{n\to\infty} P(W_{n+1}|W_1 \cap W_2 \cap .. \cap W_n) = \frac{4}{6}$

|Q-5⟩ What does the equation $x^2 + 4y^2 + 2x + 16y + 3 = 0$ represent?

- ☐ Ellipse with focus $(-1, -2)$
- ☐ Ellipse with centre $(1, -2)$
- ☐ Ellipse with focus $(1, -2)$
- ☐ Ellipse with centre $(-1, -2)$

► |Q-6⟩ If c is a real number such that the function $\cos(x) + \cos(x + c)$ can take a value 2, then which of the following is/are POSSIBLE value(s) of c?

☐ 46π ☐ $-\pi$ ☐ $\frac{\pi}{2}$ ☐ 0 ☐ π

#3/ NEATLY write your full name AS ON ROLLS:

TTC 2016/IITG Mathematics
Evaluation II
8th JAN 2016

INSTRUCTIONS: This is a fully-objective/multiple-choice type of test. Questions marked with ► may have more than one answer correct. You need to indicate your answer by bubbling the box to the left of the correct answer. Use only a ball–point pen. The right way to fill a bubble like ☐ is as in ■. **No overwriting, no rewriting, no erasing and no cancellation**. Use supplementary sheets ONLY FOR ROUGH WORK. {Note: $\mathbb{N}, \mathbb{Z}, \mathbb{Q}$ and $\mathbb{R}$ denote the sets of natural numbers, integers, rational numbers and real numbers respectively.}

|Q-1⟩ Odometer is a device which measures distance covered by a vehicle. The odometer reading of an aircraft flying straight at various times are given as:

Time (seconds)	Odometer (metres)
0	120
1	335
0.1	142.1
0.01	122.22
0.001	120.2227
0.0001	120.02229
0.00001	120.0022296

From the given data, what is the best approximate to the speed of the aircraft in metres/second at time 0?

☐ 120 ☐ 215 ☐ 220 ☐ 221 ☐ 223 ☐ 225

|Q-2⟩ We want to make 12-digit natural numbers in which odd digits are in the odd positions (from left) and even digits are in the even positions. How many such numbers are there which contain all the digits?

☐ $\left(6\frac{6!}{2!}\right)^2$ ☐ $\frac{12!}{2!2!}$ ☐ $\left(5\frac{6!}{2!}\right)^2$ ☐ $\frac{12!}{2!2!2!}$

|Q-3⟩ Let $A \subset \mathbb{R}$ and $f : A \to \mathbb{R}$ be defined by

$$f(x) = \begin{cases} \frac{x-5}{x-2} & \text{if } x \neq 2 \\ 1 & \text{if } x = 2. \end{cases}$$

Which of the following is true?

☐ Domain(f)=$\mathbb{R}$ and Range(f)= $\mathbb{R} - \{1\}$
☐ f is not one-one but an onto mapping
☐ f is one-one but not an onto mapping
☐ Domain(f)=$\mathbb{R} - \{2\}$ and Range(f)= $\mathbb{R} - \{1\}$
☐ f is a bijective mapping

► |Q-4⟩ Balls are placed in an urn according to the following experiment: Pick one chit at random among 6 chits numbered 1,2,3,4, 5 and 6. If the number drawn is 1,2,3 or 4, then 2 black balls and 4 white balls are kept in the urn, otherwise 3 black balls and 2 white balls are kept in the urn. Balls are drawn at random repeatedly, and with replacement from this urn (after

the balls are placed once and for all).
Let A_1, A_2 be the events that the the ratio of black balls to white balls in the urn is $2:4$, $3:2$, respectively. Let B_i be the event that the i-th ball drawn is black.
Which of the following are TRUE?

- ☐ $\lim_{n\to\infty} P(A_1|B_1 \cap B_2 \cap .. \cap B_n) = 0$, $\lim_{n\to\infty} P(W_{n+1}|W_1 \cap W_2 \cap .. \cap W_n) = \frac{4}{6}$
- ☐ $\lim_{n\to\infty} P(A_1|B_1 \cap B_2 \cap .. \cap B_n) = 0$, $\lim_{n\to\infty} P(W_{n+1}|B_1 \cap B_2 \cap .. \cap B_n) = \frac{2}{5}$
- ☐ $\lim_{n\to\infty} P(A_2|B_1 \cap B_2 \cap .. \cap B_n) = 1$, $\lim_{n\to\infty} P(B_{n+1}|W_1 \cap W_2 \cap .. \cap W_n) = \frac{2}{6}$
- ☐ $\lim_{n\to\infty} P(A_2|B_1 \cap B_2 \cap .. \cap B_n) = 0$, $\lim_{n\to\infty} P(W_{n+1}|W_1 \cap W_2 \cap .. \cap W_n) = \frac{4}{6}$
- ☐ $\lim_{n\to\infty} P(A_1|W_1 \cap W_2 \cap .. \cap W_n) = 1$, $\lim_{n\to\infty} P(W_{n+1}|W_1 \cap W_2 \cap .. \cap W_n) = \frac{4}{6}$
- ☐ $\lim_{n\to\infty} P(A_1|B_1 \cap B_2 \cap .. \cap B_n) = 1$, $\lim_{n\to\infty} P(W_{n+1}|W_1 \cap W_2 \cap .. \cap W_n) = \frac{4}{6}$

|Q-5⟩ What does the equation $x^2 + 4y^2 + 2x + 16y + 3 = 0$ represent?

- ☐ Ellipse with focus $(1, -2)$
- ☐ Ellipse with centre $(-1, -2)$
- ☐ Ellipse with focus $(-1, -2)$
- ☐ Ellipse with centre $(1, -2)$

► |Q-6⟩ If c is a real number such that the function $\cos(x) + \cos(x + c)$ can take a value 2, then which of the following is/are POSSIBLE value(s) of c?

☐ 46π ☐ $\frac{\pi}{2}$ ☐ 0 ☐ $-\pi$ ☐ π

#4/ NEATLY write your full name AS ON ROLLS:

TTC 2016/IITG Mathematics
Evaluation II
8th JAN 2016

INSTRUCTIONS: This is a fully-objective/multiple-choice type of test. Questions marked with ► may have more than one answer correct. You need to indicate your answer by bubbling the box to the left of the correct answer. Use only a ball–point pen. The right way to fill a bubble like ☐ is as in ■. **No overwriting, no rewriting, no erasing and no cancellation**. Use supplementary sheets ONLY FOR ROUGH WORK. {Note: $\mathbb{N}, \mathbb{Z}, \mathbb{Q}$ and $\mathbb{R}$ denote the sets of natural numbers, integers, rational numbers and real numbers respectively.}

|Q-1⟩ Odometer is a device which measures distance covered by a vehicle. The odometer reading of an aircraft flying straight at various times are given as:

Time (seconds)	Odometer (metres)
0	120
1	335
0.1	142.1
0.01	122.22
0.001	120.2227
0.0001	120.02229
0.00001	120.0022296

From the given data, what is the best approximate to the speed of the aircraft in metres/second at time 0?

☐ 120 ☐ 215 ☐ 220 ☐ 221 ☐ 223 ☐ 225

|Q-2⟩ We want to make 12-digit natural numbers in which odd digits are in the odd positions (from left) and even digits are in the even positions. How many such numbers are there which contain all the digits?

☐ $\left(6\frac{6!}{2!}\right)^2$ ☐ $\frac{12!}{2!2!}$ ☐ $\left(5\frac{6!}{2!}\right)^2$ ☐ $\frac{12!}{2!2!2!}$

|Q-3⟩ Let $A \subset \mathbb{R}$ and $f : A \to \mathbb{R}$ be defined by

$$f(x) = \begin{cases} \frac{x-5}{x-2} & \text{if } x \neq 2 \\ 1 & \text{if } x = 2. \end{cases}$$

Which of the following is true?

☐ f is one-one but not an onto mapping
☐ Domain(f)=$\mathbb{R}$ and Range(f)= $\mathbb{R} - \{1\}$
☐ f is not one-one but an onto mapping
☐ Domain(f)=$\mathbb{R} - \{2\}$ and Range(f)= $\mathbb{R} - \{1\}$
☐ f is a bijective mapping

► |Q-4⟩ Balls are placed in an urn according to the following experiment: Pick one chit at random among 6 chits numbered 1,2,3,4, 5 and 6. If the number drawn is 1,2,3 or 4, then 2 black balls and 4 white balls are kept in the urn, otherwise 3 black balls and 2 white balls are kept in the urn. Balls are drawn at random repeatedly, and with replacement from this urn (after

the balls are placed once and for all).
Let A_1, A_2 be the events that the the ratio of black balls to white balls in the urn is $2:4$, $3:2$, respectively. Let B_i be the event that the i-th ball drawn is black.
Which of the following are TRUE?

- ☐ $\lim_{n\to\infty} P(A_1|B_1 \cap B_2 \cap .. \cap B_n) = 0$, $\lim_{n\to\infty} P(W_{n+1}|W_1 \cap W_2 \cap .. \cap W_n) = \frac{4}{6}$
- ☐ $\lim_{n\to\infty} P(A_1|B_1 \cap B_2 \cap .. \cap B_n) = 0$, $\lim_{n\to\infty} P(W_{n+1}|B_1 \cap B_2 \cap .. \cap B_n) = \frac{2}{5}$
- ☐ $\lim_{n\to\infty} P(A_2|B_1 \cap B_2 \cap .. \cap B_n) = 0$, $\lim_{n\to\infty} P(W_{n+1}|W_1 \cap W_2 \cap .. \cap W_n) = \frac{4}{6}$
- ☐ $\lim_{n\to\infty} P(A_2|B_1 \cap B_2 \cap .. \cap B_n) = 1$, $\lim_{n\to\infty} P(B_{n+1}|W_1 \cap W_2 \cap .. \cap W_n) = \frac{2}{6}$
- ☐ $\lim_{n\to\infty} P(A_1|B_1 \cap B_2 \cap .. \cap B_n) = 1$, $\lim_{n\to\infty} P(W_{n+1}|W_1 \cap W_2 \cap .. \cap W_n) = \frac{4}{6}$
- ☐ $\lim_{n\to\infty} P(A_1|W_1 \cap W_2 \cap .. \cap W_n) = 1$, $\lim_{n\to\infty} P(W_{n+1}|W_1 \cap W_2 \cap .. \cap W_n) = \frac{4}{6}$

|Q-5⟩ What does the equation $x^2 + 4y^2 + 2x + 16y + 3 = 0$ represent?

- ☐ Ellipse with focus $(1, -2)$
- ☐ Ellipse with centre $(1, -2)$
- ☐ Ellipse with focus $(-1, -2)$
- ☐ Ellipse with centre $(-1, -2)$

► |Q-6⟩ If c is a real number such that the function $\cos(x) + \cos(x + c)$ can take a value 2, then which of the following is/are POSSIBLE value(s) of c?

☐ $\frac{\pi}{2}$ ☐ $-\pi$ ☐ π ☐ 0 ☐ 46π

#5/ NEATLY write your full name AS ON ROLLS:	TTC 2016/IITG Mathematics Evaluation II 8th JAN 2016

INSTRUCTIONS: This is a fully-objective/multiple-choice type of test. Questions marked with ► may have more than one answer correct. You need to indicate your answer by bubbling the box to the left of the correct answer. Use only a ball–point pen. The right way to fill a bubble like ☐ is as in ■. **No overwriting, no rewriting, no erasing and no cancellation**. Use supplementary sheets ONLY FOR ROUGH WORK. {Note: $\mathbb{N}, \mathbb{Z}, \mathbb{Q}$ and $\mathbb{R}$ denote the sets of natural numbers, integers, rational numbers and real numbers respectively.}

|Q-1⟩ Odometer is a device which measures distance covered by a vehicle. The odometer reading of an aircraft flying straight at various times are given as:

Time (seconds)	Odometer (metres)
0	120
1	335
0.1	142.1
0.01	122.22
0.001	120.2227
0.0001	120.02229
0.00001	120.0022296

From the given data, what is the best approximate to the speed of the aircraft in metres/second at time 0?

☐ 120 ☐ 215 ☐ 220 ☐ 221 ☐ 223 ☐ 225

|Q-2⟩ We want to make 12-digit natural numbers in which odd digits are in the odd positions (from left) and even digits are in the even positions. How many such numbers are there which contain all the digits?

☐ $\left(6\frac{6!}{2!}\right)^2$ ☐ $\frac{12!}{2!2!}$ ☐ $\left(5\frac{6!}{2!}\right)^2$ ☐ $\frac{12!}{2!2!2!}$

|Q-3⟩ Let $A \subset \mathbb{R}$ and $f : A \to \mathbb{R}$ be defined by

$$f(x) = \begin{cases} \frac{x-5}{x-2} & \text{if } x \neq 2 \\ 1 & \text{if } x = 2. \end{cases}$$

Which of the following is true?

☐ f is not one-one but an onto mapping
☐ Domain(f)=$\mathbb{R}$ and Range(f)= $\mathbb{R} - \{1\}$
☐ f is one-one but not an onto mapping
☐ Domain(f)=$\mathbb{R} - \{2\}$ and Range(f)= $\mathbb{R} - \{1\}$
☐ f is a bijective mapping

► |Q-4⟩ Balls are placed in an urn according to the following experiment: Pick one chit at random among 6 chits numbered 1,2,3,4, 5 and 6. If the number drawn is 1,2,3 or 4, then 2 black balls and 4 white balls are kept in the urn, otherwise 3 black balls and 2 white balls are kept in the urn. Balls are drawn at random repeatedly, and with replacement from this urn (after

the balls are placed once and for all).
Let A_1, A_2 be the events that the the ratio of black balls to white balls in the urn is $2:4$, $3:2$, respectively. Let B_i be the event that the i-th ball drawn is black.
Which of the following are TRUE?

- ☐ $\lim_{n\to\infty} P(A_2|B_1 \cap B_2 \cap .. \cap B_n) = 1$, $\lim_{n\to\infty} P(B_{n+1}|W_1 \cap W_2 \cap .. \cap W_n) = \frac{2}{6}$
- ☐ $\lim_{n\to\infty} P(A_1|B_1 \cap B_2 \cap .. \cap B_n) = 1$, $\lim_{n\to\infty} P(W_{n+1}|W_1 \cap W_2 \cap .. \cap W_n) = \frac{4}{6}$
- ☐ $\lim_{n\to\infty} P(A_1|B_1 \cap B_2 \cap .. \cap B_n) = 0$, $\lim_{n\to\infty} P(W_{n+1}|W_1 \cap W_2 \cap .. \cap W_n) = \frac{4}{6}$
- ☐ $\lim_{n\to\infty} P(A_1|B_1 \cap B_2 \cap .. \cap B_n) = 0$, $\lim_{n\to\infty} P(W_{n+1}|B_1 \cap B_2 \cap .. \cap B_n) = \frac{2}{5}$
- ☐ $\lim_{n\to\infty} P(A_1|W_1 \cap W_2 \cap .. \cap W_n) = 1$, $\lim_{n\to\infty} P(W_{n+1}|W_1 \cap W_2 \cap .. \cap W_n) = \frac{4}{6}$
- ☐ $\lim_{n\to\infty} P(A_2|B_1 \cap B_2 \cap .. \cap B_n) = 0$, $\lim_{n\to\infty} P(W_{n+1}|W_1 \cap W_2 \cap .. \cap W_n) = \frac{4}{6}$

|Q-5⟩ What does the equation $x^2 + 4y^2 + 2x + 16y + 3 = 0$ represent?

- ☐ Ellipse with focus $(-1, -2)$
- ☐ Ellipse with centre $(-1, -2)$
- ☐ Ellipse with centre $(1, -2)$
- ☐ Ellipse with focus $(1, -2)$

► |Q-6⟩ If c is a real number such that the function $\cos(x) + \cos(x + c)$ can take a value 2, then which of the following is/are POSSIBLE value(s) of c?

☐ π ☐ 0 ☐ 46π ☐ $-\pi$ ☐ $\frac{\pi}{2}$

#6/ NEATLY write your full name AS ON ROLLS:	TTC 2016/IITG Mathematics Evaluation II 8th JAN 2016

INSTRUCTIONS: This is a fully-objective/multiple-choice type of test. Questions marked with ► may have more than one answer correct. You need to indicate your answer by bubbling the box to the left of the correct answer. Use only a ball–point pen. The right way to fill a bubble like ☐ is as in ■. **No overwriting, no rewriting, no erasing and no cancellation**. Use supplementary sheets ONLY FOR ROUGH WORK. {Note: $\mathbb{N}, \mathbb{Z}, \mathbb{Q}$ and $\mathbb{R}$ denote the sets of natural numbers, integers, rational numbers and real numbers respectively.}

|Q-1⟩ Odometer is a device which measures distance covered by a vehicle. The odometer reading of an aircraft flying straight at various times are given as:

Time (seconds)	Odometer (metres)
0	120
1	335
0.1	142.1
0.01	122.22
0.001	120.2227
0.0001	120.02229
0.00001	120.0022296

From the given data, what is the best approximate to the speed of the aircraft in metres/second at time 0?

☐ 120 ☐ 215 ☐ 220 ☐ 221 ☐ 223 ☐ 225

|Q-2⟩ We want to make 12-digit natural numbers in which odd digits are in the odd positions (from left) and even digits are in the even positions. How many such numbers are there which contain all the digits?

☐ $\left(6\frac{6!}{2!}\right)^2$ ☐ $\frac{12!}{2!2!}$ ☐ $\left(5\frac{6!}{2!}\right)^2$ ☐ $\frac{12!}{2!2!2!}$

|Q-3⟩ Let $A \subset \mathbb{R}$ and $f : A \to \mathbb{R}$ be defined by

$$f(x) = \begin{cases} \frac{x-5}{x-2} & \text{if } x \neq 2 \\ 1 & \text{if } x = 2. \end{cases}$$

Which of the following is true?

☐ Domain(f)=$\mathbb{R} - \{2\}$ and Range(f)= $\mathbb{R} - \{1\}$
☐ f is not one-one but an onto mapping
☐ f is a bijective mapping
☐ Domain(f)=$\mathbb{R}$ and Range(f)= $\mathbb{R} - \{1\}$
☐ f is one-one but not an onto mapping

► |Q-4⟩ Balls are placed in an urn according to the following experiment: Pick one chit at random among 6 chits numbered 1,2,3,4, 5 and 6. If the number drawn is 1,2,3 or 4, then 2 black balls and 4 white balls are kept in the urn, otherwise 3 black balls and 2 white balls are kept in the urn. Balls are drawn at random repeatedly, and with replacement from this urn (after

the balls are placed once and for all).
Let A_1, A_2 be the events that the the ratio of black balls to white balls in the urn is $2:4$, $3:2$, respectively. Let B_i be the event that the i-th ball drawn is black.
Which of the following are TRUE?

- ☐ $\lim_{n\to\infty} P(A_1|B_1 \cap B_2 \cap .. \cap B_n) = 1$, $\lim_{n\to\infty} P(W_{n+1}|W_1 \cap W_2 \cap .. \cap W_n) = \frac{4}{6}$
- ☐ $\lim_{n\to\infty} P(A_2|B_1 \cap B_2 \cap .. \cap B_n) = 1$, $\lim_{n\to\infty} P(B_{n+1}|W_1 \cap W_2 \cap .. \cap W_n) = \frac{2}{6}$
- ☐ $\lim_{n\to\infty} P(A_2|B_1 \cap B_2 \cap .. \cap B_n) = 0$, $\lim_{n\to\infty} P(W_{n+1}|W_1 \cap W_2 \cap .. \cap W_n) = \frac{4}{6}$
- ☐ $\lim_{n\to\infty} P(A_1|W_1 \cap W_2 \cap .. \cap W_n) = 1$, $\lim_{n\to\infty} P(W_{n+1}|W_1 \cap W_2 \cap .. \cap W_n) = \frac{4}{6}$
- ☐ $\lim_{n\to\infty} P(A_1|B_1 \cap B_2 \cap .. \cap B_n) = 0$, $\lim_{n\to\infty} P(W_{n+1}|W_1 \cap W_2 \cap .. \cap W_n) = \frac{4}{6}$
- ☐ $\lim_{n\to\infty} P(A_1|B_1 \cap B_2 \cap .. \cap B_n) = 0$, $\lim_{n\to\infty} P(W_{n+1}|B_1 \cap B_2 \cap .. \cap B_n) = \frac{2}{5}$

|Q-5⟩ What does the equation $x^2 + 4y^2 + 2x + 16y + 3 = 0$ represent?

- ☐ Ellipse with focus $(1, -2)$
- ☐ Ellipse with focus $(-1, -2)$
- ☐ Ellipse with centre $(1, -2)$
- ☐ Ellipse with centre $(-1, -2)$

► |Q-6⟩ If c is a real number such that the function $\cos(x) + \cos(x + c)$ can take a value 2, then which of the following is/are POSSIBLE value(s) of c?

☐ $\frac{\pi}{2}$ ☐ 46π ☐ 0 ☐ π ☐ $-\pi$

#7/ NEATLY write your full name AS ON ROLLS:	TTC 2016/IITG Mathematics Evaluation II 8th JAN 2016

INSTRUCTIONS: This is a fully-objective/multiple-choice type of test. Questions marked with ► may have more than one answer correct. You need to indicate your answer by bubbling the box to the left of the correct answer. Use only a ball–point pen. The right way to fill a bubble like ☐ is as in ■. **No overwriting, no rewriting, no erasing and no cancellation**. Use supplementary sheets ONLY FOR ROUGH WORK. {Note: $\mathbb{N}, \mathbb{Z}, \mathbb{Q}$ and $\mathbb{R}$ denote the sets of natural numbers, integers, rational numbers and real numbers respectively.}

|Q-1⟩ Odometer is a device which measures distance covered by a vehicle. The odometer reading of an aircraft flying straight at various times are given as:

Time (seconds)	Odometer (metres)
0	120
1	335
0.1	142.1
0.01	122.22
0.001	120.2227
0.0001	120.02229
0.00001	120.0022296

From the given data, what is the best approximate to the speed of the aircraft in metres/second at time 0?

☐ 120 ☐ 215 ☐ 220 ☐ 221 ☐ 223 ☐ 225

|Q-2⟩ We want to make 12-digit natural numbers in which odd digits are in the odd positions (from left) and even digits are in the even positions. How many such numbers are there which contain all the digits?

☐ $\left(6\frac{6!}{2!}\right)^2$ ☐ $\frac{12!}{2!2!}$ ☐ $\left(5\frac{6!}{2!}\right)^2$ ☐ $\frac{12!}{2!2!2!}$

|Q-3⟩ Let $A \subset \mathbb{R}$ and $f : A \to \mathbb{R}$ be defined by

$$f(x) = \begin{cases} \frac{x-5}{x-2} & \text{if } x \neq 2 \\ 1 & \text{if } x = 2. \end{cases}$$

Which of the following is true?

☐ f is one-one but not an onto mapping
☐ f is a bijective mapping
☐ Domain(f)=$\mathbb{R}$ and Range(f)= $\mathbb{R} - \{1\}$
☐ Domain(f)=$\mathbb{R} - \{2\}$ and Range(f)= $\mathbb{R} - \{1\}$
☐ f is not one-one but an onto mapping

► |Q-4⟩ Balls are placed in an urn according to the following experiment: Pick one chit at random among 6 chits numbered 1,2,3,4, 5 and 6. If the number drawn is 1,2,3 or 4, then 2 black balls and 4 white balls are kept in the urn, otherwise 3 black balls and 2 white balls are kept in the urn. Balls are drawn at random repeatedly, and with replacement from this urn (after

the balls are placed once and for all).
Let A_1, A_2 be the events that the the ratio of black balls to white balls in the urn is $2:4$, $3:2$, respectively. Let B_i be the event that the i-th ball drawn is black.
Which of the following are TRUE?

- ☐ $\lim_{n\to\infty} P(A_1|B_1 \cap B_2 \cap .. \cap B_n) = 0$, $\lim_{n\to\infty} P(W_{n+1}|B_1 \cap B_2 \cap .. \cap B_n) = \frac{2}{5}$
- ☐ $\lim_{n\to\infty} P(A_2|B_1 \cap B_2 \cap .. \cap B_n) = 1$, $\lim_{n\to\infty} P(B_{n+1}|W_1 \cap W_2 \cap .. \cap W_n) = \frac{2}{6}$
- ☐ $\lim_{n\to\infty} P(A_2|B_1 \cap B_2 \cap .. \cap B_n) = 0$, $\lim_{n\to\infty} P(W_{n+1}|W_1 \cap W_2 \cap .. \cap W_n) = \frac{4}{6}$
- ☐ $\lim_{n\to\infty} P(A_1|B_1 \cap B_2 \cap .. \cap B_n) = 0$, $\lim_{n\to\infty} P(W_{n+1}|W_1 \cap W_2 \cap .. \cap W_n) = \frac{4}{6}$
- ☐ $\lim_{n\to\infty} P(A_1|B_1 \cap B_2 \cap .. \cap B_n) = 1$, $\lim_{n\to\infty} P(W_{n+1}|W_1 \cap W_2 \cap .. \cap W_n) = \frac{4}{6}$
- ☐ $\lim_{n\to\infty} P(A_1|W_1 \cap W_2 \cap .. \cap W_n) = 1$, $\lim_{n\to\infty} P(W_{n+1}|W_1 \cap W_2 \cap .. \cap W_n) = \frac{4}{6}$

|Q-5⟩ What does the equation $x^2 + 4y^2 + 2x + 16y + 3 = 0$ represent?

- ☐ Ellipse with centre $(-1, -2)$
- ☐ Ellipse with centre $(1, -2)$
- ☐ Ellipse with focus $(-1, -2)$
- ☐ Ellipse with focus $(1, -2)$

► |Q-6⟩ If c is a real number such that the function $\cos(x) + \cos(x + c)$ can take a value 2, then which of the following is/are POSSIBLE value(s) of c?

☐ $\frac{\pi}{2}$ ☐ $-\pi$ ☐ 46π ☐ 0 ☐ π

#8/ NEATLY write your full name AS ON ROLLS:	TTC 2016/IITG Mathematics Evaluation II 8th JAN 2016

INSTRUCTIONS: This is a fully-objective/multiple-choice type of test. Questions marked with ► may have more than one answer correct. You need to indicate your answer by bubbling the box to the left of the correct answer. Use only a ball–point pen. The right way to fill a bubble like ☐ is as in ■. **No overwriting, no rewriting, no erasing and no cancellation**. Use supplementary sheets ONLY FOR ROUGH WORK. {Note: $\mathbb{N}, \mathbb{Z}, \mathbb{Q}$ and $\mathbb{R}$ denote the sets of natural numbers, integers, rational numbers and real numbers respectively.}

|Q-1⟩ Odometer is a device which measures distance covered by a vehicle. The odometer reading of an aircraft flying straight at various times are given as:

Time (seconds)	Odometer (metres)
0	120
1	335
0.1	142.1
0.01	122.22
0.001	120.2227
0.0001	120.02229
0.00001	120.0022296

From the given data, what is the best approximate to the speed of the aircraft in metres/second at time 0?

☐ 120 ☐ 215 ☐ 220 ☐ 221 ☐ 223 ☐ 225

|Q-2⟩ We want to make 12-digit natural numbers in which odd digits are in the odd positions (from left) and even digits are in the even positions. How many such numbers are there which contain all the digits?

☐ $\left(6\frac{6!}{2!}\right)^2$ ☐ $\frac{12!}{2!2!}$ ☐ $\left(5\frac{6!}{2!}\right)^2$ ☐ $\frac{12!}{2!2!2!}$

|Q-3⟩ Let $A \subset \mathbb{R}$ and $f : A \to \mathbb{R}$ be defined by

$$f(x) = \begin{cases} \frac{x-5}{x-2} & \text{if } x \neq 2 \\ 1 & \text{if } x = 2. \end{cases}$$

Which of the following is true?

☐ Domain(f)=$\mathbb{R} - \{2\}$ and Range(f)= $\mathbb{R} - \{1\}$
☐ f is one-one but not an onto mapping
☐ Domain(f)=$\mathbb{R}$ and Range(f)= $\mathbb{R} - \{1\}$
☐ f is a bijective mapping
☐ f is not one-one but an onto mapping

► |Q-4⟩ Balls are placed in an urn according to the following experiment: Pick one chit at random among 6 chits numbered 1,2,3,4, 5 and 6. If the number drawn is 1,2,3 or 4, then 2 black balls and 4 white balls are kept in the urn, otherwise 3 black balls and 2 white balls are kept in the urn. Balls are drawn at random repeatedly, and with replacement from this urn (after

the balls are placed once and for all).
Let A_1, A_2 be the events that the the ratio of black balls to white balls in the urn is $2:4$, $3:2$, respectively. Let B_i be the event that the i-th ball drawn is black.
Which of the following are TRUE?

- ☐ $\lim_{n\to\infty} P(A_2|B_1 \cap B_2 \cap .. \cap B_n) = 0$, $\lim_{n\to\infty} P(W_{n+1}|W_1 \cap W_2 \cap .. \cap W_n) = \frac{4}{6}$
- ☐ $\lim_{n\to\infty} P(A_2|B_1 \cap B_2 \cap .. \cap B_n) = 1$, $\lim_{n\to\infty} P(B_{n+1}|W_1 \cap W_2 \cap .. \cap W_n) = \frac{2}{6}$
- ☐ $\lim_{n\to\infty} P(A_1|B_1 \cap B_2 \cap .. \cap B_n) = 1$, $\lim_{n\to\infty} P(W_{n+1}|W_1 \cap W_2 \cap .. \cap W_n) = \frac{4}{6}$
- ☐ $\lim_{n\to\infty} P(A_1|B_1 \cap B_2 \cap .. \cap B_n) = 0$, $\lim_{n\to\infty} P(W_{n+1}|W_1 \cap W_2 \cap .. \cap W_n) = \frac{4}{6}$
- ☐ $\lim_{n\to\infty} P(A_1|B_1 \cap B_2 \cap .. \cap B_n) = 0$, $\lim_{n\to\infty} P(W_{n+1}|B_1 \cap B_2 \cap .. \cap B_n) = \frac{2}{5}$
- ☐ $\lim_{n\to\infty} P(A_1|W_1 \cap W_2 \cap .. \cap W_n) = 1$, $\lim_{n\to\infty} P(W_{n+1}|W_1 \cap W_2 \cap .. \cap W_n) = \frac{4}{6}$

|Q-5⟩ What does the equation $x^2 + 4y^2 + 2x + 16y + 3 = 0$ represent?

- ☐ Ellipse with focus $(1, -2)$
- ☐ Ellipse with centre $(1, -2)$
- ☐ Ellipse with centre $(-1, -2)$
- ☐ Ellipse with focus $(-1, -2)$

► |Q-6⟩ If c is a real number such that the function $\cos(x) + \cos(x + c)$ can take a value 2, then which of the following is/are POSSIBLE value(s) of c?

☐ 46π ☐ 0 ☐ $\frac{\pi}{2}$ ☐ π ☐ $-\pi$

#9/ NEATLY write your full name AS ON ROLLS:	TTC 2016/IITG Mathematics Evaluation II 8th JAN 2016

INSTRUCTIONS: This is a fully-objective/multiple-choice type of test. Questions marked with ► may have more than one answer correct. You need to indicate your answer by bubbling the box to the left of the correct answer. Use only a ball–point pen. The right way to fill a bubble like ☐ is as in ■. **No overwriting, no rewriting, no erasing and no cancellation**. Use supplementary sheets ONLY FOR ROUGH WORK. {Note: $\mathbb{N}, \mathbb{Z}, \mathbb{Q}$ and $\mathbb{R}$ denote the sets of natural numbers, integers, rational numbers and real numbers respectively.}

|Q-1⟩ Odometer is a device which measures distance covered by a vehicle. The odometer reading of an aircraft flying straight at various times are given as:

Time (seconds)	Odometer (metres)
0	120
1	335
0.1	142.1
0.01	122.22
0.001	120.2227
0.0001	120.02229
0.00001	120.0022296

From the given data, what is the best approximate to the speed of the aircraft in metres/second at time 0?

☐ 120 ☐ 215 ☐ 220 ☐ 221 ☐ 223 ☐ 225

|Q-2⟩ We want to make 12-digit natural numbers in which odd digits are in the odd positions (from left) and even digits are in the even positions. How many such numbers are there which contain all the digits?

☐ $\left(6\frac{6!}{2!}\right)^2$ ☐ $\frac{12!}{2!2!}$ ☐ $\left(5\frac{6!}{2!}\right)^2$ ☐ $\frac{12!}{2!2!2!}$

|Q-3⟩ Let $A \subset \mathbb{R}$ and $f : A \to \mathbb{R}$ be defined by

$$f(x) = \begin{cases} \frac{x-5}{x-2} & \text{if } x \neq 2 \\ 1 & \text{if } x = 2. \end{cases}$$

Which of the following is true?

☐ f is a bijective mapping
☐ f is not one-one but an onto mapping
☐ Domain(f)=$\mathbb{R} - \{2\}$ and Range(f)= $\mathbb{R} - \{1\}$
☐ f is one-one but not an onto mapping
☐ Domain(f)=$\mathbb{R}$ and Range(f)= $\mathbb{R} - \{1\}$

► |Q-4⟩ Balls are placed in an urn according to the following experiment: Pick one chit at random among 6 chits numbered 1,2,3,4, 5 and 6. If the number drawn is 1,2,3 or 4, then 2 black balls and 4 white balls are kept in the urn, otherwise 3 black balls and 2 white balls are kept in the urn. Balls are drawn at random repeatedly, and with replacement from this urn (after

the balls are placed once and for all).
Let A_1, A_2 be the events that the the ratio of black balls to white balls in the urn is $2:4$, $3:2$, respectively. Let B_i be the event that the i-th ball drawn is black.
Which of the following are TRUE?

- ☐ $\lim_{n\to\infty} P(A_1|B_1 \cap B_2 \cap .. \cap B_n) = 1$, $\lim_{n\to\infty} P(W_{n+1}|W_1 \cap W_2 \cap .. \cap W_n) = \frac{4}{6}$
- ☐ $\lim_{n\to\infty} P(A_1|W_1 \cap W_2 \cap .. \cap W_n) = 1$, $\lim_{n\to\infty} P(W_{n+1}|W_1 \cap W_2 \cap .. \cap W_n) = \frac{4}{6}$
- ☐ $\lim_{n\to\infty} P(A_1|B_1 \cap B_2 \cap .. \cap B_n) = 0$, $\lim_{n\to\infty} P(W_{n+1}|B_1 \cap B_2 \cap .. \cap B_n) = \frac{2}{5}$
- ☐ $\lim_{n\to\infty} P(A_1|B_1 \cap B_2 \cap .. \cap B_n) = 0$, $\lim_{n\to\infty} P(W_{n+1}|W_1 \cap W_2 \cap .. \cap W_n) = \frac{4}{6}$
- ☐ $\lim_{n\to\infty} P(A_2|B_1 \cap B_2 \cap .. \cap B_n) = 0$, $\lim_{n\to\infty} P(W_{n+1}|W_1 \cap W_2 \cap .. \cap W_n) = \frac{4}{6}$
- ☐ $\lim_{n\to\infty} P(A_2|B_1 \cap B_2 \cap .. \cap B_n) = 1$, $\lim_{n\to\infty} P(B_{n+1}|W_1 \cap W_2 \cap .. \cap W_n) = \frac{2}{6}$

|Q-5⟩ What does the equation $x^2 + 4y^2 + 2x + 16y + 3 = 0$ represent?

- ☐ Ellipse with focus $(-1, -2)$
- ☐ Ellipse with centre $(-1, -2)$
- ☐ Ellipse with focus $(1, -2)$
- ☐ Ellipse with centre $(1, -2)$

► |Q-6⟩ If c is a real number such that the function $\cos(x) + \cos(x + c)$ can take a value 2, then which of the following is/are POSSIBLE value(s) of c?

☐ $\frac{\pi}{2}$ ☐ 0 ☐ 46π ☐ π ☐ $-\pi$

#10/ NEATLY write your full name AS ON ROLLS:	TTC 2016/IITG Mathematics Evaluation II 8th JAN 2016

INSTRUCTIONS: This is a fully-objective/multiple-choice type of test. Questions marked with ► may have more than one answer correct. You need to indicate your answer by bubbling the box to the left of the correct answer. Use only a ball–point pen. The right way to fill a bubble like ☐ is as in ■. **No overwriting, no rewriting, no erasing and no cancellation**. Use supplementary sheets ONLY FOR ROUGH WORK. {Note: $\mathbb{N}, \mathbb{Z}, \mathbb{Q}$ and $\mathbb{R}$ denote the sets of natural numbers, integers, rational numbers and real numbers respectively.}

|Q-1⟩ Odometer is a device which measures distance covered by a vehicle. The odometer reading of an aircraft flying straight at various times are given as:

Time (seconds)	Odometer (metres)
0	120
1	335
0.1	142.1
0.01	122.22
0.001	120.2227
0.0001	120.02229
0.00001	120.0022296

From the given data, what is the best approximate to the speed of the aircraft in metres/second at time 0?

☐ 120 ☐ 215 ☐ 220 ☐ 221 ☐ 223 ☐ 225

|Q-2⟩ We want to make 12-digit natural numbers in which odd digits are in the odd positions (from left) and even digits are in the even positions. How many such numbers are there which contain all the digits?

☐ $\left(6\frac{6!}{2!}\right)^2$ ☐ $\frac{12!}{2!2!}$ ☐ $\left(5\frac{6!}{2!}\right)^2$ ☐ $\frac{12!}{2!2!2!}$

|Q-3⟩ Let $A \subset \mathbb{R}$ and $f : A \to \mathbb{R}$ be defined by

$$f(x) = \begin{cases} \frac{x-5}{x-2} & \text{if } x \neq 2 \\ 1 & \text{if } x = 2. \end{cases}$$

Which of the following is true?

☐ Domain(f)=$\mathbb{R} - \{2\}$ and Range(f)= $\mathbb{R} - \{1\}$
☐ f is a bijective mapping
☐ Domain(f)=$\mathbb{R}$ and Range(f)= $\mathbb{R} - \{1\}$
☐ f is one-one but not an onto mapping
☐ f is not one-one but an onto mapping

► |Q-4⟩ Balls are placed in an urn according to the following experiment: Pick one chit at random among 6 chits numbered 1,2,3,4, 5 and 6. If the number drawn is 1,2,3 or 4, then 2 black balls and 4 white balls are kept in the urn, otherwise 3 black balls and 2 white balls are kept in the urn. Balls are drawn at random repeatedly, and with replacement from this urn (after

the balls are placed once and for all).
Let A_1, A_2 be the events that the the ratio of black balls to white balls in the urn is $2:4$, $3:2$, respectively. Let B_i be the event that the i-th ball drawn is black.
Which of the following are TRUE?

- ☐ $\lim_{n\to\infty} P(A_2|B_1 \cap B_2 \cap .. \cap B_n) = 0$, $\lim_{n\to\infty} P(W_{n+1}|W_1 \cap W_2 \cap .. \cap W_n) = \frac{4}{6}$
- ☐ $\lim_{n\to\infty} P(A_2|B_1 \cap B_2 \cap .. \cap B_n) = 1$, $\lim_{n\to\infty} P(B_{n+1}|W_1 \cap W_2 \cap .. \cap W_n) = \frac{2}{6}$
- ☐ $\lim_{n\to\infty} P(A_1|B_1 \cap B_2 \cap .. \cap B_n) = 1$, $\lim_{n\to\infty} P(W_{n+1}|W_1 \cap W_2 \cap .. \cap W_n) = \frac{4}{6}$
- ☐ $\lim_{n\to\infty} P(A_1|B_1 \cap B_2 \cap .. \cap B_n) = 0$, $\lim_{n\to\infty} P(W_{n+1}|B_1 \cap B_2 \cap .. \cap B_n) = \frac{2}{5}$
- ☐ $\lim_{n\to\infty} P(A_1|B_1 \cap B_2 \cap .. \cap B_n) = 0$, $\lim_{n\to\infty} P(W_{n+1}|W_1 \cap W_2 \cap .. \cap W_n) = \frac{4}{6}$
- ☐ $\lim_{n\to\infty} P(A_1|W_1 \cap W_2 \cap .. \cap W_n) = 1$, $\lim_{n\to\infty} P(W_{n+1}|W_1 \cap W_2 \cap .. \cap W_n) = \frac{4}{6}$

|Q-5⟩ What does the equation $x^2 + 4y^2 + 2x + 16y + 3 = 0$ represent?

- ☐ Ellipse with focus $(-1, -2)$
- ☐ Ellipse with centre $(-1, -2)$
- ☐ Ellipse with focus $(1, -2)$
- ☐ Ellipse with centre $(1, -2)$

► |Q-6⟩ If c is a real number such that the function $\cos(x) + \cos(x + c)$ can take a value 2, then which of the following is/are POSSIBLE value(s) of c?

☐ 0 ☐ $-\pi$ ☐ $\frac{\pi}{2}$ ☐ π ☐ 46π

#11/ NEATLY write your full name AS ON ROLLS:	TTC 2016/IITG Mathematics Evaluation II 8th JAN 2016

INSTRUCTIONS: This is a fully-objective/multiple-choice type of test. Questions marked with ► may have more than one answer correct. You need to indicate your answer by bubbling the box to the left of the correct answer. Use only a ball–point pen. The right way to fill a bubble like ☐ is as in ■. **No overwriting, no rewriting, no erasing and no cancellation**. Use supplementary sheets ONLY FOR ROUGH WORK. {Note: $\mathbb{N}, \mathbb{Z}, \mathbb{Q}$ and $\mathbb{R}$ denote the sets of natural numbers, integers, rational numbers and real numbers respectively.}

|Q-1⟩ Odometer is a device which measures distance covered by a vehicle. The odometer reading of an aircraft flying straight at various times are given as:

Time (seconds)	Odometer (metres)
0	120
1	335
0.1	142.1
0.01	122.22
0.001	120.2227
0.0001	120.02229
0.00001	120.0022296

From the given data, what is the best approximate to the speed of the aircraft in metres/second at time 0?

☐ 120 ☐ 215 ☐ 220 ☐ 221 ☐ 223 ☐ 225

|Q-2⟩ We want to make 12-digit natural numbers in which odd digits are in the odd positions (from left) and even digits are in the even positions. How many such numbers are there which contain all the digits?

☐ $\left(6\frac{6!}{2!}\right)^2$ ☐ $\frac{12!}{2!2!}$ ☐ $\left(5\frac{6!}{2!}\right)^2$ ☐ $\frac{12!}{2!2!2!}$

|Q-3⟩ Let $A \subset \mathbb{R}$ and $f : A \to \mathbb{R}$ be defined by

$$f(x) = \begin{cases} \frac{x-5}{x-2} & \text{if } x \neq 2 \\ 1 & \text{if } x = 2. \end{cases}$$

Which of the following is true?

☐ Domain(f)=$\mathbb{R} - \{2\}$ and Range(f)= $\mathbb{R} - \{1\}$
☐ Domain(f)=$\mathbb{R}$ and Range(f)= $\mathbb{R} - \{1\}$
☐ f is a bijective mapping
☐ f is not one-one but an onto mapping
☐ f is one-one but not an onto mapping

► |Q-4⟩ Balls are placed in an urn according to the following experiment: Pick one chit at random among 6 chits numbered 1,2,3,4, 5 and 6. If the number drawn is 1,2,3 or 4, then 2 black balls and 4 white balls are kept in the urn, otherwise 3 black balls and 2 white balls are kept in the urn. Balls are drawn at random repeatedly, and with replacement from this urn (after

the balls are placed once and for all).
Let A_1, A_2 be the events that the the ratio of black balls to white balls in the urn is $2:4$, $3:2$, respectively. Let B_i be the event that the i-th ball drawn is black.
Which of the following are TRUE?

- ☐ $\lim_{n\to\infty} P(A_1|B_1 \cap B_2 \cap .. \cap B_n) = 0$, $\lim_{n\to\infty} P(W_{n+1}|B_1 \cap B_2 \cap .. \cap B_n) = \frac{2}{5}$
- ☐ $\lim_{n\to\infty} P(A_1|W_1 \cap W_2 \cap .. \cap W_n) = 1$, $\lim_{n\to\infty} P(W_{n+1}|W_1 \cap W_2 \cap .. \cap W_n) = \frac{4}{6}$
- ☐ $\lim_{n\to\infty} P(A_2|B_1 \cap B_2 \cap .. \cap B_n) = 0$, $\lim_{n\to\infty} P(W_{n+1}|W_1 \cap W_2 \cap .. \cap W_n) = \frac{4}{6}$
- ☐ $\lim_{n\to\infty} P(A_2|B_1 \cap B_2 \cap .. \cap B_n) = 1$, $\lim_{n\to\infty} P(B_{n+1}|W_1 \cap W_2 \cap .. \cap W_n) = \frac{2}{6}$
- ☐ $\lim_{n\to\infty} P(A_1|B_1 \cap B_2 \cap .. \cap B_n) = 0$, $\lim_{n\to\infty} P(W_{n+1}|W_1 \cap W_2 \cap .. \cap W_n) = \frac{4}{6}$
- ☐ $\lim_{n\to\infty} P(A_1|B_1 \cap B_2 \cap .. \cap B_n) = 1$, $\lim_{n\to\infty} P(W_{n+1}|W_1 \cap W_2 \cap .. \cap W_n) = \frac{4}{6}$

|Q-5⟩ What does the equation $x^2 + 4y^2 + 2x + 16y + 3 = 0$ represent?

- ☐ Ellipse with centre $(-1, -2)$
- ☐ Ellipse with focus $(-1, -2)$
- ☐ Ellipse with centre $(1, -2)$
- ☐ Ellipse with focus $(1, -2)$

► |Q-6⟩ If c is a real number such that the function $\cos(x) + \cos(x + c)$ can take a value 2, then which of the following is/are POSSIBLE value(s) of c?

☐ 0 ☐ 46π ☐ π ☐ $\frac{\pi}{2}$ ☐ $-\pi$

#12/ NEATLY write your full name AS ON ROLLS:	TTC 2016/IITG Mathematics Evaluation II 8th JAN 2016

INSTRUCTIONS: This is a fully-objective/multiple-choice type of test. Questions marked with ► may have more than one answer correct. You need to indicate your answer by bubbling the box to the left of the correct answer. Use only a ball–point pen. The right way to fill a bubble like ☐ is as in ■. **No overwriting, no rewriting, no erasing and no cancellation**. Use supplementary sheets ONLY FOR ROUGH WORK. {Note: $\mathbb{N}, \mathbb{Z}, \mathbb{Q}$ and $\mathbb{R}$ denote the sets of natural numbers, integers, rational numbers and real numbers respectively.}

|Q-1⟩ Odometer is a device which measures distance covered by a vehicle. The odometer reading of an aircraft flying straight at various times are given as:

Time (seconds)	Odometer (metres)
0	120
1	335
0.1	142.1
0.01	122.22
0.001	120.2227
0.0001	120.02229
0.00001	120.0022296

From the given data, what is the best approximate to the speed of the aircraft in metres/second at time 0?

☐ 120 ☐ 215 ☐ 220 ☐ 221 ☐ 223 ☐ 225

|Q-2⟩ We want to make 12-digit natural numbers in which odd digits are in the odd positions (from left) and even digits are in the even positions. How many such numbers are there which contain all the digits?

☐ $\left(6\frac{6!}{2!}\right)^2$ ☐ $\frac{12!}{2!2!}$ ☐ $\left(5\frac{6!}{2!}\right)^2$ ☐ $\frac{12!}{2!2!2!}$

|Q-3⟩ Let $A \subset \mathbb{R}$ and $f : A \to \mathbb{R}$ be defined by

$$f(x) = \begin{cases} \frac{x-5}{x-2} & \text{if } x \neq 2 \\ 1 & \text{if } x = 2. \end{cases}$$

Which of the following is true?

☐ Domain(f)=$\mathbb{R} - \{2\}$ and Range(f)= $\mathbb{R} - \{1\}$
☐ f is not one-one but an onto mapping
☐ f is one-one but not an onto mapping
☐ f is a bijective mapping
☐ Domain(f)=$\mathbb{R}$ and Range(f)= $\mathbb{R} - \{1\}$

► |Q-4⟩ Balls are placed in an urn according to the following experiment: Pick one chit at random among 6 chits numbered 1,2,3,4, 5 and 6. If the number drawn is 1,2,3 or 4, then 2 black balls and 4 white balls are kept in the urn, otherwise 3 black balls and 2 white balls are kept in the urn. Balls are drawn at random repeatedly, and with replacement from this urn (after

the balls are placed once and for all).
Let A_1, A_2 be the events that the the ratio of black balls to white balls in the urn is $2:4$, $3:2$, respectively. Let B_i be the event that the i-th ball drawn is black.
Which of the following are TRUE?

- ☐ $\lim_{n\to\infty} P(A_1|B_1 \cap B_2 \cap .. \cap B_n) = 0$, $\lim_{n\to\infty} P(W_{n+1}|B_1 \cap B_2 \cap .. \cap B_n) = \frac{2}{5}$
- ☐ $\lim_{n\to\infty} P(A_1|B_1 \cap B_2 \cap .. \cap B_n) = 0$, $\lim_{n\to\infty} P(W_{n+1}|W_1 \cap W_2 \cap .. \cap W_n) = \frac{4}{6}$
- ☐ $\lim_{n\to\infty} P(A_2|B_1 \cap B_2 \cap .. \cap B_n) = 1$, $\lim_{n\to\infty} P(B_{n+1}|W_1 \cap W_2 \cap .. \cap W_n) = \frac{2}{6}$
- ☐ $\lim_{n\to\infty} P(A_1|B_1 \cap B_2 \cap .. \cap B_n) = 1$, $\lim_{n\to\infty} P(W_{n+1}|W_1 \cap W_2 \cap .. \cap W_n) = \frac{4}{6}$
- ☐ $\lim_{n\to\infty} P(A_2|B_1 \cap B_2 \cap .. \cap B_n) = 0$, $\lim_{n\to\infty} P(W_{n+1}|W_1 \cap W_2 \cap .. \cap W_n) = \frac{4}{6}$
- ☐ $\lim_{n\to\infty} P(A_1|W_1 \cap W_2 \cap .. \cap W_n) = 1$, $\lim_{n\to\infty} P(W_{n+1}|W_1 \cap W_2 \cap .. \cap W_n) = \frac{4}{6}$

|Q-5⟩ What does the equation $x^2 + 4y^2 + 2x + 16y + 3 = 0$ represent?

- ☐ Ellipse with centre $(-1, -2)$
- ☐ Ellipse with centre $(1, -2)$
- ☐ Ellipse with focus $(1, -2)$
- ☐ Ellipse with focus $(-1, -2)$

► |Q-6⟩ If c is a real number such that the function $\cos(x) + \cos(x + c)$ can take a value 2, then which of the following is/are POSSIBLE value(s) of c?

☐ 46π ☐ π ☐ $\frac{\pi}{2}$ ☐ $-\pi$ ☐ 0

#13/ NEATLY write your full name AS ON ROLLS:	TTC 2016/IITG Mathematics Evaluation II 8th JAN 2016

INSTRUCTIONS: This is a fully-objective/multiple-choice type of test. Questions marked with ► may have more than one answer correct. You need to indicate your answer by bubbling the box to the left of the correct answer. Use only a ball–point pen. The right way to fill a bubble like ☐ is as in ■. **No overwriting, no rewriting, no erasing and no cancellation**. Use supplementary sheets ONLY FOR ROUGH WORK. {Note: $\mathbb{N}, \mathbb{Z}, \mathbb{Q}$ and $\mathbb{R}$ denote the sets of natural numbers, integers, rational numbers and real numbers respectively.}

|Q-1⟩ Odometer is a device which measures distance covered by a vehicle. The odometer reading of an aircraft flying straight at various times are given as:

Time (seconds)	Odometer (metres)
0	120
1	335
0.1	142.1
0.01	122.22
0.001	120.2227
0.0001	120.02229
0.00001	120.0022296

From the given data, what is the best approximate to the speed of the aircraft in metres/second at time 0?

☐ 120 ☐ 215 ☐ 220 ☐ 221 ☐ 223 ☐ 225

|Q-2⟩ We want to make 12-digit natural numbers in which odd digits are in the odd positions (from left) and even digits are in the even positions. How many such numbers are there which contain all the digits?

☐ $\left(6\frac{6!}{2!}\right)^2$ ☐ $\frac{12!}{2!2!}$ ☐ $\left(5\frac{6!}{2!}\right)^2$ ☐ $\frac{12!}{2!2!2!}$

|Q-3⟩ Let $A \subset \mathbb{R}$ and $f : A \to \mathbb{R}$ be defined by

$$f(x) = \begin{cases} \frac{x-5}{x-2} & \text{if } x \neq 2 \\ 1 & \text{if } x = 2. \end{cases}$$

Which of the following is true?

☐ f is not one-one but an onto mapping
☐ f is one-one but not an onto mapping
☐ Domain(f)=$\mathbb{R} - \{2\}$ and Range(f)= $\mathbb{R} - \{1\}$
☐ Domain(f)=$\mathbb{R}$ and Range(f)= $\mathbb{R} - \{1\}$
☐ f is a bijective mapping

► |Q-4⟩ Balls are placed in an urn according to the following experiment: Pick one chit at random among 6 chits numbered 1,2,3,4, 5 and 6. If the number drawn is 1,2,3 or 4, then 2 black balls and 4 white balls are kept in the urn, otherwise 3 black balls and 2 white balls are kept in the urn. Balls are drawn at random repeatedly, and with replacement from this urn (after

the balls are placed once and for all).
Let A_1, A_2 be the events that the the ratio of black balls to white balls in the urn is $2:4$, $3:2$, respectively. Let B_i be the event that the i-th ball drawn is black.
Which of the following are TRUE?

- ☐ $\lim_{n\to\infty} P(A_1|B_1 \cap B_2 \cap .. \cap B_n) = 0$, $\lim_{n\to\infty} P(W_{n+1}|W_1 \cap W_2 \cap .. \cap W_n) = \frac{4}{6}$
- ☐ $\lim_{n\to\infty} P(A_1|W_1 \cap W_2 \cap .. \cap W_n) = 1$, $\lim_{n\to\infty} P(W_{n+1}|W_1 \cap W_2 \cap .. \cap W_n) = \frac{4}{6}$
- ☐ $\lim_{n\to\infty} P(A_2|B_1 \cap B_2 \cap .. \cap B_n) = 0$, $\lim_{n\to\infty} P(W_{n+1}|W_1 \cap W_2 \cap .. \cap W_n) = \frac{4}{6}$
- ☐ $\lim_{n\to\infty} P(A_2|B_1 \cap B_2 \cap .. \cap B_n) = 1$, $\lim_{n\to\infty} P(B_{n+1}|W_1 \cap W_2 \cap .. \cap W_n) = \frac{2}{6}$
- ☐ $\lim_{n\to\infty} P(A_1|B_1 \cap B_2 \cap .. \cap B_n) = 0$, $\lim_{n\to\infty} P(W_{n+1}|B_1 \cap B_2 \cap .. \cap B_n) = \frac{2}{5}$
- ☐ $\lim_{n\to\infty} P(A_1|B_1 \cap B_2 \cap .. \cap B_n) = 1$, $\lim_{n\to\infty} P(W_{n+1}|W_1 \cap W_2 \cap .. \cap W_n) = \frac{4}{6}$

|Q-5⟩ What does the equation $x^2 + 4y^2 + 2x + 16y + 3 = 0$ represent?

- ☐ Ellipse with centre $(1, -2)$
- ☐ Ellipse with centre $(-1, -2)$
- ☐ Ellipse with focus $(-1, -2)$
- ☐ Ellipse with focus $(1, -2)$

► |Q-6⟩ If c is a real number such that the function $\cos(x) + \cos(x + c)$ can take a value 2, then which of the following is/are POSSIBLE value(s) of c?

☐ $-\pi$ ☐ 46π ☐ 0 ☐ $\frac{\pi}{2}$ ☐ π

#14/ NEATLY write your full name AS ON ROLLS:	TTC 2016/IITG Mathematics Evaluation II 8th JAN 2016

INSTRUCTIONS: This is a fully-objective/multiple-choice type of test. Questions marked with ► may have more than one answer correct. You need to indicate your answer by bubbling the box to the left of the correct answer. Use only a ball–point pen. The right way to fill a bubble like ☐ is as in ■. **No overwriting, no rewriting, no erasing and no cancellation**. Use supplementary sheets ONLY FOR ROUGH WORK. {Note: $\mathbb{N}, \mathbb{Z}, \mathbb{Q}$ and $\mathbb{R}$ denote the sets of natural numbers, integers, rational numbers and real numbers respectively.}

|Q-1⟩ Odometer is a device which measures distance covered by a vehicle. The odometer reading of an aircraft flying straight at various times are given as:

Time (seconds)	Odometer (metres)
0	120
1	335
0.1	142.1
0.01	122.22
0.001	120.2227
0.0001	120.02229
0.00001	120.0022296

From the given data, what is the best approximate to the speed of the aircraft in metres/second at time 0?

☐ 120 ☐ 215 ☐ 220 ☐ 221 ☐ 223 ☐ 225

|Q-2⟩ We want to make 12-digit natural numbers in which odd digits are in the odd positions (from left) and even digits are in the even positions. How many such numbers are there which contain all the digits?

☐ $\left(6\frac{6!}{2!}\right)^2$ ☐ $\frac{12!}{2!2!}$ ☐ $\left(5\frac{6!}{2!}\right)^2$ ☐ $\frac{12!}{2!2!2!}$

|Q-3⟩ Let $A \subset \mathbb{R}$ and $f : A \to \mathbb{R}$ be defined by

$$f(x) = \begin{cases} \frac{x-5}{x-2} & \text{if } x \neq 2 \\ 1 & \text{if } x = 2. \end{cases}$$

Which of the following is true?

☐ f is a bijective mapping
☐ f is not one-one but an onto mapping
☐ Domain(f)=$\mathbb{R} - \{2\}$ and Range(f)= $\mathbb{R} - \{1\}$
☐ f is one-one but not an onto mapping
☐ Domain(f)=$\mathbb{R}$ and Range(f)= $\mathbb{R} - \{1\}$

► |Q-4⟩ Balls are placed in an urn according to the following experiment: Pick one chit at random among 6 chits numbered 1,2,3,4, 5 and 6. If the number drawn is 1,2,3 or 4, then 2 black balls and 4 white balls are kept in the urn, otherwise 3 black balls and 2 white balls are kept in the urn. Balls are drawn at random repeatedly, and with replacement from this urn (after

the balls are placed once and for all).
Let A_1, A_2 be the events that the the ratio of black balls to white balls in the urn is $2:4$, $3:2$, respectively. Let B_i be the event that the i-th ball drawn is black.
Which of the following are TRUE?

- ☐ $\lim_{n\to\infty} P(A_1|B_1 \cap B_2 \cap .. \cap B_n) = 0$, $\lim_{n\to\infty} P(W_{n+1}|B_1 \cap B_2 \cap .. \cap B_n) = \frac{2}{5}$
- ☐ $\lim_{n\to\infty} P(A_1|W_1 \cap W_2 \cap .. \cap W_n) = 1$, $\lim_{n\to\infty} P(W_{n+1}|W_1 \cap W_2 \cap .. \cap W_n) = \frac{4}{6}$
- ☐ $\lim_{n\to\infty} P(A_1|B_1 \cap B_2 \cap .. \cap B_n) = 1$, $\lim_{n\to\infty} P(W_{n+1}|W_1 \cap W_2 \cap .. \cap W_n) = \frac{4}{6}$
- ☐ $\lim_{n\to\infty} P(A_2|B_1 \cap B_2 \cap .. \cap B_n) = 0$, $\lim_{n\to\infty} P(W_{n+1}|W_1 \cap W_2 \cap .. \cap W_n) = \frac{4}{6}$
- ☐ $\lim_{n\to\infty} P(A_2|B_1 \cap B_2 \cap .. \cap B_n) = 1$, $\lim_{n\to\infty} P(B_{n+1}|W_1 \cap W_2 \cap .. \cap W_n) = \frac{2}{6}$
- ☐ $\lim_{n\to\infty} P(A_1|B_1 \cap B_2 \cap .. \cap B_n) = 0$, $\lim_{n\to\infty} P(W_{n+1}|W_1 \cap W_2 \cap .. \cap W_n) = \frac{4}{6}$

|Q-5⟩ What does the equation $x^2 + 4y^2 + 2x + 16y + 3 = 0$ represent?

- ☐ Ellipse with centre $(-1, -2)$
- ☐ Ellipse with focus $(1, -2)$
- ☐ Ellipse with focus $(-1, -2)$
- ☐ Ellipse with centre $(1, -2)$

► |Q-6⟩ If c is a real number such that the function $\cos(x) + \cos(x + c)$ can take a value 2, then which of the following is/are POSSIBLE value(s) of c?

☐ 0 ☐ $-\pi$ ☐ $\frac{\pi}{2}$ ☐ 46π ☐ π

#15/ NEATLY write your full name AS ON ROLLS:	TTC 2016/IITG Mathematics Evaluation II 8th JAN 2016

INSTRUCTIONS: This is a fully-objective/multiple-choice type of test. Questions marked with ► may have more than one answer correct. You need to indicate your answer by bubbling the box to the left of the correct answer. Use only a ball–point pen. The right way to fill a bubble like ☐ is as in ■. **No overwriting, no rewriting, no erasing and no cancellation**. Use supplementary sheets ONLY FOR ROUGH WORK. {Note: $\mathbb{N}, \mathbb{Z}, \mathbb{Q}$ and $\mathbb{R}$ denote the sets of natural numbers, integers, rational numbers and real numbers respectively.}

|Q-1⟩ Odometer is a device which measures distance covered by a vehicle. The odometer reading of an aircraft flying straight at various times are given as:

Time (seconds)	Odometer (metres)
0	120
1	335
0.1	142.1
0.01	122.22
0.001	120.2227
0.0001	120.02229
0.00001	120.0022296

From the given data, what is the best approximate to the speed of the aircraft in metres/second at time 0?

☐ 120 ☐ 215 ☐ 220 ☐ 221 ☐ 223 ☐ 225

|Q-2⟩ We want to make 12-digit natural numbers in which odd digits are in the odd positions (from left) and even digits are in the even positions. How many such numbers are there which contain all the digits?

☐ $\left(6\frac{6!}{2!}\right)^2$ ☐ $\frac{12!}{2!2!}$ ☐ $\left(5\frac{6!}{2!}\right)^2$ ☐ $\frac{12!}{2!2!2!}$

|Q-3⟩ Let $A \subset \mathbb{R}$ and $f : A \to \mathbb{R}$ be defined by

$$f(x) = \begin{cases} \frac{x-5}{x-2} & \text{if } x \neq 2 \\ 1 & \text{if } x = 2. \end{cases}$$

Which of the following is true?

☐ f is one-one but not an onto mapping
☐ Domain(f)=$\mathbb{R} - \{2\}$ and Range(f)= $\mathbb{R} - \{1\}$
☐ f is not one-one but an onto mapping
☐ f is a bijective mapping
☐ Domain(f)=$\mathbb{R}$ and Range(f)= $\mathbb{R} - \{1\}$

► |Q-4⟩ Balls are placed in an urn according to the following experiment: Pick one chit at random among 6 chits numbered 1,2,3,4, 5 and 6. If the number drawn is 1,2,3 or 4, then 2 black balls and 4 white balls are kept in the urn, otherwise 3 black balls and 2 white balls are kept in the urn. Balls are drawn at random repeatedly, and with replacement from this urn (after

the balls are placed once and for all).
Let A_1, A_2 be the events that the the ratio of black balls to white balls in the urn is $2:4$, $3:2$, respectively. Let B_i be the event that the i-th ball drawn is black.
Which of the following are TRUE?

- ☐ $\lim_{n\to\infty} P(A_1|B_1 \cap B_2 \cap .. \cap B_n) = 0$, $\lim_{n\to\infty} P(W_{n+1}|B_1 \cap B_2 \cap .. \cap B_n) = \frac{2}{5}$
- ☐ $\lim_{n\to\infty} P(A_2|B_1 \cap B_2 \cap .. \cap B_n) = 1$, $\lim_{n\to\infty} P(B_{n+1}|W_1 \cap W_2 \cap .. \cap W_n) = \frac{2}{6}$
- ☐ $\lim_{n\to\infty} P(A_1|W_1 \cap W_2 \cap .. \cap W_n) = 1$, $\lim_{n\to\infty} P(W_{n+1}|W_1 \cap W_2 \cap .. \cap W_n) = \frac{4}{6}$
- ☐ $\lim_{n\to\infty} P(A_1|B_1 \cap B_2 \cap .. \cap B_n) = 0$, $\lim_{n\to\infty} P(W_{n+1}|W_1 \cap W_2 \cap .. \cap W_n) = \frac{4}{6}$
- ☐ $\lim_{n\to\infty} P(A_1|B_1 \cap B_2 \cap .. \cap B_n) = 1$, $\lim_{n\to\infty} P(W_{n+1}|W_1 \cap W_2 \cap .. \cap W_n) = \frac{4}{6}$
- ☐ $\lim_{n\to\infty} P(A_2|B_1 \cap B_2 \cap .. \cap B_n) = 0$, $\lim_{n\to\infty} P(W_{n+1}|W_1 \cap W_2 \cap .. \cap W_n) = \frac{4}{6}$

|Q-5⟩ What does the equation $x^2 + 4y^2 + 2x + 16y + 3 = 0$ represent?

- ☐ Ellipse with focus $(1, -2)$
- ☐ Ellipse with centre $(-1, -2)$
- ☐ Ellipse with focus $(-1, -2)$
- ☐ Ellipse with centre $(1, -2)$

► |Q-6⟩ If c is a real number such that the function $\cos(x) + \cos(x + c)$ can take a value 2, then which of the following is/are POSSIBLE value(s) of c?

☐ $\frac{\pi}{2}$ ☐ π ☐ 46π ☐ $-\pi$ ☐ 0

#16/ NEATLY write your full name AS ON ROLLS:	TTC 2016/IITG Mathematics Evaluation II 8th JAN 2016

INSTRUCTIONS: This is a fully-objective/multiple-choice type of test. Questions marked with ► may have more than one answer correct. You need to indicate your answer by bubbling the box to the left of the correct answer. Use only a ball–point pen. The right way to fill a bubble like ☐ is as in ■. **No overwriting, no rewriting, no erasing and no cancellation**. Use supplementary sheets ONLY FOR ROUGH WORK. {Note: $\mathbb{N}, \mathbb{Z}, \mathbb{Q}$ and $\mathbb{R}$ denote the sets of natural numbers, integers, rational numbers and real numbers respectively.}

|Q-1⟩ Odometer is a device which measures distance covered by a vehicle. The odometer reading of an aircraft flying straight at various times are given as:

Time (seconds)	Odometer (metres)
0	120
1	335
0.1	142.1
0.01	122.22
0.001	120.2227
0.0001	120.02229
0.00001	120.0022296

From the given data, what is the best approximate to the speed of the aircraft in metres/second at time 0?

☐ 120 ☐ 215 ☐ 220 ☐ 221 ☐ 223 ☐ 225

|Q-2⟩ We want to make 12-digit natural numbers in which odd digits are in the odd positions (from left) and even digits are in the even positions. How many such numbers are there which contain all the digits?

☐ $\left(6\frac{6!}{2!}\right)^2$ ☐ $\frac{12!}{2!2!}$ ☐ $\left(5\frac{6!}{2!}\right)^2$ ☐ $\frac{12!}{2!2!2!}$

|Q-3⟩ Let $A \subset \mathbb{R}$ and $f : A \to \mathbb{R}$ be defined by

$$f(x) = \begin{cases} \frac{x-5}{x-2} & \text{if } x \neq 2 \\ 1 & \text{if } x = 2. \end{cases}$$

Which of the following is true?

☐ f is a bijective mapping
☐ Domain(f)=$\mathbb{R} - \{2\}$ and Range(f)= $\mathbb{R} - \{1\}$
☐ f is not one-one but an onto mapping
☐ f is one-one but not an onto mapping
☐ Domain(f)=$\mathbb{R}$ and Range(f)= $\mathbb{R} - \{1\}$

► |Q-4⟩ Balls are placed in an urn according to the following experiment: Pick one chit at random among 6 chits numbered 1,2,3,4, 5 and 6. If the number drawn is 1,2,3 or 4, then 2 black balls and 4 white balls are kept in the urn, otherwise 3 black balls and 2 white balls are kept in the urn. Balls are drawn at random repeatedly, and with replacement from this urn (after

the balls are placed once and for all).
Let A_1, A_2 be the events that the the ratio of black balls to white balls in the urn is $2:4$, $3:2$, respectively. Let B_i be the event that the i-th ball drawn is black.
Which of the following are TRUE?

- ☐ $\lim_{n\to\infty} P(A_1|B_1 \cap B_2 \cap .. \cap B_n) = 0$, $\lim_{n\to\infty} P(W_{n+1}|W_1 \cap W_2 \cap .. \cap W_n) = \frac{4}{6}$
- ☐ $\lim_{n\to\infty} P(A_1|W_1 \cap W_2 \cap .. \cap W_n) = 1$, $\lim_{n\to\infty} P(W_{n+1}|W_1 \cap W_2 \cap .. \cap W_n) = \frac{4}{6}$
- ☐ $\lim_{n\to\infty} P(A_1|B_1 \cap B_2 \cap .. \cap B_n) = 0$, $\lim_{n\to\infty} P(W_{n+1}|B_1 \cap B_2 \cap .. \cap B_n) = \frac{2}{5}$
- ☐ $\lim_{n\to\infty} P(A_1|B_1 \cap B_2 \cap .. \cap B_n) = 1$, $\lim_{n\to\infty} P(W_{n+1}|W_1 \cap W_2 \cap .. \cap W_n) = \frac{4}{6}$
- ☐ $\lim_{n\to\infty} P(A_2|B_1 \cap B_2 \cap .. \cap B_n) = 0$, $\lim_{n\to\infty} P(W_{n+1}|W_1 \cap W_2 \cap .. \cap W_n) = \frac{4}{6}$
- ☐ $\lim_{n\to\infty} P(A_2|B_1 \cap B_2 \cap .. \cap B_n) = 1$, $\lim_{n\to\infty} P(B_{n+1}|W_1 \cap W_2 \cap .. \cap W_n) = \frac{2}{6}$

|Q-5⟩ What does the equation $x^2 + 4y^2 + 2x + 16y + 3 = 0$ represent?

- ☐ Ellipse with centre $(1, -2)$
- ☐ Ellipse with focus $(1, -2)$
- ☐ Ellipse with focus $(-1, -2)$
- ☐ Ellipse with centre $(-1, -2)$

► |Q-6⟩ If c is a real number such that the function $\cos(x) + \cos(x + c)$ can take a value 2, then which of the following is/are POSSIBLE value(s) of c?

☐ $-\pi$ ☐ 0 ☐ $\frac{\pi}{2}$ ☐ π ☐ 46π

#17/ NEATLY write your full name AS ON ROLLS:	TTC 2016/IITG Mathematics Evaluation II 8th JAN 2016

INSTRUCTIONS: This is a fully-objective/multiple-choice type of test. Questions marked with ► may have more than one answer correct. You need to indicate your answer by bubbling the box to the left of the correct answer. Use only a ball–point pen. The right way to fill a bubble like ☐ is as in ■. **No overwriting, no rewriting, no erasing and no cancellation**. Use supplementary sheets ONLY FOR ROUGH WORK. {Note: $\mathbb{N}, \mathbb{Z}, \mathbb{Q}$ and $\mathbb{R}$ denote the sets of natural numbers, integers, rational numbers and real numbers respectively.}

|Q-1⟩ Odometer is a device which measures distance covered by a vehicle. The odometer reading of an aircraft flying straight at various times are given as:

Time (seconds)	Odometer (metres)
0	120
1	335
0.1	142.1
0.01	122.22
0.001	120.2227
0.0001	120.02229
0.00001	120.0022296

From the given data, what is the best approximate to the speed of the aircraft in metres/second at time 0?

☐ 120 ☐ 215 ☐ 220 ☐ 221 ☐ 223 ☐ 225

|Q-2⟩ We want to make 12-digit natural numbers in which odd digits are in the odd positions (from left) and even digits are in the even positions. How many such numbers are there which contain all the digits?

☐ $\left(6\frac{6!}{2!}\right)^2$ ☐ $\frac{12!}{2!2!}$ ☐ $\left(5\frac{6!}{2!}\right)^2$ ☐ $\frac{12!}{2!2!2!}$

|Q-3⟩ Let $A \subset \mathbb{R}$ and $f : A \to \mathbb{R}$ be defined by

$$f(x) = \begin{cases} \frac{x-5}{x-2} & \text{if } x \neq 2 \\ 1 & \text{if } x = 2. \end{cases}$$

Which of the following is true?

☐ f is one-one but not an onto mapping
☐ Domain(f)=$\mathbb{R}$ and Range(f)= $\mathbb{R} - \{1\}$
☐ f is not one-one but an onto mapping
☐ Domain(f)=$\mathbb{R} - \{2\}$ and Range(f)= $\mathbb{R} - \{1\}$
☐ f is a bijective mapping

► |Q-4⟩ Balls are placed in an urn according to the following experiment: Pick one chit at random among 6 chits numbered 1,2,3,4, 5 and 6. If the number drawn is 1,2,3 or 4, then 2 black balls and 4 white balls are kept in the urn, otherwise 3 black balls and 2 white balls are kept in the urn. Balls are drawn at random repeatedly, and with replacement from this urn (after

the balls are placed once and for all).
Let A_1, A_2 be the events that the the ratio of black balls to white balls in the urn is $2:4$, $3:2$, respectively. Let B_i be the event that the i-th ball drawn is black.
Which of the following are TRUE?

- ☐ $\lim_{n\to\infty} P(A_1|B_1 \cap B_2 \cap .. \cap B_n) = 0$, $\lim_{n\to\infty} P(W_{n+1}|W_1 \cap W_2 \cap .. \cap W_n) = \frac{4}{6}$
- ☐ $\lim_{n\to\infty} P(A_1|W_1 \cap W_2 \cap .. \cap W_n) = 1$, $\lim_{n\to\infty} P(W_{n+1}|W_1 \cap W_2 \cap .. \cap W_n) = \frac{4}{6}$
- ☐ $\lim_{n\to\infty} P(A_1|B_1 \cap B_2 \cap .. \cap B_n) = 1$, $\lim_{n\to\infty} P(W_{n+1}|W_1 \cap W_2 \cap .. \cap W_n) = \frac{4}{6}$
- ☐ $\lim_{n\to\infty} P(A_2|B_1 \cap B_2 \cap .. \cap B_n) = 0$, $\lim_{n\to\infty} P(W_{n+1}|W_1 \cap W_2 \cap .. \cap W_n) = \frac{4}{6}$
- ☐ $\lim_{n\to\infty} P(A_1|B_1 \cap B_2 \cap .. \cap B_n) = 0$, $\lim_{n\to\infty} P(W_{n+1}|B_1 \cap B_2 \cap .. \cap B_n) = \frac{2}{5}$
- ☐ $\lim_{n\to\infty} P(A_2|B_1 \cap B_2 \cap .. \cap B_n) = 1$, $\lim_{n\to\infty} P(B_{n+1}|W_1 \cap W_2 \cap .. \cap W_n) = \frac{2}{6}$

|Q-5⟩ What does the equation $x^2 + 4y^2 + 2x + 16y + 3 = 0$ represent?

- ☐ Ellipse with focus $(1, -2)$
- ☐ Ellipse with centre $(1, -2)$
- ☐ Ellipse with centre $(-1, -2)$
- ☐ Ellipse with focus $(-1, -2)$

► |Q-6⟩ If c is a real number such that the function $\cos(x) + \cos(x + c)$ can take a value 2, then which of the following is/are POSSIBLE value(s) of c?

☐ $\frac{\pi}{2}$ ☐ 0 ☐ 46π ☐ π ☐ $-\pi$

#18/ NEATLY write your full name AS ON ROLLS:	TTC 2016/IITG Mathematics Evaluation II 8th JAN 2016

INSTRUCTIONS: This is a fully-objective/multiple-choice type of test. Questions marked with ► may have more than one answer correct. You need to indicate your answer by bubbling the box to the left of the correct answer. Use only a ball–point pen. The right way to fill a bubble like ☐ is as in ■. **No overwriting, no rewriting, no erasing and no cancellation**. Use supplementary sheets ONLY FOR ROUGH WORK. {Note: $\mathbb{N}, \mathbb{Z}, \mathbb{Q}$ and $\mathbb{R}$ denote the sets of natural numbers, integers, rational numbers and real numbers respectively.}

|Q-1⟩ Odometer is a device which measures distance covered by a vehicle. The odometer reading of an aircraft flying straight at various times are given as:

Time (seconds)	Odometer (metres)
0	120
1	335
0.1	142.1
0.01	122.22
0.001	120.2227
0.0001	120.02229
0.00001	120.0022296

From the given data, what is the best approximate to the speed of the aircraft in metres/second at time 0?

☐ 120 ☐ 215 ☐ 220 ☐ 221 ☐ 223 ☐ 225

|Q-2⟩ We want to make 12-digit natural numbers in which odd digits are in the odd positions (from left) and even digits are in the even positions. How many such numbers are there which contain all the digits?

☐ $\left(6\frac{6!}{2!}\right)^2$ ☐ $\frac{12!}{2!2!}$ ☐ $\left(5\frac{6!}{2!}\right)^2$ ☐ $\frac{12!}{2!2!2!}$

|Q-3⟩ Let $A \subset \mathbb{R}$ and $f : A \to \mathbb{R}$ be defined by

$$f(x) = \begin{cases} \frac{x-5}{x-2} & \text{if } x \neq 2 \\ 1 & \text{if } x = 2. \end{cases}$$

Which of the following is true?

☐ f is not one-one but an onto mapping
☐ Domain(f)=$\mathbb{R} - \{2\}$ and Range(f)= $\mathbb{R} - \{1\}$
☐ Domain(f)=$\mathbb{R}$ and Range(f)= $\mathbb{R} - \{1\}$
☐ f is a bijective mapping
☐ f is one-one but not an onto mapping

► |Q-4⟩ Balls are placed in an urn according to the following experiment: Pick one chit at random among 6 chits numbered 1,2,3,4, 5 and 6. If the number drawn is 1,2,3 or 4, then 2 black balls and 4 white balls are kept in the urn, otherwise 3 black balls and 2 white balls are kept in the urn. Balls are drawn at random repeatedly, and with replacement from this urn (after

the balls are placed once and for all).
Let A_1, A_2 be the events that the the ratio of black balls to white balls in the urn is $2:4$, $3:2$, respectively. Let B_i be the event that the i-th ball drawn is black.
Which of the following are TRUE?

- ☐ $\lim_{n\to\infty} P(A_2|B_1 \cap B_2 \cap .. \cap B_n) = 0$, $\lim_{n\to\infty} P(W_{n+1}|W_1 \cap W_2 \cap .. \cap W_n) = \frac{4}{6}$
- ☐ $\lim_{n\to\infty} P(A_1|B_1 \cap B_2 \cap .. \cap B_n) = 0$, $\lim_{n\to\infty} P(W_{n+1}|B_1 \cap B_2 \cap .. \cap B_n) = \frac{2}{5}$
- ☐ $\lim_{n\to\infty} P(A_2|B_1 \cap B_2 \cap .. \cap B_n) = 1$, $\lim_{n\to\infty} P(B_{n+1}|W_1 \cap W_2 \cap .. \cap W_n) = \frac{2}{6}$
- ☐ $\lim_{n\to\infty} P(A_1|B_1 \cap B_2 \cap .. \cap B_n) = 1$, $\lim_{n\to\infty} P(W_{n+1}|W_1 \cap W_2 \cap .. \cap W_n) = \frac{4}{6}$
- ☐ $\lim_{n\to\infty} P(A_1|B_1 \cap B_2 \cap .. \cap B_n) = 0$, $\lim_{n\to\infty} P(W_{n+1}|W_1 \cap W_2 \cap .. \cap W_n) = \frac{4}{6}$
- ☐ $\lim_{n\to\infty} P(A_1|W_1 \cap W_2 \cap .. \cap W_n) = 1$, $\lim_{n\to\infty} P(W_{n+1}|W_1 \cap W_2 \cap .. \cap W_n) = \frac{4}{6}$

|Q-5⟩ What does the equation $x^2 + 4y^2 + 2x + 16y + 3 = 0$ represent?

- ☐ Ellipse with centre $(-1, -2)$
- ☐ Ellipse with focus $(-1, -2)$
- ☐ Ellipse with focus $(1, -2)$
- ☐ Ellipse with centre $(1, -2)$

► |Q-6⟩ If c is a real number such that the function $\cos(x) + \cos(x + c)$ can take a value 2, then which of the following is/are POSSIBLE value(s) of c?

☐ $-\pi$ ☐ 46π ☐ 0 ☐ π ☐ $\frac{\pi}{2}$

#19/ NEATLY write your full name AS ON ROLLS:	TTC 2016/IITG Mathematics Evaluation II 8th JAN 2016

INSTRUCTIONS: This is a fully-objective/multiple-choice type of test. Questions marked with ► may have more than one answer correct. You need to indicate your answer by bubbling the box to the left of the correct answer. Use only a ball–point pen. The right way to fill a bubble like ☐ is as in ■. **No overwriting, no rewriting, no erasing and no cancellation**. Use supplementary sheets ONLY FOR ROUGH WORK. {Note: $\mathbb{N}, \mathbb{Z}, \mathbb{Q}$ and $\mathbb{R}$ denote the sets of natural numbers, integers, rational numbers and real numbers respectively.}

|Q-1⟩ Odometer is a device which measures distance covered by a vehicle. The odometer reading of an aircraft flying straight at various times are given as:

Time (seconds)	Odometer (metres)
0	120
1	335
0.1	142.1
0.01	122.22
0.001	120.2227
0.0001	120.02229
0.00001	120.0022296

From the given data, what is the best approximate to the speed of the aircraft in metres/second at time 0?

☐ 120 ☐ 215 ☐ 220 ☐ 221 ☐ 223 ☐ 225

|Q-2⟩ We want to make 12-digit natural numbers in which odd digits are in the odd positions (from left) and even digits are in the even positions. How many such numbers are there which contain all the digits?

☐ $\left(6\frac{6!}{2!}\right)^2$ ☐ $\frac{12!}{2!2!}$ ☐ $\left(5\frac{6!}{2!}\right)^2$ ☐ $\frac{12!}{2!2!2!}$

|Q-3⟩ Let $A \subset \mathbb{R}$ and $f : A \to \mathbb{R}$ be defined by

$$f(x) = \begin{cases} \frac{x-5}{x-2} & \text{if } x \neq 2 \\ 1 & \text{if } x = 2. \end{cases}$$

Which of the following is true?

☐ f is not one-one but an onto mapping
☐ Domain(f)=$\mathbb{R} - \{2\}$ and Range(f)= $\mathbb{R} - \{1\}$
☐ Domain(f)=$\mathbb{R}$ and Range(f)= $\mathbb{R} - \{1\}$
☐ f is a bijective mapping
☐ f is one-one but not an onto mapping

► |Q-4⟩ Balls are placed in an urn according to the following experiment: Pick one chit at random among 6 chits numbered 1,2,3,4, 5 and 6. If the number drawn is 1,2,3 or 4, then 2 black balls and 4 white balls are kept in the urn, otherwise 3 black balls and 2 white balls are kept in the urn. Balls are drawn at random repeatedly, and with replacement from this urn (after

the balls are placed once and for all).
Let A_1, A_2 be the events that the the ratio of black balls to white balls in the urn is $2:4$, $3:2$, respectively. Let B_i be the event that the i-th ball drawn is black.
Which of the following are TRUE?

- ☐ $\lim_{n\to\infty} P(A_1|B_1 \cap B_2 \cap .. \cap B_n) = 0$, $\lim_{n\to\infty} P(W_{n+1}|W_1 \cap W_2 \cap .. \cap W_n) = \frac{4}{6}$
- ☐ $\lim_{n\to\infty} P(A_2|B_1 \cap B_2 \cap .. \cap B_n) = 0$, $\lim_{n\to\infty} P(W_{n+1}|W_1 \cap W_2 \cap .. \cap W_n) = \frac{4}{6}$
- ☐ $\lim_{n\to\infty} P(A_2|B_1 \cap B_2 \cap .. \cap B_n) = 1$, $\lim_{n\to\infty} P(B_{n+1}|W_1 \cap W_2 \cap .. \cap W_n) = \frac{2}{6}$
- ☐ $\lim_{n\to\infty} P(A_1|B_1 \cap B_2 \cap .. \cap B_n) = 0$, $\lim_{n\to\infty} P(W_{n+1}|B_1 \cap B_2 \cap .. \cap B_n) = \frac{2}{5}$
- ☐ $\lim_{n\to\infty} P(A_1|B_1 \cap B_2 \cap .. \cap B_n) = 1$, $\lim_{n\to\infty} P(W_{n+1}|W_1 \cap W_2 \cap .. \cap W_n) = \frac{4}{6}$
- ☐ $\lim_{n\to\infty} P(A_1|W_1 \cap W_2 \cap .. \cap W_n) = 1$, $\lim_{n\to\infty} P(W_{n+1}|W_1 \cap W_2 \cap .. \cap W_n) = \frac{4}{6}$

|Q-5⟩ What does the equation $x^2 + 4y^2 + 2x + 16y + 3 = 0$ represent?

- ☐ Ellipse with centre $(1, -2)$
- ☐ Ellipse with focus $(1, -2)$
- ☐ Ellipse with focus $(-1, -2)$
- ☐ Ellipse with centre $(-1, -2)$

► |Q-6⟩ If c is a real number such that the function $\cos(x) + \cos(x + c)$ can take a value 2, then which of the following is/are POSSIBLE value(s) of c?

☐ $-\pi$ ☐ 0 ☐ π ☐ $\frac{\pi}{2}$ ☐ 46π

#20/ NEATLY write your full name AS ON ROLLS:	TTC 2016/IITG Mathematics Evaluation II 8th JAN 2016

INSTRUCTIONS: This is a fully-objective/multiple-choice type of test. Questions marked with ► may have more than one answer correct. You need to indicate your answer by bubbling the box to the left of the correct answer. Use only a ball–point pen. The right way to fill a bubble like ☐ is as in ■. **No overwriting, no rewriting, no erasing and no cancellation**. Use supplementary sheets ONLY FOR ROUGH WORK. {Note: $\mathbb{N}, \mathbb{Z}, \mathbb{Q}$ and $\mathbb{R}$ denote the sets of natural numbers, integers, rational numbers and real numbers respectively.}

|Q-1⟩ Odometer is a device which measures distance covered by a vehicle. The odometer reading of an aircraft flying straight at various times are given as:

Time (seconds)	Odometer (metres)
0	120
1	335
0.1	142.1
0.01	122.22
0.001	120.2227
0.0001	120.02229
0.00001	120.0022296

From the given data, what is the best approximate to the speed of the aircraft in metres/second at time 0?

☐ 120 ☐ 215 ☐ 220 ☐ 221 ☐ 223 ☐ 225

|Q-2⟩ We want to make 12-digit natural numbers in which odd digits are in the odd positions (from left) and even digits are in the even positions. How many such numbers are there which contain all the digits?

☐ $\left(6\frac{6!}{2!}\right)^2$ ☐ $\frac{12!}{2!2!}$ ☐ $\left(5\frac{6!}{2!}\right)^2$ ☐ $\frac{12!}{2!2!2!}$

|Q-3⟩ Let $A \subset \mathbb{R}$ and $f : A \to \mathbb{R}$ be defined by

$$f(x) = \begin{cases} \frac{x-5}{x-2} & \text{if } x \neq 2 \\ 1 & \text{if } x = 2. \end{cases}$$

Which of the following is true?

☐ f is not one-one but an onto mapping
☐ Domain(f)=$\mathbb{R}$ and Range(f)= $\mathbb{R} - \{1\}$
☐ Domain(f)=$\mathbb{R} - \{2\}$ and Range(f)= $\mathbb{R} - \{1\}$
☐ f is a bijective mapping
☐ f is one-one but not an onto mapping

► |Q-4⟩ Balls are placed in an urn according to the following experiment: Pick one chit at random among 6 chits numbered 1,2,3,4, 5 and 6. If the number drawn is 1,2,3 or 4, then 2 black balls and 4 white balls are kept in the urn, otherwise 3 black balls and 2 white balls are kept in the urn. Balls are drawn at random repeatedly, and with replacement from this urn (after

the balls are placed once and for all).
Let A_1, A_2 be the events that the the ratio of black balls to white balls in the urn is $2:4$, $3:2$, respectively. Let B_i be the event that the i-th ball drawn is black.
Which of the following are TRUE?

- ☐ $\lim_{n\to\infty} P(A_2|B_1 \cap B_2 \cap .. \cap B_n) = 0$, $\lim_{n\to\infty} P(W_{n+1}|W_1 \cap W_2 \cap .. \cap W_n) = \frac{4}{6}$
- ☐ $\lim_{n\to\infty} P(A_2|B_1 \cap B_2 \cap .. \cap B_n) = 1$, $\lim_{n\to\infty} P(B_{n+1}|W_1 \cap W_2 \cap .. \cap W_n) = \frac{2}{6}$
- ☐ $\lim_{n\to\infty} P(A_1|B_1 \cap B_2 \cap .. \cap B_n) = 1$, $\lim_{n\to\infty} P(W_{n+1}|W_1 \cap W_2 \cap .. \cap W_n) = \frac{4}{6}$
- ☐ $\lim_{n\to\infty} P(A_1|W_1 \cap W_2 \cap .. \cap W_n) = 1$, $\lim_{n\to\infty} P(W_{n+1}|W_1 \cap W_2 \cap .. \cap W_n) = \frac{4}{6}$
- ☐ $\lim_{n\to\infty} P(A_1|B_1 \cap B_2 \cap .. \cap B_n) = 0$, $\lim_{n\to\infty} P(W_{n+1}|W_1 \cap W_2 \cap .. \cap W_n) = \frac{4}{6}$
- ☐ $\lim_{n\to\infty} P(A_1|B_1 \cap B_2 \cap .. \cap B_n) = 0$, $\lim_{n\to\infty} P(W_{n+1}|B_1 \cap B_2 \cap .. \cap B_n) = \frac{2}{5}$

|Q-5⟩ What does the equation $x^2 + 4y^2 + 2x + 16y + 3 = 0$ represent?

- ☐ Ellipse with centre $(-1, -2)$
- ☐ Ellipse with centre $(1, -2)$
- ☐ Ellipse with focus $(1, -2)$
- ☐ Ellipse with focus $(-1, -2)$

► |Q-6⟩ If c is a real number such that the function $\cos(x) + \cos(x + c)$ can take a value 2, then which of the following is/are POSSIBLE value(s) of c?

☐ $\frac{\pi}{2}$ ☐ 0 ☐ $-\pi$ ☐ π ☐ 46π

#21/ NEATLY write your full name AS ON ROLLS:	TTC 2016/IITG Mathematics Evaluation II 8th JAN 2016

INSTRUCTIONS: This is a fully-objective/multiple-choice type of test. Questions marked with ► may have more than one answer correct. You need to indicate your answer by bubbling the box to the left of the correct answer. Use only a ball–point pen. The right way to fill a bubble like ☐ is as in ■. **No overwriting, no rewriting, no erasing and no cancellation**. Use supplementary sheets ONLY FOR ROUGH WORK. {Note: $\mathbb{N}, \mathbb{Z}, \mathbb{Q}$ and $\mathbb{R}$ denote the sets of natural numbers, integers, rational numbers and real numbers respectively.}

|Q-1⟩ Odometer is a device which measures distance covered by a vehicle. The odometer reading of an aircraft flying straight at various times are given as:

Time (seconds)	Odometer (metres)
0	120
1	335
0.1	142.1
0.01	122.22
0.001	120.2227
0.0001	120.02229
0.00001	120.0022296

From the given data, what is the best approximate to the speed of the aircraft in metres/second at time 0?

☐ 120 ☐ 215 ☐ 220 ☐ 221 ☐ 223 ☐ 225

|Q-2⟩ We want to make 12-digit natural numbers in which odd digits are in the odd positions (from left) and even digits are in the even positions. How many such numbers are there which contain all the digits?

☐ $\left(6\frac{6!}{2!}\right)^2$ ☐ $\frac{12!}{2!2!}$ ☐ $\left(5\frac{6!}{2!}\right)^2$ ☐ $\frac{12!}{2!2!2!}$

|Q-3⟩ Let $A \subset \mathbb{R}$ and $f : A \to \mathbb{R}$ be defined by

$$f(x) = \begin{cases} \frac{x-5}{x-2} & \text{if } x \neq 2 \\ 1 & \text{if } x = 2. \end{cases}$$

Which of the following is true?

☐ Domain(f)=$\mathbb{R}$ and Range(f)= $\mathbb{R} - \{1\}$
☐ f is one-one but not an onto mapping
☐ f is not one-one but an onto mapping
☐ f is a bijective mapping
☐ Domain(f)=$\mathbb{R} - \{2\}$ and Range(f)= $\mathbb{R} - \{1\}$

► |Q-4⟩ Balls are placed in an urn according to the following experiment: Pick one chit at random among 6 chits numbered 1,2,3,4, 5 and 6. If the number drawn is 1,2,3 or 4, then 2 black balls and 4 white balls are kept in the urn, otherwise 3 black balls and 2 white balls are kept in the urn. Balls are drawn at random repeatedly, and with replacement from this urn (after

the balls are placed once and for all).
Let A_1, A_2 be the events that the the ratio of black balls to white balls in the urn is $2:4$, $3:2$, respectively. Let B_i be the event that the i-th ball drawn is black.
Which of the following are TRUE?

- ☐ $\lim_{n\to\infty} P(A_1|B_1 \cap B_2 \cap .. \cap B_n) = 0$, $\lim_{n\to\infty} P(W_{n+1}|W_1 \cap W_2 \cap .. \cap W_n) = \frac{4}{6}$
- ☐ $\lim_{n\to\infty} P(A_1|W_1 \cap W_2 \cap .. \cap W_n) = 1$, $\lim_{n\to\infty} P(W_{n+1}|W_1 \cap W_2 \cap .. \cap W_n) = \frac{4}{6}$
- ☐ $\lim_{n\to\infty} P(A_1|B_1 \cap B_2 \cap .. \cap B_n) = 0$, $\lim_{n\to\infty} P(W_{n+1}|B_1 \cap B_2 \cap .. \cap B_n) = \frac{2}{5}$
- ☐ $\lim_{n\to\infty} P(A_2|B_1 \cap B_2 \cap .. \cap B_n) = 1$, $\lim_{n\to\infty} P(B_{n+1}|W_1 \cap W_2 \cap .. \cap W_n) = \frac{2}{6}$
- ☐ $\lim_{n\to\infty} P(A_1|B_1 \cap B_2 \cap .. \cap B_n) = 1$, $\lim_{n\to\infty} P(W_{n+1}|W_1 \cap W_2 \cap .. \cap W_n) = \frac{4}{6}$
- ☐ $\lim_{n\to\infty} P(A_2|B_1 \cap B_2 \cap .. \cap B_n) = 0$, $\lim_{n\to\infty} P(W_{n+1}|W_1 \cap W_2 \cap .. \cap W_n) = \frac{4}{6}$

|Q-5⟩ What does the equation $x^2 + 4y^2 + 2x + 16y + 3 = 0$ represent?

- ☐ Ellipse with focus $(-1, -2)$
- ☐ Ellipse with centre $(-1, -2)$
- ☐ Ellipse with centre $(1, -2)$
- ☐ Ellipse with focus $(1, -2)$

► |Q-6⟩ If c is a real number such that the function $\cos(x) + \cos(x + c)$ can take a value 2, then which of the following is/are POSSIBLE value(s) of c?

☐ 46π ☐ $-\pi$ ☐ 0 ☐ $\frac{\pi}{2}$ ☐ π

#22/ NEATLY write your full name AS ON ROLLS:	TTC 2016/IITG Mathematics Evaluation II 8th JAN 2016

INSTRUCTIONS: This is a fully-objective/multiple-choice type of test. Questions marked with ► may have more than one answer correct. You need to indicate your answer by bubbling the box to the left of the correct answer. Use only a ball–point pen. The right way to fill a bubble like ☐ is as in ■. **No overwriting, no rewriting, no erasing and no cancellation**. Use supplementary sheets ONLY FOR ROUGH WORK. {Note: $\mathbb{N}, \mathbb{Z}, \mathbb{Q}$ and $\mathbb{R}$ denote the sets of natural numbers, integers, rational numbers and real numbers respectively.}

|Q-1⟩ Odometer is a device which measures distance covered by a vehicle. The odometer reading of an aircraft flying straight at various times are given as:

Time (seconds)	Odometer (metres)
0	120
1	335
0.1	142.1
0.01	122.22
0.001	120.2227
0.0001	120.02229
0.00001	120.0022296

From the given data, what is the best approximate to the speed of the aircraft in metres/second at time 0?

☐ 120 ☐ 215 ☐ 220 ☐ 221 ☐ 223 ☐ 225

|Q-2⟩ We want to make 12-digit natural numbers in which odd digits are in the odd positions (from left) and even digits are in the even positions. How many such numbers are there which contain all the digits?

☐ $\left(6\frac{6!}{2!}\right)^2$ ☐ $\frac{12!}{2!2!}$ ☐ $\left(5\frac{6!}{2!}\right)^2$ ☐ $\frac{12!}{2!2!2!}$

|Q-3⟩ Let $A \subset \mathbb{R}$ and $f : A \to \mathbb{R}$ be defined by

$$f(x) = \begin{cases} \frac{x-5}{x-2} & \text{if } x \neq 2 \\ 1 & \text{if } x = 2. \end{cases}$$

Which of the following is true?

☐ f is a bijective mapping
☐ f is one-one but not an onto mapping
☐ f is not one-one but an onto mapping
☐ Domain(f)=$\mathbb{R} - \{2\}$ and Range(f)= $\mathbb{R} - \{1\}$
☐ Domain(f)=$\mathbb{R}$ and Range(f)= $\mathbb{R} - \{1\}$

► |Q-4⟩ Balls are placed in an urn according to the following experiment: Pick one chit at random among 6 chits numbered 1,2,3,4, 5 and 6. If the number drawn is 1,2,3 or 4, then 2 black balls and 4 white balls are kept in the urn, otherwise 3 black balls and 2 white balls are kept in the urn. Balls are drawn at random repeatedly, and with replacement from this urn (after

the balls are placed once and for all).
Let A_1, A_2 be the events that the the ratio of black balls to white balls in the urn is $2:4$, $3:2$, respectively. Let B_i be the event that the i-th ball drawn is black.
Which of the following are TRUE?

- ☐ $\lim_{n\to\infty} P(A_2|B_1 \cap B_2 \cap .. \cap B_n) = 0$, $\lim_{n\to\infty} P(W_{n+1}|W_1 \cap W_2 \cap .. \cap W_n) = \frac{4}{6}$
- ☐ $\lim_{n\to\infty} P(A_2|B_1 \cap B_2 \cap .. \cap B_n) = 1$, $\lim_{n\to\infty} P(B_{n+1}|W_1 \cap W_2 \cap .. \cap W_n) = \frac{2}{6}$
- ☐ $\lim_{n\to\infty} P(A_1|B_1 \cap B_2 \cap .. \cap B_n) = 0$, $\lim_{n\to\infty} P(W_{n+1}|W_1 \cap W_2 \cap .. \cap W_n) = \frac{4}{6}$
- ☐ $\lim_{n\to\infty} P(A_1|W_1 \cap W_2 \cap .. \cap W_n) = 1$, $\lim_{n\to\infty} P(W_{n+1}|W_1 \cap W_2 \cap .. \cap W_n) = \frac{4}{6}$
- ☐ $\lim_{n\to\infty} P(A_1|B_1 \cap B_2 \cap .. \cap B_n) = 1$, $\lim_{n\to\infty} P(W_{n+1}|W_1 \cap W_2 \cap .. \cap W_n) = \frac{4}{6}$
- ☐ $\lim_{n\to\infty} P(A_1|B_1 \cap B_2 \cap .. \cap B_n) = 0$, $\lim_{n\to\infty} P(W_{n+1}|B_1 \cap B_2 \cap .. \cap B_n) = \frac{2}{5}$

|Q-5⟩ What does the equation $x^2 + 4y^2 + 2x + 16y + 3 = 0$ represent?

- ☐ Ellipse with centre $(-1, -2)$
- ☐ Ellipse with centre $(1, -2)$
- ☐ Ellipse with focus $(1, -2)$
- ☐ Ellipse with focus $(-1, -2)$

► |Q-6⟩ If c is a real number such that the function $\cos(x) + \cos(x + c)$ can take a value 2, then which of the following is/are POSSIBLE value(s) of c?

☐ $-\pi$ ☐ 0 ☐ 46π ☐ $\frac{\pi}{2}$ ☐ π

#23/ NEATLY write your full name AS ON ROLLS:	TTC 2016/IITG Mathematics Evaluation II 8th JAN 2016

INSTRUCTIONS: This is a fully-objective/multiple-choice type of test. Questions marked with ► may have more than one answer correct. You need to indicate your answer by bubbling the box to the left of the correct answer. Use only a ball–point pen. The right way to fill a bubble like ☐ is as in ■. **No overwriting, no rewriting, no erasing and no cancellation**. Use supplementary sheets ONLY FOR ROUGH WORK. {Note: $\mathbb{N}, \mathbb{Z}, \mathbb{Q}$ and $\mathbb{R}$ denote the sets of natural numbers, integers, rational numbers and real numbers respectively.}

|Q-1⟩ Odometer is a device which measures distance covered by a vehicle. The odometer reading of an aircraft flying straight at various times are given as:

Time (seconds)	Odometer (metres)
0	120
1	335
0.1	142.1
0.01	122.22
0.001	120.2227
0.0001	120.02229
0.00001	120.0022296

From the given data, what is the best approximate to the speed of the aircraft in metres/second at time 0?

☐ 120 ☐ 215 ☐ 220 ☐ 221 ☐ 223 ☐ 225

|Q-2⟩ We want to make 12-digit natural numbers in which odd digits are in the odd positions (from left) and even digits are in the even positions. How many such numbers are there which contain all the digits?

☐ $\left(6\frac{6!}{2!}\right)^2$ ☐ $\frac{12!}{2!2!}$ ☐ $\left(5\frac{6!}{2!}\right)^2$ ☐ $\frac{12!}{2!2!2!}$

|Q-3⟩ Let $A \subset \mathbb{R}$ and $f : A \to \mathbb{R}$ be defined by

$$f(x) = \begin{cases} \frac{x-5}{x-2} & \text{if } x \neq 2 \\ 1 & \text{if } x = 2. \end{cases}$$

Which of the following is true?

☐ f is one-one but not an onto mapping
☐ Domain(f)=$\mathbb{R} - \{2\}$ and Range(f)= $\mathbb{R} - \{1\}$
☐ f is a bijective mapping
☐ f is not one-one but an onto mapping
☐ Domain(f)=$\mathbb{R}$ and Range(f)= $\mathbb{R} - \{1\}$

► |Q-4⟩ Balls are placed in an urn according to the following experiment: Pick one chit at random among 6 chits numbered 1,2,3,4, 5 and 6. If the number drawn is 1,2,3 or 4, then 2 black balls and 4 white balls are kept in the urn, otherwise 3 black balls and 2 white balls are kept in the urn. Balls are drawn at random repeatedly, and with replacement from this urn (after

the balls are placed once and for all).
Let A_1, A_2 be the events that the the ratio of black balls to white balls in the urn is $2:4$, $3:2$, respectively. Let B_i be the event that the i-th ball drawn is black.
Which of the following are TRUE?

- ☐ $\lim_{n\to\infty} P(A_1|B_1 \cap B_2 \cap .. \cap B_n) = 0$, $\lim_{n\to\infty} P(W_{n+1}|B_1 \cap B_2 \cap .. \cap B_n) = \frac{2}{5}$
- ☐ $\lim_{n\to\infty} P(A_1|B_1 \cap B_2 \cap .. \cap B_n) = 0$, $\lim_{n\to\infty} P(W_{n+1}|W_1 \cap W_2 \cap .. \cap W_n) = \frac{4}{6}$
- ☐ $\lim_{n\to\infty} P(A_1|B_1 \cap B_2 \cap .. \cap B_n) = 1$, $\lim_{n\to\infty} P(W_{n+1}|W_1 \cap W_2 \cap .. \cap W_n) = \frac{4}{6}$
- ☐ $\lim_{n\to\infty} P(A_1|W_1 \cap W_2 \cap .. \cap W_n) = 1$, $\lim_{n\to\infty} P(W_{n+1}|W_1 \cap W_2 \cap .. \cap W_n) = \frac{4}{6}$
- ☐ $\lim_{n\to\infty} P(A_2|B_1 \cap B_2 \cap .. \cap B_n) = 0$, $\lim_{n\to\infty} P(W_{n+1}|W_1 \cap W_2 \cap .. \cap W_n) = \frac{4}{6}$
- ☐ $\lim_{n\to\infty} P(A_2|B_1 \cap B_2 \cap .. \cap B_n) = 1$, $\lim_{n\to\infty} P(B_{n+1}|W_1 \cap W_2 \cap .. \cap W_n) = \frac{2}{6}$

|Q-5⟩ What does the equation $x^2 + 4y^2 + 2x + 16y + 3 = 0$ represent?

- ☐ Ellipse with centre $(1, -2)$
- ☐ Ellipse with centre $(-1, -2)$
- ☐ Ellipse with focus $(1, -2)$
- ☐ Ellipse with focus $(-1, -2)$

► |Q-6⟩ If c is a real number such that the function $\cos(x) + \cos(x + c)$ can take a value 2, then which of the following is/are POSSIBLE value(s) of c?

☐ $-\pi$ ☐ 0 ☐ $\frac{\pi}{2}$ ☐ 46π ☐ π

#24/ NEATLY write your full name AS ON ROLLS:	TTC 2016/IITG Mathematics Evaluation II 8th JAN 2016

INSTRUCTIONS: This is a fully-objective/multiple-choice type of test. Questions marked with ► may have more than one answer correct. You need to indicate your answer by bubbling the box to the left of the correct answer. Use only a ball–point pen. The right way to fill a bubble like ☐ is as in ■. **No overwriting, no rewriting, no erasing and no cancellation**. Use supplementary sheets ONLY FOR ROUGH WORK. {Note: $\mathbb{N}, \mathbb{Z}, \mathbb{Q}$ and $\mathbb{R}$ denote the sets of natural numbers, integers, rational numbers and real numbers respectively.}

|Q-1⟩ Odometer is a device which measures distance covered by a vehicle. The odometer reading of an aircraft flying straight at various times are given as:

Time (seconds)	Odometer (metres)
0	120
1	335
0.1	142.1
0.01	122.22
0.001	120.2227
0.0001	120.02229
0.00001	120.0022296

From the given data, what is the best approximate to the speed of the aircraft in metres/second at time 0?

☐ 120 ☐ 215 ☐ 220 ☐ 221 ☐ 223 ☐ 225

|Q-2⟩ We want to make 12-digit natural numbers in which odd digits are in the odd positions (from left) and even digits are in the even positions. How many such numbers are there which contain all the digits?

☐ $\left(6\frac{6!}{2!}\right)^2$ ☐ $\frac{12!}{2!2!}$ ☐ $\left(5\frac{6!}{2!}\right)^2$ ☐ $\frac{12!}{2!2!2!}$

|Q-3⟩ Let $A \subset \mathbb{R}$ and $f : A \to \mathbb{R}$ be defined by

$$f(x) = \begin{cases} \frac{x-5}{x-2} & \text{if } x \neq 2 \\ 1 & \text{if } x = 2. \end{cases}$$

Which of the following is true?

☐ Domain(f)=$\mathbb{R} - \{2\}$ and Range(f)= $\mathbb{R} - \{1\}$
☐ f is not one-one but an onto mapping
☐ f is a bijective mapping
☐ f is one-one but not an onto mapping
☐ Domain(f)=$\mathbb{R}$ and Range(f)= $\mathbb{R} - \{1\}$

► |Q-4⟩ Balls are placed in an urn according to the following experiment: Pick one chit at random among 6 chits numbered 1,2,3,4, 5 and 6. If the number drawn is 1,2,3 or 4, then 2 black balls and 4 white balls are kept in the urn, otherwise 3 black balls and 2 white balls are kept in the urn. Balls are drawn at random repeatedly, and with replacement from this urn (after

the balls are placed once and for all).
Let A_1, A_2 be the events that the the ratio of black balls to white balls in the urn is $2:4$, $3:2$, respectively. Let B_i be the event that the i-th ball drawn is black.
Which of the following are TRUE?

- ☐ $\lim_{n\to\infty} P(A_1|B_1 \cap B_2 \cap .. \cap B_n) = 0$, $\lim_{n\to\infty} P(W_{n+1}|B_1 \cap B_2 \cap .. \cap B_n) = \frac{2}{5}$
- ☐ $\lim_{n\to\infty} P(A_1|W_1 \cap W_2 \cap .. \cap W_n) = 1$, $\lim_{n\to\infty} P(W_{n+1}|W_1 \cap W_2 \cap .. \cap W_n) = \frac{4}{6}$
- ☐ $\lim_{n\to\infty} P(A_1|B_1 \cap B_2 \cap .. \cap B_n) = 0$, $\lim_{n\to\infty} P(W_{n+1}|W_1 \cap W_2 \cap .. \cap W_n) = \frac{4}{6}$
- ☐ $\lim_{n\to\infty} P(A_1|B_1 \cap B_2 \cap .. \cap B_n) = 1$, $\lim_{n\to\infty} P(W_{n+1}|W_1 \cap W_2 \cap .. \cap W_n) = \frac{4}{6}$
- ☐ $\lim_{n\to\infty} P(A_2|B_1 \cap B_2 \cap .. \cap B_n) = 0$, $\lim_{n\to\infty} P(W_{n+1}|W_1 \cap W_2 \cap .. \cap W_n) = \frac{4}{6}$
- ☐ $\lim_{n\to\infty} P(A_2|B_1 \cap B_2 \cap .. \cap B_n) = 1$, $\lim_{n\to\infty} P(B_{n+1}|W_1 \cap W_2 \cap .. \cap W_n) = \frac{2}{6}$

|Q-5⟩ What does the equation $x^2 + 4y^2 + 2x + 16y + 3 = 0$ represent?

- ☐ Ellipse with focus $(-1, -2)$
- ☐ Ellipse with focus $(1, -2)$
- ☐ Ellipse with centre $(-1, -2)$
- ☐ Ellipse with centre $(1, -2)$

► |Q-6⟩ If c is a real number such that the function $\cos(x) + \cos(x + c)$ can take a value 2, then which of the following is/are POSSIBLE value(s) of c?

☐ 46π ☐ $-\pi$ ☐ π ☐ $\frac{\pi}{2}$ ☐ 0

#25/ NEATLY write your full name AS ON ROLLS:	TTC 2016/IITG Mathematics Evaluation II 8th JAN 2016

INSTRUCTIONS: This is a fully-objective/multiple-choice type of test. Questions marked with ► may have more than one answer correct. You need to indicate your answer by bubbling the box to the left of the correct answer. Use only a ball–point pen. The right way to fill a bubble like ☐ is as in ■. **No overwriting, no rewriting, no erasing and no cancellation**. Use supplementary sheets ONLY FOR ROUGH WORK. {Note: $\mathbb{N}, \mathbb{Z}, \mathbb{Q}$ and $\mathbb{R}$ denote the sets of natural numbers, integers, rational numbers and real numbers respectively.}

|Q-1⟩ Odometer is a device which measures distance covered by a vehicle. The odometer reading of an aircraft flying straight at various times are given as:

Time (seconds)	Odometer (metres)
0	120
1	335
0.1	142.1
0.01	122.22
0.001	120.2227
0.0001	120.02229
0.00001	120.0022296

From the given data, what is the best approximate to the speed of the aircraft in metres/second at time 0?

☐ 120 ☐ 215 ☐ 220 ☐ 221 ☐ 223 ☐ 225

|Q-2⟩ We want to make 12-digit natural numbers in which odd digits are in the odd positions (from left) and even digits are in the even positions. How many such numbers are there which contain all the digits?

☐ $\left(6\frac{6!}{2!}\right)^2$ ☐ $\frac{12!}{2!2!}$ ☐ $\left(5\frac{6!}{2!}\right)^2$ ☐ $\frac{12!}{2!2!2!}$

|Q-3⟩ Let $A \subset \mathbb{R}$ and $f : A \to \mathbb{R}$ be defined by

$$f(x) = \begin{cases} \frac{x-5}{x-2} & \text{if } x \neq 2 \\ 1 & \text{if } x = 2. \end{cases}$$

Which of the following is true?

☐ Domain(f)=$\mathbb{R} - \{2\}$ and Range(f)= $\mathbb{R} - \{1\}$
☐ f is one-one but not an onto mapping
☐ f is not one-one but an onto mapping
☐ f is a bijective mapping
☐ Domain(f)=$\mathbb{R}$ and Range(f)= $\mathbb{R} - \{1\}$

► |Q-4⟩ Balls are placed in an urn according to the following experiment: Pick one chit at random among 6 chits numbered 1,2,3,4, 5 and 6. If the number drawn is 1,2,3 or 4, then 2 black balls and 4 white balls are kept in the urn, otherwise 3 black balls and 2 white balls are kept in the urn. Balls are drawn at random repeatedly, and with replacement from this urn (after

the balls are placed once and for all).
Let A_1, A_2 be the events that the the ratio of black balls to white balls in the urn is $2:4$, $3:2$, respectively. Let B_i be the event that the i-th ball drawn is black.
Which of the following are TRUE?

- ☐ $\lim_{n\to\infty} P(A_2|B_1 \cap B_2 \cap .. \cap B_n) = 0$, $\lim_{n\to\infty} P(W_{n+1}|W_1 \cap W_2 \cap .. \cap W_n) = \frac{4}{6}$
- ☐ $\lim_{n\to\infty} P(A_1|B_1 \cap B_2 \cap .. \cap B_n) = 0$, $\lim_{n\to\infty} P(W_{n+1}|B_1 \cap B_2 \cap .. \cap B_n) = \frac{2}{5}$
- ☐ $\lim_{n\to\infty} P(A_1|B_1 \cap B_2 \cap .. \cap B_n) = 1$, $\lim_{n\to\infty} P(W_{n+1}|W_1 \cap W_2 \cap .. \cap W_n) = \frac{4}{6}$
- ☐ $\lim_{n\to\infty} P(A_1|B_1 \cap B_2 \cap .. \cap B_n) = 0$, $\lim_{n\to\infty} P(W_{n+1}|W_1 \cap W_2 \cap .. \cap W_n) = \frac{4}{6}$
- ☐ $\lim_{n\to\infty} P(A_1|W_1 \cap W_2 \cap .. \cap W_n) = 1$, $\lim_{n\to\infty} P(W_{n+1}|W_1 \cap W_2 \cap .. \cap W_n) = \frac{4}{6}$
- ☐ $\lim_{n\to\infty} P(A_2|B_1 \cap B_2 \cap .. \cap B_n) = 1$, $\lim_{n\to\infty} P(B_{n+1}|W_1 \cap W_2 \cap .. \cap W_n) = \frac{2}{6}$

|Q-5⟩ What does the equation $x^2 + 4y^2 + 2x + 16y + 3 = 0$ represent?

- ☐ Ellipse with focus $(1, -2)$
- ☐ Ellipse with centre $(1, -2)$
- ☐ Ellipse with centre $(-1, -2)$
- ☐ Ellipse with focus $(-1, -2)$

► |Q-6⟩ If c is a real number such that the function $\cos(x) + \cos(x + c)$ can take a value 2, then which of the following is/are POSSIBLE value(s) of c?

☐ $-\pi$ ☐ 0 ☐ π ☐ 46π ☐ $\frac{\pi}{2}$

#26/ NEATLY write your full name AS ON ROLLS:	TTC 2016/IITG Mathematics Evaluation II 8th JAN 2016

INSTRUCTIONS: This is a fully-objective/multiple-choice type of test. Questions marked with ► may have more than one answer correct. You need to indicate your answer by bubbling the box to the left of the correct answer. Use only a ball–point pen. The right way to fill a bubble like ☐ is as in ■. **No overwriting, no rewriting, no erasing and no cancellation**. Use supplementary sheets ONLY FOR ROUGH WORK. {Note: $\mathbb{N}, \mathbb{Z}, \mathbb{Q}$ and $\mathbb{R}$ denote the sets of natural numbers, integers, rational numbers and real numbers respectively.}

|Q-1⟩ Odometer is a device which measures distance covered by a vehicle. The odometer reading of an aircraft flying straight at various times are given as:

Time (seconds)	Odometer (metres)
0	120
1	335
0.1	142.1
0.01	122.22
0.001	120.2227
0.0001	120.02229
0.00001	120.0022296

From the given data, what is the best approximate to the speed of the aircraft in metres/second at time 0?

☐ 120 ☐ 215 ☐ 220 ☐ 221 ☐ 223 ☐ 225

|Q-2⟩ We want to make 12-digit natural numbers in which odd digits are in the odd positions (from left) and even digits are in the even positions. How many such numbers are there which contain all the digits?

☐ $\left(6\frac{6!}{2!}\right)^2$ ☐ $\frac{12!}{2!2!}$ ☐ $\left(5\frac{6!}{2!}\right)^2$ ☐ $\frac{12!}{2!2!2!}$

|Q-3⟩ Let $A \subset \mathbb{R}$ and $f : A \to \mathbb{R}$ be defined by

$$f(x) = \begin{cases} \frac{x-5}{x-2} & \text{if } x \neq 2 \\ 1 & \text{if } x = 2. \end{cases}$$

Which of the following is true?

☐ Domain(f)=$\mathbb{R}$ and Range(f)= $\mathbb{R} - \{1\}$
☐ f is not one-one but an onto mapping
☐ f is one-one but not an onto mapping
☐ Domain(f)=$\mathbb{R} - \{2\}$ and Range(f)= $\mathbb{R} - \{1\}$
☐ f is a bijective mapping

► |Q-4⟩ Balls are placed in an urn according to the following experiment: Pick one chit at random among 6 chits numbered 1,2,3,4, 5 and 6. If the number drawn is 1,2,3 or 4, then 2 black balls and 4 white balls are kept in the urn, otherwise 3 black balls and 2 white balls are kept in the urn. Balls are drawn at random repeatedly, and with replacement from this urn (after

the balls are placed once and for all).
Let A_1, A_2 be the events that the the ratio of black balls to white balls in the urn is $2:4$, $3:2$, respectively. Let B_i be the event that the i-th ball drawn is black.
Which of the following are TRUE?

- ☐ $\lim_{n\to\infty} P(A_2|B_1 \cap B_2 \cap .. \cap B_n) = 0$, $\lim_{n\to\infty} P(W_{n+1}|W_1 \cap W_2 \cap .. \cap W_n) = \frac{4}{6}$
- ☐ $\lim_{n\to\infty} P(A_1|B_1 \cap B_2 \cap .. \cap B_n) = 0$, $\lim_{n\to\infty} P(W_{n+1}|B_1 \cap B_2 \cap .. \cap B_n) = \frac{2}{5}$
- ☐ $\lim_{n\to\infty} P(A_1|B_1 \cap B_2 \cap .. \cap B_n) = 1$, $\lim_{n\to\infty} P(W_{n+1}|W_1 \cap W_2 \cap .. \cap W_n) = \frac{4}{6}$
- ☐ $\lim_{n\to\infty} P(A_2|B_1 \cap B_2 \cap .. \cap B_n) = 1$, $\lim_{n\to\infty} P(B_{n+1}|W_1 \cap W_2 \cap .. \cap W_n) = \frac{2}{6}$
- ☐ $\lim_{n\to\infty} P(A_1|B_1 \cap B_2 \cap .. \cap B_n) = 0$, $\lim_{n\to\infty} P(W_{n+1}|W_1 \cap W_2 \cap .. \cap W_n) = \frac{4}{6}$
- ☐ $\lim_{n\to\infty} P(A_1|W_1 \cap W_2 \cap .. \cap W_n) = 1$, $\lim_{n\to\infty} P(W_{n+1}|W_1 \cap W_2 \cap .. \cap W_n) = \frac{4}{6}$

|Q-5⟩ What does the equation $x^2 + 4y^2 + 2x + 16y + 3 = 0$ represent?

- ☐ Ellipse with focus $(-1, -2)$
- ☐ Ellipse with focus $(1, -2)$
- ☐ Ellipse with centre $(1, -2)$
- ☐ Ellipse with centre $(-1, -2)$

► |Q-6⟩ If c is a real number such that the function $\cos(x) + \cos(x + c)$ can take a value 2, then which of the following is/are POSSIBLE value(s) of c?

☐ $-\pi$ ☐ π ☐ 0 ☐ 46π ☐ $\frac{\pi}{2}$

#27/ NEATLY write your full name AS ON ROLLS:	TTC 2016/IITG Mathematics Evaluation II 8th JAN 2016

INSTRUCTIONS: This is a fully-objective/multiple-choice type of test. Questions marked with ► may have more than one answer correct. You need to indicate your answer by bubbling the box to the left of the correct answer. Use only a ball–point pen. The right way to fill a bubble like ☐ is as in ■. **No overwriting, no rewriting, no erasing and no cancellation**. Use supplementary sheets ONLY FOR ROUGH WORK. {Note: $\mathbb{N}, \mathbb{Z}, \mathbb{Q}$ and $\mathbb{R}$ denote the sets of natural numbers, integers, rational numbers and real numbers respectively.}

|Q-1⟩ Odometer is a device which measures distance covered by a vehicle. The odometer reading of an aircraft flying straight at various times are given as:

Time (seconds)	Odometer (metres)
0	120
1	335
0.1	142.1
0.01	122.22
0.001	120.2227
0.0001	120.02229
0.00001	120.0022296

From the given data, what is the best approximate to the speed of the aircraft in metres/second at time 0?

☐ 120 ☐ 215 ☐ 220 ☐ 221 ☐ 223 ☐ 225

|Q-2⟩ We want to make 12-digit natural numbers in which odd digits are in the odd positions (from left) and even digits are in the even positions. How many such numbers are there which contain all the digits?

☐ $\left(6\frac{6!}{2!}\right)^2$ ☐ $\frac{12!}{2!2!}$ ☐ $\left(5\frac{6!}{2!}\right)^2$ ☐ $\frac{12!}{2!2!2!}$

|Q-3⟩ Let $A \subset \mathbb{R}$ and $f : A \to \mathbb{R}$ be defined by

$$f(x) = \begin{cases} \frac{x-5}{x-2} & \text{if } x \neq 2 \\ 1 & \text{if } x = 2. \end{cases}$$

Which of the following is true?

☐ f is one-one but not an onto mapping
☐ f is not one-one but an onto mapping
☐ Domain(f)=$\mathbb{R}$ and Range(f)= $\mathbb{R} - \{1\}$
☐ f is a bijective mapping
☐ Domain(f)=$\mathbb{R} - \{2\}$ and Range(f)= $\mathbb{R} - \{1\}$

► |Q-4⟩ Balls are placed in an urn according to the following experiment: Pick one chit at random among 6 chits numbered 1,2,3,4, 5 and 6. If the number drawn is 1,2,3 or 4, then 2 black balls and 4 white balls are kept in the urn, otherwise 3 black balls and 2 white balls are kept in the urn. Balls are drawn at random repeatedly, and with replacement from this urn (after

the balls are placed once and for all).
Let A_1, A_2 be the events that the the ratio of black balls to white balls in the urn is $2:4$, $3:2$, respectively. Let B_i be the event that the i-th ball drawn is black.
Which of the following are TRUE?

- ☐ $\lim_{n\to\infty} P(A_1|W_1 \cap W_2 \cap .. \cap W_n) = 1$, $\lim_{n\to\infty} P(W_{n+1}|W_1 \cap W_2 \cap .. \cap W_n) = \frac{4}{6}$
- ☐ $\lim_{n\to\infty} P(A_2|B_1 \cap B_2 \cap .. \cap B_n) = 0$, $\lim_{n\to\infty} P(W_{n+1}|W_1 \cap W_2 \cap .. \cap W_n) = \frac{4}{6}$
- ☐ $\lim_{n\to\infty} P(A_1|B_1 \cap B_2 \cap .. \cap B_n) = 1$, $\lim_{n\to\infty} P(W_{n+1}|W_1 \cap W_2 \cap .. \cap W_n) = \frac{4}{6}$
- ☐ $\lim_{n\to\infty} P(A_1|B_1 \cap B_2 \cap .. \cap B_n) = 0$, $\lim_{n\to\infty} P(W_{n+1}|B_1 \cap B_2 \cap .. \cap B_n) = \frac{2}{5}$
- ☐ $\lim_{n\to\infty} P(A_1|B_1 \cap B_2 \cap .. \cap B_n) = 0$, $\lim_{n\to\infty} P(W_{n+1}|W_1 \cap W_2 \cap .. \cap W_n) = \frac{4}{6}$
- ☐ $\lim_{n\to\infty} P(A_2|B_1 \cap B_2 \cap .. \cap B_n) = 1$, $\lim_{n\to\infty} P(B_{n+1}|W_1 \cap W_2 \cap .. \cap W_n) = \frac{2}{6}$

|Q-5⟩ What does the equation $x^2 + 4y^2 + 2x + 16y + 3 = 0$ represent?

- ☐ Ellipse with focus $(1, -2)$
- ☐ Ellipse with centre $(1, -2)$
- ☐ Ellipse with centre $(-1, -2)$
- ☐ Ellipse with focus $(-1, -2)$

► |Q-6⟩ If c is a real number such that the function $\cos(x) + \cos(x + c)$ can take a value 2, then which of the following is/are POSSIBLE value(s) of c?

☐ π ☐ 46π ☐ $\frac{\pi}{2}$ ☐ 0 ☐ $-\pi$

#28/ NEATLY write your full name AS ON ROLLS:	TTC 2016/IITG Mathematics Evaluation II 8th JAN 2016

INSTRUCTIONS: This is a fully-objective/multiple-choice type of test. Questions marked with ► may have more than one answer correct. You need to indicate your answer by bubbling the box to the left of the correct answer. Use only a ball–point pen. The right way to fill a bubble like ☐ is as in ■. **No overwriting, no rewriting, no erasing and no cancellation**. Use supplementary sheets ONLY FOR ROUGH WORK. {Note: $\mathbb{N}, \mathbb{Z}, \mathbb{Q}$ and $\mathbb{R}$ denote the sets of natural numbers, integers, rational numbers and real numbers respectively.}

|Q-1⟩ Odometer is a device which measures distance covered by a vehicle. The odometer reading of an aircraft flying straight at various times are given as:

Time (seconds)	Odometer (metres)
0	120
1	335
0.1	142.1
0.01	122.22
0.001	120.2227
0.0001	120.02229
0.00001	120.0022296

From the given data, what is the best approximate to the speed of the aircraft in metres/second at time 0?

☐ 120 ☐ 215 ☐ 220 ☐ 221 ☐ 223 ☐ 225

|Q-2⟩ We want to make 12-digit natural numbers in which odd digits are in the odd positions (from left) and even digits are in the even positions. How many such numbers are there which contain all the digits?

☐ $\left(6\frac{6!}{2!}\right)^2$ ☐ $\frac{12!}{2!2!}$ ☐ $\left(5\frac{6!}{2!}\right)^2$ ☐ $\frac{12!}{2!2!2!}$

|Q-3⟩ Let $A \subset \mathbb{R}$ and $f : A \to \mathbb{R}$ be defined by

$$f(x) = \begin{cases} \frac{x-5}{x-2} & \text{if } x \neq 2 \\ 1 & \text{if } x = 2. \end{cases}$$

Which of the following is true?

☐ f is one-one but not an onto mapping
☐ f is not one-one but an onto mapping
☐ Domain(f)=$\mathbb{R} - \{2\}$ and Range(f)= $\mathbb{R} - \{1\}$
☐ Domain(f)=$\mathbb{R}$ and Range(f)= $\mathbb{R} - \{1\}$
☐ f is a bijective mapping

► |Q-4⟩ Balls are placed in an urn according to the following experiment: Pick one chit at random among 6 chits numbered 1,2,3,4, 5 and 6. If the number drawn is 1,2,3 or 4, then 2 black balls and 4 white balls are kept in the urn, otherwise 3 black balls and 2 white balls are kept in the urn. Balls are drawn at random repeatedly, and with replacement from this urn (after

the balls are placed once and for all).
Let A_1, A_2 be the events that the the ratio of black balls to white balls in the urn is $2:4$, $3:2$, respectively. Let B_i be the event that the i-th ball drawn is black.
Which of the following are TRUE?

- ☐ $\lim_{n\to\infty} P(A_2|B_1 \cap B_2 \cap .. \cap B_n) = 1$, $\lim_{n\to\infty} P(B_{n+1}|W_1 \cap W_2 \cap .. \cap W_n) = \frac{2}{6}$
- ☐ $\lim_{n\to\infty} P(A_1|W_1 \cap W_2 \cap .. \cap W_n) = 1$, $\lim_{n\to\infty} P(W_{n+1}|W_1 \cap W_2 \cap .. \cap W_n) = \frac{4}{6}$
- ☐ $\lim_{n\to\infty} P(A_2|B_1 \cap B_2 \cap .. \cap B_n) = 0$, $\lim_{n\to\infty} P(W_{n+1}|W_1 \cap W_2 \cap .. \cap W_n) = \frac{4}{6}$
- ☐ $\lim_{n\to\infty} P(A_1|B_1 \cap B_2 \cap .. \cap B_n) = 0$, $\lim_{n\to\infty} P(W_{n+1}|W_1 \cap W_2 \cap .. \cap W_n) = \frac{4}{6}$
- ☐ $\lim_{n\to\infty} P(A_1|B_1 \cap B_2 \cap .. \cap B_n) = 1$, $\lim_{n\to\infty} P(W_{n+1}|W_1 \cap W_2 \cap .. \cap W_n) = \frac{4}{6}$
- ☐ $\lim_{n\to\infty} P(A_1|B_1 \cap B_2 \cap .. \cap B_n) = 0$, $\lim_{n\to\infty} P(W_{n+1}|B_1 \cap B_2 \cap .. \cap B_n) = \frac{2}{5}$

|Q-5⟩ What does the equation $x^2 + 4y^2 + 2x + 16y + 3 = 0$ represent?

- ☐ Ellipse with focus $(1, -2)$
- ☐ Ellipse with centre $(1, -2)$
- ☐ Ellipse with focus $(-1, -2)$
- ☐ Ellipse with centre $(-1, -2)$

► |Q-6⟩ If c is a real number such that the function $\cos(x) + \cos(x + c)$ can take a value 2, then which of the following is/are POSSIBLE value(s) of c?

☐ π ☐ $\frac{\pi}{2}$ ☐ 0 ☐ 46π ☐ $-\pi$

#29/ NEATLY write your full name AS ON ROLLS:	TTC 2016/IITG Mathematics Evaluation II 8th JAN 2016

INSTRUCTIONS: This is a fully-objective/multiple-choice type of test. Questions marked with ► may have more than one answer correct. You need to indicate your answer by bubbling the box to the left of the correct answer. Use only a ball–point pen. The right way to fill a bubble like ☐ is as in ■. **No overwriting, no rewriting, no erasing and no cancellation**. Use supplementary sheets ONLY FOR ROUGH WORK. {Note: $\mathbb{N}, \mathbb{Z}, \mathbb{Q}$ and $\mathbb{R}$ denote the sets of natural numbers, integers, rational numbers and real numbers respectively.}

|Q-1⟩ Odometer is a device which measures distance covered by a vehicle. The odometer reading of an aircraft flying straight at various times are given as:

Time (seconds)	Odometer (metres)
0	120
1	335
0.1	142.1
0.01	122.22
0.001	120.2227
0.0001	120.02229
0.00001	120.0022296

From the given data, what is the best approximate to the speed of the aircraft in metres/second at time 0?

☐ 120 ☐ 215 ☐ 220 ☐ 221 ☐ 223 ☐ 225

|Q-2⟩ We want to make 12-digit natural numbers in which odd digits are in the odd positions (from left) and even digits are in the even positions. How many such numbers are there which contain all the digits?

☐ $\left(6\frac{6!}{2!}\right)^2$ ☐ $\frac{12!}{2!2!}$ ☐ $\left(5\frac{6!}{2!}\right)^2$ ☐ $\frac{12!}{2!2!2!}$

|Q-3⟩ Let $A \subset \mathbb{R}$ and $f : A \to \mathbb{R}$ be defined by

$$f(x) = \begin{cases} \frac{x-5}{x-2} & \text{if } x \neq 2 \\ 1 & \text{if } x = 2. \end{cases}$$

Which of the following is true?

☐ Domain(f)=$\mathbb{R}$ and Range(f)= $\mathbb{R} - \{1\}$
☐ Domain(f)=$\mathbb{R} - \{2\}$ and Range(f)= $\mathbb{R} - \{1\}$
☐ f is one-one but not an onto mapping
☐ f is a bijective mapping
☐ f is not one-one but an onto mapping

► |Q-4⟩ Balls are placed in an urn according to the following experiment: Pick one chit at random among 6 chits numbered 1,2,3,4, 5 and 6. If the number drawn is 1,2,3 or 4, then 2 black balls and 4 white balls are kept in the urn, otherwise 3 black balls and 2 white balls are kept in the urn. Balls are drawn at random repeatedly, and with replacement from this urn (after

the balls are placed once and for all).
Let A_1, A_2 be the events that the the ratio of black balls to white balls in the urn is $2:4$, $3:2$, respectively. Let B_i be the event that the i-th ball drawn is black.
Which of the following are TRUE?

- ☐ $\lim_{n\to\infty} P(A_2|B_1 \cap B_2 \cap .. \cap B_n) = 0$, $\lim_{n\to\infty} P(W_{n+1}|W_1 \cap W_2 \cap .. \cap W_n) = \frac{4}{6}$
- ☐ $\lim_{n\to\infty} P(A_1|B_1 \cap B_2 \cap .. \cap B_n) = 1$, $\lim_{n\to\infty} P(W_{n+1}|W_1 \cap W_2 \cap .. \cap W_n) = \frac{4}{6}$
- ☐ $\lim_{n\to\infty} P(A_1|B_1 \cap B_2 \cap .. \cap B_n) = 0$, $\lim_{n\to\infty} P(W_{n+1}|B_1 \cap B_2 \cap .. \cap B_n) = \frac{2}{5}$
- ☐ $\lim_{n\to\infty} P(A_2|B_1 \cap B_2 \cap .. \cap B_n) = 1$, $\lim_{n\to\infty} P(B_{n+1}|W_1 \cap W_2 \cap .. \cap W_n) = \frac{2}{6}$
- ☐ $\lim_{n\to\infty} P(A_1|W_1 \cap W_2 \cap .. \cap W_n) = 1$, $\lim_{n\to\infty} P(W_{n+1}|W_1 \cap W_2 \cap .. \cap W_n) = \frac{4}{6}$
- ☐ $\lim_{n\to\infty} P(A_1|B_1 \cap B_2 \cap .. \cap B_n) = 0$, $\lim_{n\to\infty} P(W_{n+1}|W_1 \cap W_2 \cap .. \cap W_n) = \frac{4}{6}$

|Q-5⟩ What does the equation $x^2 + 4y^2 + 2x + 16y + 3 = 0$ represent?

- ☐ Ellipse with focus $(-1, -2)$
- ☐ Ellipse with centre $(-1, -2)$
- ☐ Ellipse with centre $(1, -2)$
- ☐ Ellipse with focus $(1, -2)$

► |Q-6⟩ If c is a real number such that the function $\cos(x) + \cos(x + c)$ can take a value 2, then which of the following is/are POSSIBLE value(s) of c?

☐ 46π ☐ 0 ☐ $\frac{\pi}{2}$ ☐ $-\pi$ ☐ π

#30/ NEATLY write your full name AS ON ROLLS:	TTC 2016/IITG Mathematics Evaluation II 8th JAN 2016

INSTRUCTIONS: This is a fully-objective/multiple-choice type of test. Questions marked with ► may have more than one answer correct. You need to indicate your answer by bubbling the box to the left of the correct answer. Use only a ball–point pen. The right way to fill a bubble like ☐ is as in ■. **No overwriting, no rewriting, no erasing and no cancellation**. Use supplementary sheets ONLY FOR ROUGH WORK. {Note: $\mathbb{N}, \mathbb{Z}, \mathbb{Q}$ and $\mathbb{R}$ denote the sets of natural numbers, integers, rational numbers and real numbers respectively.}

|Q-1⟩ Odometer is a device which measures distance covered by a vehicle. The odometer reading of an aircraft flying straight at various times are given as:

Time (seconds)	Odometer (metres)
0	120
1	335
0.1	142.1
0.01	122.22
0.001	120.2227
0.0001	120.02229
0.00001	120.0022296

From the given data, what is the best approximate to the speed of the aircraft in metres/second at time 0?

☐ 120 ☐ 215 ☐ 220 ☐ 221 ☐ 223 ☐ 225

|Q-2⟩ We want to make 12-digit natural numbers in which odd digits are in the odd positions (from left) and even digits are in the even positions. How many such numbers are there which contain all the digits?

☐ $\left(6\frac{6!}{2!}\right)^2$ ☐ $\frac{12!}{2!2!}$ ☐ $\left(5\frac{6!}{2!}\right)^2$ ☐ $\frac{12!}{2!2!2!}$

|Q-3⟩ Let $A \subset \mathbb{R}$ and $f : A \to \mathbb{R}$ be defined by

$$f(x) = \begin{cases} \frac{x-5}{x-2} & \text{if } x \neq 2 \\ 1 & \text{if } x = 2. \end{cases}$$

Which of the following is true?

☐ f is a bijective mapping
☐ Domain(f)=$\mathbb{R}$ and Range(f)= $\mathbb{R} - \{1\}$
☐ f is not one-one but an onto mapping
☐ f is one-one but not an onto mapping
☐ Domain(f)=$\mathbb{R} - \{2\}$ and Range(f)= $\mathbb{R} - \{1\}$

► |Q-4⟩ Balls are placed in an urn according to the following experiment: Pick one chit at random among 6 chits numbered 1,2,3,4, 5 and 6. If the number drawn is 1,2,3 or 4, then 2 black balls and 4 white balls are kept in the urn, otherwise 3 black balls and 2 white balls are kept in the urn. Balls are drawn at random repeatedly, and with replacement from this urn (after

the balls are placed once and for all).
Let A_1, A_2 be the events that the the ratio of black balls to white balls in the urn is $2:4$, $3:2$, respectively. Let B_i be the event that the i-th ball drawn is black.
Which of the following are TRUE?

- ☐ $\lim_{n\to\infty} P(A_1|W_1 \cap W_2 \cap .. \cap W_n) = 1$, $\lim_{n\to\infty} P(W_{n+1}|W_1 \cap W_2 \cap .. \cap W_n) = \frac{4}{6}$
- ☐ $\lim_{n\to\infty} P(A_1|B_1 \cap B_2 \cap .. \cap B_n) = 0$, $\lim_{n\to\infty} P(W_{n+1}|B_1 \cap B_2 \cap .. \cap B_n) = \frac{2}{5}$
- ☐ $\lim_{n\to\infty} P(A_1|B_1 \cap B_2 \cap .. \cap B_n) = 1$, $\lim_{n\to\infty} P(W_{n+1}|W_1 \cap W_2 \cap .. \cap W_n) = \frac{4}{6}$
- ☐ $\lim_{n\to\infty} P(A_2|B_1 \cap B_2 \cap .. \cap B_n) = 0$, $\lim_{n\to\infty} P(W_{n+1}|W_1 \cap W_2 \cap .. \cap W_n) = \frac{4}{6}$
- ☐ $\lim_{n\to\infty} P(A_1|B_1 \cap B_2 \cap .. \cap B_n) = 0$, $\lim_{n\to\infty} P(W_{n+1}|W_1 \cap W_2 \cap .. \cap W_n) = \frac{4}{6}$
- ☐ $\lim_{n\to\infty} P(A_2|B_1 \cap B_2 \cap .. \cap B_n) = 1$, $\lim_{n\to\infty} P(B_{n+1}|W_1 \cap W_2 \cap .. \cap W_n) = \frac{2}{6}$

|Q-5⟩ What does the equation $x^2 + 4y^2 + 2x + 16y + 3 = 0$ represent?

- ☐ Ellipse with focus $(1, -2)$
- ☐ Ellipse with centre $(1, -2)$
- ☐ Ellipse with centre $(-1, -2)$
- ☐ Ellipse with focus $(-1, -2)$

► |Q-6⟩ If c is a real number such that the function $\cos(x) + \cos(x + c)$ can take a value 2, then which of the following is/are POSSIBLE value(s) of c?

☐ 46π ☐ $\frac{\pi}{2}$ ☐ 0 ☐ $-\pi$ ☐ π

#31/ NEATLY write your full name AS ON ROLLS:	TTC 2016/IITG Mathematics Evaluation II 8th JAN 2016

INSTRUCTIONS: This is a fully-objective/multiple-choice type of test. Questions marked with ► may have more than one answer correct. You need to indicate your answer by bubbling the box to the left of the correct answer. Use only a ball–point pen. The right way to fill a bubble like ☐ is as in ■. **No overwriting, no rewriting, no erasing and no cancellation**. Use supplementary sheets ONLY FOR ROUGH WORK. {Note: $\mathbb{N}, \mathbb{Z}, \mathbb{Q}$ and $\mathbb{R}$ denote the sets of natural numbers, integers, rational numbers and real numbers respectively.}

|Q-1⟩ Odometer is a device which measures distance covered by a vehicle. The odometer reading of an aircraft flying straight at various times are given as:

Time (seconds)	Odometer (metres)
0	120
1	335
0.1	142.1
0.01	122.22
0.001	120.2227
0.0001	120.02229
0.00001	120.0022296

From the given data, what is the best approximate to the speed of the aircraft in metres/second at time 0?

☐ 120 ☐ 215 ☐ 220 ☐ 221 ☐ 223 ☐ 225

|Q-2⟩ We want to make 12-digit natural numbers in which odd digits are in the odd positions (from left) and even digits are in the even positions. How many such numbers are there which contain all the digits?

☐ $\left(6\frac{6!}{2!}\right)^2$ ☐ $\frac{12!}{2!2!}$ ☐ $\left(5\frac{6!}{2!}\right)^2$ ☐ $\frac{12!}{2!2!2!}$

|Q-3⟩ Let $A \subset \mathbb{R}$ and $f : A \to \mathbb{R}$ be defined by

$$f(x) = \begin{cases} \frac{x-5}{x-2} & \text{if } x \neq 2 \\ 1 & \text{if } x = 2. \end{cases}$$

Which of the following is true?

☐ f is one-one but not an onto mapping
☐ Domain(f)=$\mathbb{R} - \{2\}$ and Range(f)= $\mathbb{R} - \{1\}$
☐ Domain(f)=$\mathbb{R}$ and Range(f)= $\mathbb{R} - \{1\}$
☐ f is not one-one but an onto mapping
☐ f is a bijective mapping

► |Q-4⟩ Balls are placed in an urn according to the following experiment: Pick one chit at random among 6 chits numbered 1,2,3,4, 5 and 6. If the number drawn is 1,2,3 or 4, then 2 black balls and 4 white balls are kept in the urn, otherwise 3 black balls and 2 white balls are kept in the urn. Balls are drawn at random repeatedly, and with replacement from this urn (after

the balls are placed once and for all).
Let A_1, A_2 be the events that the the ratio of black balls to white balls in the urn is $2:4$, $3:2$, respectively. Let B_i be the event that the i-th ball drawn is black.
Which of the following are TRUE?

- ☐ $\lim_{n\to\infty} P(A_1|B_1 \cap B_2 \cap .. \cap B_n) = 0$, $\lim_{n\to\infty} P(W_{n+1}|B_1 \cap B_2 \cap .. \cap B_n) = \frac{2}{5}$
- ☐ $\lim_{n\to\infty} P(A_1|B_1 \cap B_2 \cap .. \cap B_n) = 0$, $\lim_{n\to\infty} P(W_{n+1}|W_1 \cap W_2 \cap .. \cap W_n) = \frac{4}{6}$
- ☐ $\lim_{n\to\infty} P(A_2|B_1 \cap B_2 \cap .. \cap B_n) = 0$, $\lim_{n\to\infty} P(W_{n+1}|W_1 \cap W_2 \cap .. \cap W_n) = \frac{4}{6}$
- ☐ $\lim_{n\to\infty} P(A_2|B_1 \cap B_2 \cap .. \cap B_n) = 1$, $\lim_{n\to\infty} P(B_{n+1}|W_1 \cap W_2 \cap .. \cap W_n) = \frac{2}{6}$
- ☐ $\lim_{n\to\infty} P(A_1|B_1 \cap B_2 \cap .. \cap B_n) = 1$, $\lim_{n\to\infty} P(W_{n+1}|W_1 \cap W_2 \cap .. \cap W_n) = \frac{4}{6}$
- ☐ $\lim_{n\to\infty} P(A_1|W_1 \cap W_2 \cap .. \cap W_n) = 1$, $\lim_{n\to\infty} P(W_{n+1}|W_1 \cap W_2 \cap .. \cap W_n) = \frac{4}{6}$

|Q-5⟩ What does the equation $x^2 + 4y^2 + 2x + 16y + 3 = 0$ represent?

- ☐ Ellipse with centre $(-1, -2)$
- ☐ Ellipse with centre $(1, -2)$
- ☐ Ellipse with focus $(-1, -2)$
- ☐ Ellipse with focus $(1, -2)$

► |Q-6⟩ If c is a real number such that the function $\cos(x) + \cos(x + c)$ can take a value 2, then which of the following is/are POSSIBLE value(s) of c?

☐ 0 ☐ 46π ☐ $-\pi$ ☐ $\frac{\pi}{2}$ ☐ π

#32/ NEATLY write your full name AS ON ROLLS:	TTC 2016/IITG Mathematics Evaluation II 8th JAN 2016

INSTRUCTIONS: This is a fully-objective/multiple-choice type of test. Questions marked with ► may have more than one answer correct. You need to indicate your answer by bubbling the box to the left of the correct answer. Use only a ball–point pen. The right way to fill a bubble like ☐ is as in ■. **No overwriting, no rewriting, no erasing and no cancellation**. Use supplementary sheets ONLY FOR ROUGH WORK. {Note: $\mathbb{N}, \mathbb{Z}, \mathbb{Q}$ and $\mathbb{R}$ denote the sets of natural numbers, integers, rational numbers and real numbers respectively.}

|Q-1⟩ Odometer is a device which measures distance covered by a vehicle. The odometer reading of an aircraft flying straight at various times are given as:

Time (seconds)	Odometer (metres)
0	120
1	335
0.1	142.1
0.01	122.22
0.001	120.2227
0.0001	120.02229
0.00001	120.0022296

From the given data, what is the best approximate to the speed of the aircraft in metres/second at time 0?

☐ 120 ☐ 215 ☐ 220 ☐ 221 ☐ 223 ☐ 225

|Q-2⟩ We want to make 12-digit natural numbers in which odd digits are in the odd positions (from left) and even digits are in the even positions. How many such numbers are there which contain all the digits?

☐ $\left(6\frac{6!}{2!}\right)^2$ ☐ $\frac{12!}{2!2!}$ ☐ $\left(5\frac{6!}{2!}\right)^2$ ☐ $\frac{12!}{2!2!2!}$

|Q-3⟩ Let $A \subset \mathbb{R}$ and $f : A \to \mathbb{R}$ be defined by

$$f(x) = \begin{cases} \frac{x-5}{x-2} & \text{if } x \neq 2 \\ 1 & \text{if } x = 2. \end{cases}$$

Which of the following is true?

☐ f is one-one but not an onto mapping
☐ Domain(f)=$\mathbb{R} - \{2\}$ and Range(f)= $\mathbb{R} - \{1\}$
☐ f is a bijective mapping
☐ Domain(f)=$\mathbb{R}$ and Range(f)= $\mathbb{R} - \{1\}$
☐ f is not one-one but an onto mapping

► |Q-4⟩ Balls are placed in an urn according to the following experiment: Pick one chit at random among 6 chits numbered 1,2,3,4, 5 and 6. If the number drawn is 1,2,3 or 4, then 2 black balls and 4 white balls are kept in the urn, otherwise 3 black balls and 2 white balls are kept in the urn. Balls are drawn at random repeatedly, and with replacement from this urn (after

the balls are placed once and for all).
Let A_1, A_2 be the events that the the ratio of black balls to white balls in the urn is $2:4$, $3:2$, respectively. Let B_i be the event that the i-th ball drawn is black.
Which of the following are TRUE?

- ☐ $\lim_{n\to\infty} P(A_1|B_1 \cap B_2 \cap .. \cap B_n) = 0$, $\lim_{n\to\infty} P(W_{n+1}|W_1 \cap W_2 \cap .. \cap W_n) = \frac{4}{6}$
- ☐ $\lim_{n\to\infty} P(A_1|W_1 \cap W_2 \cap .. \cap W_n) = 1$, $\lim_{n\to\infty} P(W_{n+1}|W_1 \cap W_2 \cap .. \cap W_n) = \frac{4}{6}$
- ☐ $\lim_{n\to\infty} P(A_1|B_1 \cap B_2 \cap .. \cap B_n) = 0$, $\lim_{n\to\infty} P(W_{n+1}|B_1 \cap B_2 \cap .. \cap B_n) = \frac{2}{5}$
- ☐ $\lim_{n\to\infty} P(A_2|B_1 \cap B_2 \cap .. \cap B_n) = 0$, $\lim_{n\to\infty} P(W_{n+1}|W_1 \cap W_2 \cap .. \cap W_n) = \frac{4}{6}$
- ☐ $\lim_{n\to\infty} P(A_1|B_1 \cap B_2 \cap .. \cap B_n) = 1$, $\lim_{n\to\infty} P(W_{n+1}|W_1 \cap W_2 \cap .. \cap W_n) = \frac{4}{6}$
- ☐ $\lim_{n\to\infty} P(A_2|B_1 \cap B_2 \cap .. \cap B_n) = 1$, $\lim_{n\to\infty} P(B_{n+1}|W_1 \cap W_2 \cap .. \cap W_n) = \frac{2}{6}$

|Q-5⟩ What does the equation $x^2 + 4y^2 + 2x + 16y + 3 = 0$ represent?

- ☐ Ellipse with focus $(1, -2)$
- ☐ Ellipse with centre $(-1, -2)$
- ☐ Ellipse with focus $(-1, -2)$
- ☐ Ellipse with centre $(1, -2)$

► |Q-6⟩ If c is a real number such that the function $\cos(x) + \cos(x + c)$ can take a value 2, then which of the following is/are POSSIBLE value(s) of c?

☐ 0 ☐ 46π ☐ $-\pi$ ☐ $\frac{\pi}{2}$ ☐ π

#33/ NEATLY write your full name AS ON ROLLS:	TTC 2016/IITG Mathematics Evaluation II 8th JAN 2016

INSTRUCTIONS: This is a fully-objective/multiple-choice type of test. Questions marked with ► may have more than one answer correct. You need to indicate your answer by bubbling the box to the left of the correct answer. Use only a ball–point pen. The right way to fill a bubble like ☐ is as in ■. **No overwriting, no rewriting, no erasing and no cancellation**. Use supplementary sheets ONLY FOR ROUGH WORK. {Note: $\mathbb{N}, \mathbb{Z}, \mathbb{Q}$ and $\mathbb{R}$ denote the sets of natural numbers, integers, rational numbers and real numbers respectively.}

|Q-1⟩ Odometer is a device which measures distance covered by a vehicle. The odometer reading of an aircraft flying straight at various times are given as:

Time (seconds)	Odometer (metres)
0	120
1	335
0.1	142.1
0.01	122.22
0.001	120.2227
0.0001	120.02229
0.00001	120.0022296

From the given data, what is the best approximate to the speed of the aircraft in metres/second at time 0?

☐ 120 ☐ 215 ☐ 220 ☐ 221 ☐ 223 ☐ 225

|Q-2⟩ We want to make 12-digit natural numbers in which odd digits are in the odd positions (from left) and even digits are in the even positions. How many such numbers are there which contain all the digits?

☐ $\left(6\frac{6!}{2!}\right)^2$ ☐ $\frac{12!}{2!2!}$ ☐ $\left(5\frac{6!}{2!}\right)^2$ ☐ $\frac{12!}{2!2!2!}$

|Q-3⟩ Let $A \subset \mathbb{R}$ and $f : A \to \mathbb{R}$ be defined by

$$f(x) = \begin{cases} \frac{x-5}{x-2} & \text{if } x \neq 2 \\ 1 & \text{if } x = 2. \end{cases}$$

Which of the following is true?

☐ Domain(f)=$\mathbb{R} - \{2\}$ and Range(f)= $\mathbb{R} - \{1\}$
☐ f is one-one but not an onto mapping
☐ Domain(f)=$\mathbb{R}$ and Range(f)= $\mathbb{R} - \{1\}$
☐ f is a bijective mapping
☐ f is not one-one but an onto mapping

► |Q-4⟩ Balls are placed in an urn according to the following experiment: Pick one chit at random among 6 chits numbered 1,2,3,4, 5 and 6. If the number drawn is 1,2,3 or 4, then 2 black balls and 4 white balls are kept in the urn, otherwise 3 black balls and 2 white balls are kept in the urn. Balls are drawn at random repeatedly, and with replacement from this urn (after

the balls are placed once and for all).
Let A_1, A_2 be the events that the the ratio of black balls to white balls in the urn is $2:4$, $3:2$, respectively. Let B_i be the event that the i-th ball drawn is black.
Which of the following are TRUE?

- ☐ $\lim_{n\to\infty} P(A_2|B_1 \cap B_2 \cap .. \cap B_n) = 1$, $\lim_{n\to\infty} P(B_{n+1}|W_1 \cap W_2 \cap .. \cap W_n) = \frac{2}{6}$
- ☐ $\lim_{n\to\infty} P(A_1|B_1 \cap B_2 \cap .. \cap B_n) = 0$, $\lim_{n\to\infty} P(W_{n+1}|B_1 \cap B_2 \cap .. \cap B_n) = \frac{2}{5}$
- ☐ $\lim_{n\to\infty} P(A_1|W_1 \cap W_2 \cap .. \cap W_n) = 1$, $\lim_{n\to\infty} P(W_{n+1}|W_1 \cap W_2 \cap .. \cap W_n) = \frac{4}{6}$
- ☐ $\lim_{n\to\infty} P(A_1|B_1 \cap B_2 \cap .. \cap B_n) = 1$, $\lim_{n\to\infty} P(W_{n+1}|W_1 \cap W_2 \cap .. \cap W_n) = \frac{4}{6}$
- ☐ $\lim_{n\to\infty} P(A_2|B_1 \cap B_2 \cap .. \cap B_n) = 0$, $\lim_{n\to\infty} P(W_{n+1}|W_1 \cap W_2 \cap .. \cap W_n) = \frac{4}{6}$
- ☐ $\lim_{n\to\infty} P(A_1|B_1 \cap B_2 \cap .. \cap B_n) = 0$, $\lim_{n\to\infty} P(W_{n+1}|W_1 \cap W_2 \cap .. \cap W_n) = \frac{4}{6}$

|Q-5⟩ What does the equation $x^2 + 4y^2 + 2x + 16y + 3 = 0$ represent?

- ☐ Ellipse with centre $(1, -2)$
- ☐ Ellipse with focus $(-1, -2)$
- ☐ Ellipse with focus $(1, -2)$
- ☐ Ellipse with centre $(-1, -2)$

► |Q-6⟩ If c is a real number such that the function $\cos(x) + \cos(x + c)$ can take a value 2, then which of the following is/are POSSIBLE value(s) of c?

☐ $\frac{\pi}{2}$ ☐ $-\pi$ ☐ 46π ☐ π ☐ 0

#34/ NEATLY write your full name AS ON ROLLS:	TTC 2016/IITG Mathematics Evaluation II 8th JAN 2016

INSTRUCTIONS: This is a fully-objective/multiple-choice type of test. Questions marked with ► may have more than one answer correct. You need to indicate your answer by bubbling the box to the left of the correct answer. Use only a ball–point pen. The right way to fill a bubble like ☐ is as in ■. **No overwriting, no rewriting, no erasing and no cancellation**. Use supplementary sheets ONLY FOR ROUGH WORK. {Note: $\mathbb{N}, \mathbb{Z}, \mathbb{Q}$ and $\mathbb{R}$ denote the sets of natural numbers, integers, rational numbers and real numbers respectively.}

|Q-1⟩ Odometer is a device which measures distance covered by a vehicle. The odometer reading of an aircraft flying straight at various times are given as:

Time (seconds)	Odometer (metres)
0	120
1	335
0.1	142.1
0.01	122.22
0.001	120.2227
0.0001	120.02229
0.00001	120.0022296

From the given data, what is the best approximate to the speed of the aircraft in metres/second at time 0?

☐ 120 ☐ 215 ☐ 220 ☐ 221 ☐ 223 ☐ 225

|Q-2⟩ We want to make 12-digit natural numbers in which odd digits are in the odd positions (from left) and even digits are in the even positions. How many such numbers are there which contain all the digits?

☐ $\left(6\frac{6!}{2!}\right)^2$ ☐ $\frac{12!}{2!2!}$ ☐ $\left(5\frac{6!}{2!}\right)^2$ ☐ $\frac{12!}{2!2!2!}$

|Q-3⟩ Let $A \subset \mathbb{R}$ and $f : A \to \mathbb{R}$ be defined by

$$f(x) = \begin{cases} \frac{x-5}{x-2} & \text{if } x \neq 2 \\ 1 & \text{if } x = 2. \end{cases}$$

Which of the following is true?

☐ Domain(f)=$\mathbb{R} - \{2\}$ and Range(f)= $\mathbb{R} - \{1\}$
☐ f is a bijective mapping
☐ f is not one-one but an onto mapping
☐ f is one-one but not an onto mapping
☐ Domain(f)=$\mathbb{R}$ and Range(f)= $\mathbb{R} - \{1\}$

► |Q-4⟩ Balls are placed in an urn according to the following experiment: Pick one chit at random among 6 chits numbered 1,2,3,4, 5 and 6. If the number drawn is 1,2,3 or 4, then 2 black balls and 4 white balls are kept in the urn, otherwise 3 black balls and 2 white balls are kept in the urn. Balls are drawn at random repeatedly, and with replacement from this urn (after

the balls are placed once and for all).
Let A_1, A_2 be the events that the the ratio of black balls to white balls in the urn is $2:4$, $3:2$, respectively. Let B_i be the event that the i-th ball drawn is black.
Which of the following are TRUE?

- ☐ $\lim_{n\to\infty} P(A_1|B_1 \cap B_2 \cap .. \cap B_n) = 0$, $\lim_{n\to\infty} P(W_{n+1}|W_1 \cap W_2 \cap .. \cap W_n) = \frac{4}{6}$
- ☐ $\lim_{n\to\infty} P(A_2|B_1 \cap B_2 \cap .. \cap B_n) = 0$, $\lim_{n\to\infty} P(W_{n+1}|W_1 \cap W_2 \cap .. \cap W_n) = \frac{4}{6}$
- ☐ $\lim_{n\to\infty} P(A_1|B_1 \cap B_2 \cap .. \cap B_n) = 0$, $\lim_{n\to\infty} P(W_{n+1}|B_1 \cap B_2 \cap .. \cap B_n) = \frac{2}{5}$
- ☐ $\lim_{n\to\infty} P(A_1|B_1 \cap B_2 \cap .. \cap B_n) = 1$, $\lim_{n\to\infty} P(W_{n+1}|W_1 \cap W_2 \cap .. \cap W_n) = \frac{4}{6}$
- ☐ $\lim_{n\to\infty} P(A_1|W_1 \cap W_2 \cap .. \cap W_n) = 1$, $\lim_{n\to\infty} P(W_{n+1}|W_1 \cap W_2 \cap .. \cap W_n) = \frac{4}{6}$
- ☐ $\lim_{n\to\infty} P(A_2|B_1 \cap B_2 \cap .. \cap B_n) = 1$, $\lim_{n\to\infty} P(B_{n+1}|W_1 \cap W_2 \cap .. \cap W_n) = \frac{2}{6}$

|Q-5⟩ What does the equation $x^2 + 4y^2 + 2x + 16y + 3 = 0$ represent?

- ☐ Ellipse with focus $(1, -2)$
- ☐ Ellipse with centre $(1, -2)$
- ☐ Ellipse with centre $(-1, -2)$
- ☐ Ellipse with focus $(-1, -2)$

► |Q-6⟩ If c is a real number such that the function $\cos(x) + \cos(x + c)$ can take a value 2, then which of the following is/are POSSIBLE value(s) of c?

☐ $\frac{\pi}{2}$ ☐ $-\pi$ ☐ π ☐ 46π ☐ 0

#35/ NEATLY write your full name AS ON ROLLS:	TTC 2016/IITG Mathematics Evaluation II 8th JAN 2016

INSTRUCTIONS: This is a fully-objective/multiple-choice type of test. Questions marked with ► may have more than one answer correct. You need to indicate your answer by bubbling the box to the left of the correct answer. Use only a ball–point pen. The right way to fill a bubble like ☐ is as in ■. **No overwriting, no rewriting, no erasing and no cancellation**. Use supplementary sheets ONLY FOR ROUGH WORK. {Note: $\mathbb{N}, \mathbb{Z}, \mathbb{Q}$ and $\mathbb{R}$ denote the sets of natural numbers, integers, rational numbers and real numbers respectively.}

|Q-1⟩ Odometer is a device which measures distance covered by a vehicle. The odometer reading of an aircraft flying straight at various times are given as:

Time (seconds)	Odometer (metres)
0	120
1	335
0.1	142.1
0.01	122.22
0.001	120.2227
0.0001	120.02229
0.00001	120.0022296

From the given data, what is the best approximate to the speed of the aircraft in metres/second at time 0?

☐ 120 ☐ 215 ☐ 220 ☐ 221 ☐ 223 ☐ 225

|Q-2⟩ We want to make 12-digit natural numbers in which odd digits are in the odd positions (from left) and even digits are in the even positions. How many such numbers are there which contain all the digits?

☐ $\left(6\frac{6!}{2!}\right)^2$ ☐ $\frac{12!}{2!2!}$ ☐ $\left(5\frac{6!}{2!}\right)^2$ ☐ $\frac{12!}{2!2!2!}$

|Q-3⟩ Let $A \subset \mathbb{R}$ and $f : A \to \mathbb{R}$ be defined by

$$f(x) = \begin{cases} \frac{x-5}{x-2} & \text{if } x \neq 2 \\ 1 & \text{if } x = 2. \end{cases}$$

Which of the following is true?

☐ f is not one-one but an onto mapping
☐ f is a bijective mapping
☐ Domain(f)=$\mathbb{R}$ and Range(f)= $\mathbb{R} - \{1\}$
☐ f is one-one but not an onto mapping
☐ Domain(f)=$\mathbb{R} - \{2\}$ and Range(f)= $\mathbb{R} - \{1\}$

► |Q-4⟩ Balls are placed in an urn according to the following experiment: Pick one chit at random among 6 chits numbered 1,2,3,4, 5 and 6. If the number drawn is 1,2,3 or 4, then 2 black balls and 4 white balls are kept in the urn, otherwise 3 black balls and 2 white balls are kept in the urn. Balls are drawn at random repeatedly, and with replacement from this urn (after

the balls are placed once and for all).
Let A_1, A_2 be the events that the the ratio of black balls to white balls in the urn is $2:4$, $3:2$, respectively. Let B_i be the event that the i-th ball drawn is black.
Which of the following are TRUE?

- ☐ $\lim_{n\to\infty} P(A_1|B_1 \cap B_2 \cap .. \cap B_n) = 0$, $\lim_{n\to\infty} P(W_{n+1}|W_1 \cap W_2 \cap .. \cap W_n) = \frac{4}{6}$
- ☐ $\lim_{n\to\infty} P(A_1|B_1 \cap B_2 \cap .. \cap B_n) = 1$, $\lim_{n\to\infty} P(W_{n+1}|W_1 \cap W_2 \cap .. \cap W_n) = \frac{4}{6}$
- ☐ $\lim_{n\to\infty} P(A_1|W_1 \cap W_2 \cap .. \cap W_n) = 1$, $\lim_{n\to\infty} P(W_{n+1}|W_1 \cap W_2 \cap .. \cap W_n) = \frac{4}{6}$
- ☐ $\lim_{n\to\infty} P(A_2|B_1 \cap B_2 \cap .. \cap B_n) = 0$, $\lim_{n\to\infty} P(W_{n+1}|W_1 \cap W_2 \cap .. \cap W_n) = \frac{4}{6}$
- ☐ $\lim_{n\to\infty} P(A_2|B_1 \cap B_2 \cap .. \cap B_n) = 1$, $\lim_{n\to\infty} P(B_{n+1}|W_1 \cap W_2 \cap .. \cap W_n) = \frac{2}{6}$
- ☐ $\lim_{n\to\infty} P(A_1|B_1 \cap B_2 \cap .. \cap B_n) = 0$, $\lim_{n\to\infty} P(W_{n+1}|B_1 \cap B_2 \cap .. \cap B_n) = \frac{2}{5}$

|Q-5⟩ What does the equation $x^2 + 4y^2 + 2x + 16y + 3 = 0$ represent?

- ☐ Ellipse with centre $(-1, -2)$
- ☐ Ellipse with centre $(1, -2)$
- ☐ Ellipse with focus $(1, -2)$
- ☐ Ellipse with focus $(-1, -2)$

► |Q-6⟩ If c is a real number such that the function $\cos(x) + \cos(x + c)$ can take a value 2, then which of the following is/are POSSIBLE value(s) of c?

☐ 46π ☐ $-\pi$ ☐ 0 ☐ π ☐ $\frac{\pi}{2}$

#36/ NEATLY write your full name AS ON ROLLS:	TTC 2016/IITG Mathematics Evaluation II 8th JAN 2016

INSTRUCTIONS: This is a fully-objective/multiple-choice type of test. Questions marked with ► may have more than one answer correct. You need to indicate your answer by bubbling the box to the left of the correct answer. Use only a ball–point pen. The right way to fill a bubble like ☐ is as in ■. **No overwriting, no rewriting, no erasing and no cancellation**. Use supplementary sheets ONLY FOR ROUGH WORK. {Note: $\mathbb{N}, \mathbb{Z}, \mathbb{Q}$ and $\mathbb{R}$ denote the sets of natural numbers, integers, rational numbers and real numbers respectively.}

|Q-1⟩ Odometer is a device which measures distance covered by a vehicle. The odometer reading of an aircraft flying straight at various times are given as:

Time (seconds)	Odometer (metres)
0	120
1	335
0.1	142.1
0.01	122.22
0.001	120.2227
0.0001	120.02229
0.00001	120.0022296

From the given data, what is the best approximate to the speed of the aircraft in metres/second at time 0?

☐ 120 ☐ 215 ☐ 220 ☐ 221 ☐ 223 ☐ 225

|Q-2⟩ We want to make 12-digit natural numbers in which odd digits are in the odd positions (from left) and even digits are in the even positions. How many such numbers are there which contain all the digits?

☐ $\left(6\frac{6!}{2!}\right)^2$ ☐ $\frac{12!}{2!2!}$ ☐ $\left(5\frac{6!}{2!}\right)^2$ ☐ $\frac{12!}{2!2!2!}$

|Q-3⟩ Let $A \subset \mathbb{R}$ and $f : A \to \mathbb{R}$ be defined by

$$f(x) = \begin{cases} \frac{x-5}{x-2} & \text{if } x \neq 2 \\ 1 & \text{if } x = 2. \end{cases}$$

Which of the following is true?

☐ Domain(f)=$\mathbb{R} - \{2\}$ and Range(f)= $\mathbb{R} - \{1\}$
☐ f is a bijective mapping
☐ f is one-one but not an onto mapping
☐ Domain(f)=$\mathbb{R}$ and Range(f)= $\mathbb{R} - \{1\}$
☐ f is not one-one but an onto mapping

► |Q-4⟩ Balls are placed in an urn according to the following experiment: Pick one chit at random among 6 chits numbered 1,2,3,4, 5 and 6. If the number drawn is 1,2,3 or 4, then 2 black balls and 4 white balls are kept in the urn, otherwise 3 black balls and 2 white balls are kept in the urn. Balls are drawn at random repeatedly, and with replacement from this urn (after

the balls are placed once and for all).
Let A_1, A_2 be the events that the the ratio of black balls to white balls in the urn is $2:4$, $3:2$, respectively. Let B_i be the event that the i-th ball drawn is black.
Which of the following are TRUE?

- ☐ $\lim_{n\to\infty} P(A_2|B_1 \cap B_2 \cap .. \cap B_n) = 0$, $\lim_{n\to\infty} P(W_{n+1}|W_1 \cap W_2 \cap .. \cap W_n) = \frac{4}{6}$
- ☐ $\lim_{n\to\infty} P(A_2|B_1 \cap B_2 \cap .. \cap B_n) = 1$, $\lim_{n\to\infty} P(B_{n+1}|W_1 \cap W_2 \cap .. \cap W_n) = \frac{2}{6}$
- ☐ $\lim_{n\to\infty} P(A_1|B_1 \cap B_2 \cap .. \cap B_n) = 0$, $\lim_{n\to\infty} P(W_{n+1}|W_1 \cap W_2 \cap .. \cap W_n) = \frac{4}{6}$
- ☐ $\lim_{n\to\infty} P(A_1|B_1 \cap B_2 \cap .. \cap B_n) = 1$, $\lim_{n\to\infty} P(W_{n+1}|W_1 \cap W_2 \cap .. \cap W_n) = \frac{4}{6}$
- ☐ $\lim_{n\to\infty} P(A_1|B_1 \cap B_2 \cap .. \cap B_n) = 0$, $\lim_{n\to\infty} P(W_{n+1}|B_1 \cap B_2 \cap .. \cap B_n) = \frac{2}{5}$
- ☐ $\lim_{n\to\infty} P(A_1|W_1 \cap W_2 \cap .. \cap W_n) = 1$, $\lim_{n\to\infty} P(W_{n+1}|W_1 \cap W_2 \cap .. \cap W_n) = \frac{4}{6}$

|Q-5⟩ What does the equation $x^2 + 4y^2 + 2x + 16y + 3 = 0$ represent?

- ☐ Ellipse with centre $(-1, -2)$
- ☐ Ellipse with centre $(1, -2)$
- ☐ Ellipse with focus $(-1, -2)$
- ☐ Ellipse with focus $(1, -2)$

► |Q-6⟩ If c is a real number such that the function $\cos(x) + \cos(x + c)$ can take a value 2, then which of the following is/are POSSIBLE value(s) of c?

☐ $-\pi$ ☐ π ☐ $\frac{\pi}{2}$ ☐ 46π ☐ 0

#37/ NEATLY write your full name AS ON ROLLS:	TTC 2016/IITG Mathematics Evaluation II 8th JAN 2016

INSTRUCTIONS: This is a fully-objective/multiple-choice type of test. Questions marked with ► may have more than one answer correct. You need to indicate your answer by bubbling the box to the left of the correct answer. Use only a ball–point pen. The right way to fill a bubble like ☐ is as in ■. **No overwriting, no rewriting, no erasing and no cancellation**. Use supplementary sheets ONLY FOR ROUGH WORK. {Note: $\mathbb{N}, \mathbb{Z}, \mathbb{Q}$ and $\mathbb{R}$ denote the sets of natural numbers, integers, rational numbers and real numbers respectively.}

|Q-1⟩ Odometer is a device which measures distance covered by a vehicle. The odometer reading of an aircraft flying straight at various times are given as:

Time (seconds)	Odometer (metres)
0	120
1	335
0.1	142.1
0.01	122.22
0.001	120.2227
0.0001	120.02229
0.00001	120.0022296

From the given data, what is the best approximate to the speed of the aircraft in metres/second at time 0?

☐ 120 ☐ 215 ☐ 220 ☐ 221 ☐ 223 ☐ 225

|Q-2⟩ We want to make 12-digit natural numbers in which odd digits are in the odd positions (from left) and even digits are in the even positions. How many such numbers are there which contain all the digits?

☐ $\left(6\frac{6!}{2!}\right)^2$ ☐ $\frac{12!}{2!2!}$ ☐ $\left(5\frac{6!}{2!}\right)^2$ ☐ $\frac{12!}{2!2!2!}$

|Q-3⟩ Let $A \subset \mathbb{R}$ and $f : A \to \mathbb{R}$ be defined by

$$f(x) = \begin{cases} \frac{x-5}{x-2} & \text{if } x \neq 2 \\ 1 & \text{if } x = 2. \end{cases}$$

Which of the following is true?

☐ Domain(f)=$\mathbb{R}$ and Range(f)= $\mathbb{R} - \{1\}$
☐ Domain(f)=$\mathbb{R} - \{2\}$ and Range(f)= $\mathbb{R} - \{1\}$
☐ f is one-one but not an onto mapping
☐ f is not one-one but an onto mapping
☐ f is a bijective mapping

► |Q-4⟩ Balls are placed in an urn according to the following experiment: Pick one chit at random among 6 chits numbered 1,2,3,4, 5 and 6. If the number drawn is 1,2,3 or 4, then 2 black balls and 4 white balls are kept in the urn, otherwise 3 black balls and 2 white balls are kept in the urn. Balls are drawn at random repeatedly, and with replacement from this urn (after

the balls are placed once and for all).
Let A_1, A_2 be the events that the the ratio of black balls to white balls in the urn is $2:4$, $3:2$, respectively. Let B_i be the event that the i-th ball drawn is black.
Which of the following are TRUE?

- ☐ $\lim_{n\to\infty} P(A_2|B_1 \cap B_2 \cap .. \cap B_n) = 0$, $\lim_{n\to\infty} P(W_{n+1}|W_1 \cap W_2 \cap .. \cap W_n) = \frac{4}{6}$
- ☐ $\lim_{n\to\infty} P(A_1|B_1 \cap B_2 \cap .. \cap B_n) = 1$, $\lim_{n\to\infty} P(W_{n+1}|W_1 \cap W_2 \cap .. \cap W_n) = \frac{4}{6}$
- ☐ $\lim_{n\to\infty} P(A_1|B_1 \cap B_2 \cap .. \cap B_n) = 0$, $\lim_{n\to\infty} P(W_{n+1}|B_1 \cap B_2 \cap .. \cap B_n) = \frac{2}{5}$
- ☐ $\lim_{n\to\infty} P(A_2|B_1 \cap B_2 \cap .. \cap B_n) = 1$, $\lim_{n\to\infty} P(B_{n+1}|W_1 \cap W_2 \cap .. \cap W_n) = \frac{2}{6}$
- ☐ $\lim_{n\to\infty} P(A_1|B_1 \cap B_2 \cap .. \cap B_n) = 0$, $\lim_{n\to\infty} P(W_{n+1}|W_1 \cap W_2 \cap .. \cap W_n) = \frac{4}{6}$
- ☐ $\lim_{n\to\infty} P(A_1|W_1 \cap W_2 \cap .. \cap W_n) = 1$, $\lim_{n\to\infty} P(W_{n+1}|W_1 \cap W_2 \cap .. \cap W_n) = \frac{4}{6}$

|Q-5⟩ What does the equation $x^2 + 4y^2 + 2x + 16y + 3 = 0$ represent?

- ☐ Ellipse with centre $(-1, -2)$
- ☐ Ellipse with centre $(1, -2)$
- ☐ Ellipse with focus $(-1, -2)$
- ☐ Ellipse with focus $(1, -2)$

► |Q-6⟩ If c is a real number such that the function $\cos(x) + \cos(x + c)$ can take a value 2, then which of the following is/are POSSIBLE value(s) of c?

☐ 0 ☐ 46π ☐ $\frac{\pi}{2}$ ☐ π ☐ $-\pi$

#38/ NEATLY write your full name AS ON ROLLS:	TTC 2016/IITG Mathematics Evaluation II 8th JAN 2016

INSTRUCTIONS: This is a fully-objective/multiple-choice type of test. Questions marked with ► may have more than one answer correct. You need to indicate your answer by bubbling the box to the left of the correct answer. Use only a ball–point pen. The right way to fill a bubble like ☐ is as in ■. **No overwriting, no rewriting, no erasing and no cancellation**. Use supplementary sheets ONLY FOR ROUGH WORK. {Note: $\mathbb{N}, \mathbb{Z}, \mathbb{Q}$ and $\mathbb{R}$ denote the sets of natural numbers, integers, rational numbers and real numbers respectively.}

|Q-1⟩ Odometer is a device which measures distance covered by a vehicle. The odometer reading of an aircraft flying straight at various times are given as:

Time (seconds)	Odometer (metres)
0	120
1	335
0.1	142.1
0.01	122.22
0.001	120.2227
0.0001	120.02229
0.00001	120.0022296

From the given data, what is the best approximate to the speed of the aircraft in metres/second at time 0?

☐ 120 ☐ 215 ☐ 220 ☐ 221 ☐ 223 ☐ 225

|Q-2⟩ We want to make 12-digit natural numbers in which odd digits are in the odd positions (from left) and even digits are in the even positions. How many such numbers are there which contain all the digits?

☐ $\left(6\frac{6!}{2!}\right)^2$ ☐ $\frac{12!}{2!2!}$ ☐ $\left(5\frac{6!}{2!}\right)^2$ ☐ $\frac{12!}{2!2!2!}$

|Q-3⟩ Let $A \subset \mathbb{R}$ and $f : A \to \mathbb{R}$ be defined by

$$f(x) = \begin{cases} \frac{x-5}{x-2} & \text{if } x \neq 2 \\ 1 & \text{if } x = 2. \end{cases}$$

Which of the following is true?

☐ Domain(f)=$\mathbb{R} - \{2\}$ and Range(f)= $\mathbb{R} - \{1\}$
☐ Domain(f)=$\mathbb{R}$ and Range(f)= $\mathbb{R} - \{1\}$
☐ f is one-one but not an onto mapping
☐ f is a bijective mapping
☐ f is not one-one but an onto mapping

► |Q-4⟩ Balls are placed in an urn according to the following experiment: Pick one chit at random among 6 chits numbered 1,2,3,4, 5 and 6. If the number drawn is 1,2,3 or 4, then 2 black balls and 4 white balls are kept in the urn, otherwise 3 black balls and 2 white balls are kept in the urn. Balls are drawn at random repeatedly, and with replacement from this urn (after

the balls are placed once and for all).
Let A_1, A_2 be the events that the the ratio of black balls to white balls in the urn is $2:4$, $3:2$, respectively. Let B_i be the event that the i-th ball drawn is black.
Which of the following are TRUE?

- ☐ $\lim_{n\to\infty} P(A_1|B_1 \cap B_2 \cap .. \cap B_n) = 0$, $\lim_{n\to\infty} P(W_{n+1}|B_1 \cap B_2 \cap .. \cap B_n) = \frac{2}{5}$
- ☐ $\lim_{n\to\infty} P(A_2|B_1 \cap B_2 \cap .. \cap B_n) = 1$, $\lim_{n\to\infty} P(B_{n+1}|W_1 \cap W_2 \cap .. \cap W_n) = \frac{2}{6}$
- ☐ $\lim_{n\to\infty} P(A_1|B_1 \cap B_2 \cap .. \cap B_n) = 0$, $\lim_{n\to\infty} P(W_{n+1}|W_1 \cap W_2 \cap .. \cap W_n) = \frac{4}{6}$
- ☐ $\lim_{n\to\infty} P(A_2|B_1 \cap B_2 \cap .. \cap B_n) = 0$, $\lim_{n\to\infty} P(W_{n+1}|W_1 \cap W_2 \cap .. \cap W_n) = \frac{4}{6}$
- ☐ $\lim_{n\to\infty} P(A_1|B_1 \cap B_2 \cap .. \cap B_n) = 1$, $\lim_{n\to\infty} P(W_{n+1}|W_1 \cap W_2 \cap .. \cap W_n) = \frac{4}{6}$
- ☐ $\lim_{n\to\infty} P(A_1|W_1 \cap W_2 \cap .. \cap W_n) = 1$, $\lim_{n\to\infty} P(W_{n+1}|W_1 \cap W_2 \cap .. \cap W_n) = \frac{4}{6}$

|Q-5⟩ What does the equation $x^2 + 4y^2 + 2x + 16y + 3 = 0$ represent?

- ☐ Ellipse with centre $(1, -2)$
- ☐ Ellipse with focus $(1, -2)$
- ☐ Ellipse with focus $(-1, -2)$
- ☐ Ellipse with centre $(-1, -2)$

► |Q-6⟩ If c is a real number such that the function $\cos(x) + \cos(x + c)$ can take a value 2, then which of the following is/are POSSIBLE value(s) of c?

☐ π ☐ 0 ☐ 46π ☐ $\frac{\pi}{2}$ ☐ $-\pi$

#39/ NEATLY write your full name AS ON ROLLS:	TTC 2016/IITG Mathematics Evaluation II 8th JAN 2016

INSTRUCTIONS: This is a fully-objective/multiple-choice type of test. Questions marked with ► may have more than one answer correct. You need to indicate your answer by bubbling the box to the left of the correct answer. Use only a ball–point pen. The right way to fill a bubble like ☐ is as in ■. **No overwriting, no rewriting, no erasing and no cancellation**. Use supplementary sheets ONLY FOR ROUGH WORK. {Note: $\mathbb{N}, \mathbb{Z}, \mathbb{Q}$ and $\mathbb{R}$ denote the sets of natural numbers, integers, rational numbers and real numbers respectively.}

|Q-1⟩ Odometer is a device which measures distance covered by a vehicle. The odometer reading of an aircraft flying straight at various times are given as:

Time (seconds)	Odometer (metres)
0	120
1	335
0.1	142.1
0.01	122.22
0.001	120.2227
0.0001	120.02229
0.00001	120.0022296

From the given data, what is the best approximate to the speed of the aircraft in metres/second at time 0?

☐ 120 ☐ 215 ☐ 220 ☐ 221 ☐ 223 ☐ 225

|Q-2⟩ We want to make 12-digit natural numbers in which odd digits are in the odd positions (from left) and even digits are in the even positions. How many such numbers are there which contain all the digits?

☐ $\left(6\frac{6!}{2!}\right)^2$ ☐ $\frac{12!}{2!2!}$ ☐ $\left(5\frac{6!}{2!}\right)^2$ ☐ $\frac{12!}{2!2!2!}$

|Q-3⟩ Let $A \subset \mathbb{R}$ and $f : A \to \mathbb{R}$ be defined by

$$f(x) = \begin{cases} \frac{x-5}{x-2} & \text{if } x \neq 2 \\ 1 & \text{if } x = 2. \end{cases}$$

Which of the following is true?

☐ f is not one-one but an onto mapping
☐ f is one-one but not an onto mapping
☐ f is a bijective mapping
☐ Domain(f)=$\mathbb{R} - \{2\}$ and Range(f)= $\mathbb{R} - \{1\}$
☐ Domain(f)=$\mathbb{R}$ and Range(f)= $\mathbb{R} - \{1\}$

► |Q-4⟩ Balls are placed in an urn according to the following experiment: Pick one chit at random among 6 chits numbered 1,2,3,4, 5 and 6. If the number drawn is 1,2,3 or 4, then 2 black balls and 4 white balls are kept in the urn, otherwise 3 black balls and 2 white balls are kept in the urn. Balls are drawn at random repeatedly, and with replacement from this urn (after

the balls are placed once and for all).
Let A_1, A_2 be the events that the the ratio of black balls to white balls in the urn is $2:4$, $3:2$, respectively. Let B_i be the event that the i-th ball drawn is black.
Which of the following are TRUE?

- ☐ $\lim_{n\to\infty} P(A_2|B_1 \cap B_2 \cap .. \cap B_n) = 0$, $\lim_{n\to\infty} P(W_{n+1}|W_1 \cap W_2 \cap .. \cap W_n) = \frac{4}{6}$
- ☐ $\lim_{n\to\infty} P(A_1|W_1 \cap W_2 \cap .. \cap W_n) = 1$, $\lim_{n\to\infty} P(W_{n+1}|W_1 \cap W_2 \cap .. \cap W_n) = \frac{4}{6}$
- ☐ $\lim_{n\to\infty} P(A_2|B_1 \cap B_2 \cap .. \cap B_n) = 1$, $\lim_{n\to\infty} P(B_{n+1}|W_1 \cap W_2 \cap .. \cap W_n) = \frac{2}{6}$
- ☐ $\lim_{n\to\infty} P(A_1|B_1 \cap B_2 \cap .. \cap B_n) = 1$, $\lim_{n\to\infty} P(W_{n+1}|W_1 \cap W_2 \cap .. \cap W_n) = \frac{4}{6}$
- ☐ $\lim_{n\to\infty} P(A_1|B_1 \cap B_2 \cap .. \cap B_n) = 0$, $\lim_{n\to\infty} P(W_{n+1}|W_1 \cap W_2 \cap .. \cap W_n) = \frac{4}{6}$
- ☐ $\lim_{n\to\infty} P(A_1|B_1 \cap B_2 \cap .. \cap B_n) = 0$, $\lim_{n\to\infty} P(W_{n+1}|B_1 \cap B_2 \cap .. \cap B_n) = \frac{2}{5}$

|Q-5⟩ What does the equation $x^2 + 4y^2 + 2x + 16y + 3 = 0$ represent?

- ☐ Ellipse with centre $(1, -2)$
- ☐ Ellipse with focus $(1, -2)$
- ☐ Ellipse with focus $(-1, -2)$
- ☐ Ellipse with centre $(-1, -2)$

► |Q-6⟩ If c is a real number such that the function $\cos(x) + \cos(x + c)$ can take a value 2, then which of the following is/are POSSIBLE value(s) of c?

☐ $\frac{\pi}{2}$ ☐ 0 ☐ π ☐ 46π ☐ $-\pi$

#40/ NEATLY write your full name AS ON ROLLS:	TTC 2016/IITG Mathematics Evaluation II 8th JAN 2016

INSTRUCTIONS: This is a fully-objective/multiple-choice type of test. Questions marked with ► may have more than one answer correct. You need to indicate your answer by bubbling the box to the left of the correct answer. Use only a ball–point pen. The right way to fill a bubble like ☐ is as in ■. **No overwriting, no rewriting, no erasing and no cancellation**. Use supplementary sheets ONLY FOR ROUGH WORK. {Note: $\mathbb{N}, \mathbb{Z}, \mathbb{Q}$ and $\mathbb{R}$ denote the sets of natural numbers, integers, rational numbers and real numbers respectively.}

|Q-1⟩ Odometer is a device which measures distance covered by a vehicle. The odometer reading of an aircraft flying straight at various times are given as:

Time (seconds)	Odometer (metres)
0	120
1	335
0.1	142.1
0.01	122.22
0.001	120.2227
0.0001	120.02229
0.00001	120.0022296

From the given data, what is the best approximate to the speed of the aircraft in metres/second at time 0?

☐ 120 ☐ 215 ☐ 220 ☐ 221 ☐ 223 ☐ 225

|Q-2⟩ We want to make 12-digit natural numbers in which odd digits are in the odd positions (from left) and even digits are in the even positions. How many such numbers are there which contain all the digits?

☐ $\left(6\frac{6!}{2!}\right)^2$ ☐ $\frac{12!}{2!2!}$ ☐ $\left(5\frac{6!}{2!}\right)^2$ ☐ $\frac{12!}{2!2!2!}$

|Q-3⟩ Let $A \subset \mathbb{R}$ and $f : A \to \mathbb{R}$ be defined by

$$f(x) = \begin{cases} \frac{x-5}{x-2} & \text{if } x \neq 2 \\ 1 & \text{if } x = 2. \end{cases}$$

Which of the following is true?

☐ Domain(f)=$\mathbb{R}$ and Range(f)= $\mathbb{R} - \{1\}$
☐ f is one-one but not an onto mapping
☐ f is not one-one but an onto mapping
☐ Domain(f)=$\mathbb{R} - \{2\}$ and Range(f)= $\mathbb{R} - \{1\}$
☐ f is a bijective mapping

► |Q-4⟩ Balls are placed in an urn according to the following experiment: Pick one chit at random among 6 chits numbered 1,2,3,4, 5 and 6. If the number drawn is 1,2,3 or 4, then 2 black balls and 4 white balls are kept in the urn, otherwise 3 black balls and 2 white balls are kept in the urn. Balls are drawn at random repeatedly, and with replacement from this urn (after

the balls are placed once and for all).
Let A_1, A_2 be the events that the the ratio of black balls to white balls in the urn is $2:4$, $3:2$, respectively. Let B_i be the event that the i-th ball drawn is black.
Which of the following are TRUE?

- ☐ $\lim_{n\to\infty} P(A_2|B_1 \cap B_2 \cap .. \cap B_n) = 1$, $\lim_{n\to\infty} P(B_{n+1}|W_1 \cap W_2 \cap .. \cap W_n) = \frac{2}{6}$
- ☐ $\lim_{n\to\infty} P(A_1|B_1 \cap B_2 \cap .. \cap B_n) = 0$, $\lim_{n\to\infty} P(W_{n+1}|B_1 \cap B_2 \cap .. \cap B_n) = \frac{2}{5}$
- ☐ $\lim_{n\to\infty} P(A_1|B_1 \cap B_2 \cap .. \cap B_n) = 0$, $\lim_{n\to\infty} P(W_{n+1}|W_1 \cap W_2 \cap .. \cap W_n) = \frac{4}{6}$
- ☐ $\lim_{n\to\infty} P(A_1|B_1 \cap B_2 \cap .. \cap B_n) = 1$, $\lim_{n\to\infty} P(W_{n+1}|W_1 \cap W_2 \cap .. \cap W_n) = \frac{4}{6}$
- ☐ $\lim_{n\to\infty} P(A_1|W_1 \cap W_2 \cap .. \cap W_n) = 1$, $\lim_{n\to\infty} P(W_{n+1}|W_1 \cap W_2 \cap .. \cap W_n) = \frac{4}{6}$
- ☐ $\lim_{n\to\infty} P(A_2|B_1 \cap B_2 \cap .. \cap B_n) = 0$, $\lim_{n\to\infty} P(W_{n+1}|W_1 \cap W_2 \cap .. \cap W_n) = \frac{4}{6}$

|Q-5⟩ What does the equation $x^2 + 4y^2 + 2x + 16y + 3 = 0$ represent?

- ☐ Ellipse with focus $(-1, -2)$
- ☐ Ellipse with centre $(1, -2)$
- ☐ Ellipse with focus $(1, -2)$
- ☐ Ellipse with centre $(-1, -2)$

► |Q-6⟩ If c is a real number such that the function $\cos(x) + \cos(x + c)$ can take a value 2, then which of the following is/are POSSIBLE value(s) of c?

☐ π ☐ 46π ☐ $-\pi$ ☐ $\frac{\pi}{2}$ ☐ 0

#41/ NEATLY write your full name AS ON ROLLS:	TTC 2016/IITG Mathematics Evaluation II 8th JAN 2016

INSTRUCTIONS: This is a fully-objective/multiple-choice type of test. Questions marked with ► may have more than one answer correct. You need to indicate your answer by bubbling the box to the left of the correct answer. Use only a ball–point pen. The right way to fill a bubble like ☐ is as in ■. **No overwriting, no rewriting, no erasing and no cancellation**. Use supplementary sheets ONLY FOR ROUGH WORK. {Note: $\mathbb{N}, \mathbb{Z}, \mathbb{Q}$ and $\mathbb{R}$ denote the sets of natural numbers, integers, rational numbers and real numbers respectively.}

|Q-1⟩ Odometer is a device which measures distance covered by a vehicle. The odometer reading of an aircraft flying straight at various times are given as:

Time (seconds)	Odometer (metres)
0	120
1	335
0.1	142.1
0.01	122.22
0.001	120.2227
0.0001	120.02229
0.00001	120.0022296

From the given data, what is the best approximate to the speed of the aircraft in metres/second at time 0?

☐ 120 ☐ 215 ☐ 220 ☐ 221 ☐ 223 ☐ 225

|Q-2⟩ We want to make 12-digit natural numbers in which odd digits are in the odd positions (from left) and even digits are in the even positions. How many such numbers are there which contain all the digits?

☐ $\left(6\frac{6!}{2!}\right)^2$ ☐ $\frac{12!}{2!2!}$ ☐ $\left(5\frac{6!}{2!}\right)^2$ ☐ $\frac{12!}{2!2!2!}$

|Q-3⟩ Let $A \subset \mathbb{R}$ and $f : A \to \mathbb{R}$ be defined by

$$f(x) = \begin{cases} \frac{x-5}{x-2} & \text{if } x \neq 2 \\ 1 & \text{if } x = 2. \end{cases}$$

Which of the following is true?

☐ Domain(f)=$\mathbb{R} - \{2\}$ and Range(f)= $\mathbb{R} - \{1\}$
☐ Domain(f)=$\mathbb{R}$ and Range(f)= $\mathbb{R} - \{1\}$
☐ f is not one-one but an onto mapping
☐ f is one-one but not an onto mapping
☐ f is a bijective mapping

► |Q-4⟩ Balls are placed in an urn according to the following experiment: Pick one chit at random among 6 chits numbered 1,2,3,4, 5 and 6. If the number drawn is 1,2,3 or 4, then 2 black balls and 4 white balls are kept in the urn, otherwise 3 black balls and 2 white balls are kept in the urn. Balls are drawn at random repeatedly, and with replacement from this urn (after

the balls are placed once and for all).
Let A_1, A_2 be the events that the the ratio of black balls to white balls in the urn is $2:4$, $3:2$, respectively. Let B_i be the event that the i-th ball drawn is black.
Which of the following are TRUE?

- ☐ $\lim_{n\to\infty} P(A_2|B_1 \cap B_2 \cap .. \cap B_n) = 0$, $\lim_{n\to\infty} P(W_{n+1}|W_1 \cap W_2 \cap .. \cap W_n) = \frac{4}{6}$
- ☐ $\lim_{n\to\infty} P(A_1|B_1 \cap B_2 \cap .. \cap B_n) = 0$, $\lim_{n\to\infty} P(W_{n+1}|W_1 \cap W_2 \cap .. \cap W_n) = \frac{4}{6}$
- ☐ $\lim_{n\to\infty} P(A_1|W_1 \cap W_2 \cap .. \cap W_n) = 1$, $\lim_{n\to\infty} P(W_{n+1}|W_1 \cap W_2 \cap .. \cap W_n) = \frac{4}{6}$
- ☐ $\lim_{n\to\infty} P(A_1|B_1 \cap B_2 \cap .. \cap B_n) = 1$, $\lim_{n\to\infty} P(W_{n+1}|W_1 \cap W_2 \cap .. \cap W_n) = \frac{4}{6}$
- ☐ $\lim_{n\to\infty} P(A_1|B_1 \cap B_2 \cap .. \cap B_n) = 0$, $\lim_{n\to\infty} P(W_{n+1}|B_1 \cap B_2 \cap .. \cap B_n) = \frac{2}{5}$
- ☐ $\lim_{n\to\infty} P(A_2|B_1 \cap B_2 \cap .. \cap B_n) = 1$, $\lim_{n\to\infty} P(B_{n+1}|W_1 \cap W_2 \cap .. \cap W_n) = \frac{2}{6}$

|Q-5⟩ What does the equation $x^2 + 4y^2 + 2x + 16y + 3 = 0$ represent?

- ☐ Ellipse with focus $(1, -2)$
- ☐ Ellipse with centre $(1, -2)$
- ☐ Ellipse with centre $(-1, -2)$
- ☐ Ellipse with focus $(-1, -2)$

► |Q-6⟩ If c is a real number such that the function $\cos(x) + \cos(x + c)$ can take a value 2, then which of the following is/are POSSIBLE value(s) of c?

☐ 46π ☐ 0 ☐ $\frac{\pi}{2}$ ☐ $-\pi$ ☐ π

#42/ NEATLY write your full name AS ON ROLLS:	TTC 2016/IITG Mathematics Evaluation II 8th JAN 2016

INSTRUCTIONS: This is a fully-objective/multiple-choice type of test. Questions marked with ► may have more than one answer correct. You need to indicate your answer by bubbling the box to the left of the correct answer. Use only a ball–point pen. The right way to fill a bubble like ☐ is as in ■. **No overwriting, no rewriting, no erasing and no cancellation**. Use supplementary sheets ONLY FOR ROUGH WORK. {Note: $\mathbb{N}, \mathbb{Z}, \mathbb{Q}$ and $\mathbb{R}$ denote the sets of natural numbers, integers, rational numbers and real numbers respectively.}

|Q-1⟩ Odometer is a device which measures distance covered by a vehicle. The odometer reading of an aircraft flying straight at various times are given as:

Time (seconds)	Odometer (metres)
0	120
1	335
0.1	142.1
0.01	122.22
0.001	120.2227
0.0001	120.02229
0.00001	120.0022296

From the given data, what is the best approximate to the speed of the aircraft in metres/second at time 0?

☐ 120 ☐ 215 ☐ 220 ☐ 221 ☐ 223 ☐ 225

|Q-2⟩ We want to make 12-digit natural numbers in which odd digits are in the odd positions (from left) and even digits are in the even positions. How many such numbers are there which contain all the digits?

☐ $\left(6\frac{6!}{2!}\right)^2$ ☐ $\frac{12!}{2!2!}$ ☐ $\left(5\frac{6!}{2!}\right)^2$ ☐ $\frac{12!}{2!2!2!}$

|Q-3⟩ Let $A \subset \mathbb{R}$ and $f : A \to \mathbb{R}$ be defined by

$$f(x) = \begin{cases} \frac{x-5}{x-2} & \text{if } x \neq 2 \\ 1 & \text{if } x = 2. \end{cases}$$

Which of the following is true?

☐ Domain(f)=$\mathbb{R}$ and Range(f)= $\mathbb{R} - \{1\}$
☐ f is a bijective mapping
☐ Domain(f)=$\mathbb{R} - \{2\}$ and Range(f)= $\mathbb{R} - \{1\}$
☐ f is not one-one but an onto mapping
☐ f is one-one but not an onto mapping

► |Q-4⟩ Balls are placed in an urn according to the following experiment: Pick one chit at random among 6 chits numbered 1,2,3,4, 5 and 6. If the number drawn is 1,2,3 or 4, then 2 black balls and 4 white balls are kept in the urn, otherwise 3 black balls and 2 white balls are kept in the urn. Balls are drawn at random repeatedly, and with replacement from this urn (after

the balls are placed once and for all).
Let A_1, A_2 be the events that the the ratio of black balls to white balls in the urn is $2:4$, $3:2$, respectively. Let B_i be the event that the i-th ball drawn is black.
Which of the following are TRUE?

- ☐ $\lim_{n\to\infty} P(A_1|W_1 \cap W_2 \cap .. \cap W_n) = 1$, $\lim_{n\to\infty} P(W_{n+1}|W_1 \cap W_2 \cap .. \cap W_n) = \frac{4}{6}$
- ☐ $\lim_{n\to\infty} P(A_1|B_1 \cap B_2 \cap .. \cap B_n) = 0$, $\lim_{n\to\infty} P(W_{n+1}|W_1 \cap W_2 \cap .. \cap W_n) = \frac{4}{6}$
- ☐ $\lim_{n\to\infty} P(A_2|B_1 \cap B_2 \cap .. \cap B_n) = 1$, $\lim_{n\to\infty} P(B_{n+1}|W_1 \cap W_2 \cap .. \cap W_n) = \frac{2}{6}$
- ☐ $\lim_{n\to\infty} P(A_2|B_1 \cap B_2 \cap .. \cap B_n) = 0$, $\lim_{n\to\infty} P(W_{n+1}|W_1 \cap W_2 \cap .. \cap W_n) = \frac{4}{6}$
- ☐ $\lim_{n\to\infty} P(A_1|B_1 \cap B_2 \cap .. \cap B_n) = 0$, $\lim_{n\to\infty} P(W_{n+1}|B_1 \cap B_2 \cap .. \cap B_n) = \frac{2}{5}$
- ☐ $\lim_{n\to\infty} P(A_1|B_1 \cap B_2 \cap .. \cap B_n) = 1$, $\lim_{n\to\infty} P(W_{n+1}|W_1 \cap W_2 \cap .. \cap W_n) = \frac{4}{6}$

|Q-5⟩ What does the equation $x^2 + 4y^2 + 2x + 16y + 3 = 0$ represent?

- ☐ Ellipse with centre $(1, -2)$
- ☐ Ellipse with focus $(-1, -2)$
- ☐ Ellipse with focus $(1, -2)$
- ☐ Ellipse with centre $(-1, -2)$

► |Q-6⟩ If c is a real number such that the function $\cos(x) + \cos(x + c)$ can take a value 2, then which of the following is/are POSSIBLE value(s) of c?

☐ 46π ☐ 0 ☐ $\frac{\pi}{2}$ ☐ π ☐ $-\pi$

#43/ NEATLY write your full name AS ON ROLLS:	TTC 2016/IITG Mathematics Evaluation II 8th JAN 2016

INSTRUCTIONS: This is a fully-objective/multiple-choice type of test. Questions marked with ► may have more than one answer correct. You need to indicate your answer by bubbling the box to the left of the correct answer. Use only a ball–point pen. The right way to fill a bubble like ☐ is as in ■. **No overwriting, no rewriting, no erasing and no cancellation**. Use supplementary sheets ONLY FOR ROUGH WORK. {Note: $\mathbb{N}, \mathbb{Z}, \mathbb{Q}$ and $\mathbb{R}$ denote the sets of natural numbers, integers, rational numbers and real numbers respectively.}

|Q-1⟩ Odometer is a device which measures distance covered by a vehicle. The odometer reading of an aircraft flying straight at various times are given as:

Time (seconds)	Odometer (metres)
0	120
1	335
0.1	142.1
0.01	122.22
0.001	120.2227
0.0001	120.02229
0.00001	120.0022296

From the given data, what is the best approximate to the speed of the aircraft in metres/second at time 0?

☐ 120 ☐ 215 ☐ 220 ☐ 221 ☐ 223 ☐ 225

|Q-2⟩ We want to make 12-digit natural numbers in which odd digits are in the odd positions (from left) and even digits are in the even positions. How many such numbers are there which contain all the digits?

☐ $\left(6\frac{6!}{2!}\right)^2$ ☐ $\frac{12!}{2!2!}$ ☐ $\left(5\frac{6!}{2!}\right)^2$ ☐ $\frac{12!}{2!2!2!}$

|Q-3⟩ Let $A \subset \mathbb{R}$ and $f : A \to \mathbb{R}$ be defined by

$$f(x) = \begin{cases} \frac{x-5}{x-2} & \text{if } x \neq 2 \\ 1 & \text{if } x = 2. \end{cases}$$

Which of the following is true?

☐ Domain(f)=$\mathbb{R}$ and Range(f)= $\mathbb{R} - \{1\}$
☐ f is a bijective mapping
☐ f is not one-one but an onto mapping
☐ f is one-one but not an onto mapping
☐ Domain(f)=$\mathbb{R} - \{2\}$ and Range(f)= $\mathbb{R} - \{1\}$

► |Q-4⟩ Balls are placed in an urn according to the following experiment: Pick one chit at random among 6 chits numbered 1,2,3,4, 5 and 6. If the number drawn is 1,2,3 or 4, then 2 black balls and 4 white balls are kept in the urn, otherwise 3 black balls and 2 white balls are kept in the urn. Balls are drawn at random repeatedly, and with replacement from this urn (after

the balls are placed once and for all).
Let A_1, A_2 be the events that the the ratio of black balls to white balls in the urn is $2:4$, $3:2$, respectively. Let B_i be the event that the i-th ball drawn is black.
Which of the following are TRUE?

- ☐ $\lim_{n\to\infty} P(A_1|W_1 \cap W_2 \cap .. \cap W_n) = 1$, $\lim_{n\to\infty} P(W_{n+1}|W_1 \cap W_2 \cap .. \cap W_n) = \frac{4}{6}$
- ☐ $\lim_{n\to\infty} P(A_1|B_1 \cap B_2 \cap .. \cap B_n) = 0$, $\lim_{n\to\infty} P(W_{n+1}|B_1 \cap B_2 \cap .. \cap B_n) = \frac{2}{5}$
- ☐ $\lim_{n\to\infty} P(A_1|B_1 \cap B_2 \cap .. \cap B_n) = 0$, $\lim_{n\to\infty} P(W_{n+1}|W_1 \cap W_2 \cap .. \cap W_n) = \frac{4}{6}$
- ☐ $\lim_{n\to\infty} P(A_2|B_1 \cap B_2 \cap .. \cap B_n) = 1$, $\lim_{n\to\infty} P(B_{n+1}|W_1 \cap W_2 \cap .. \cap W_n) = \frac{2}{6}$
- ☐ $\lim_{n\to\infty} P(A_1|B_1 \cap B_2 \cap .. \cap B_n) = 1$, $\lim_{n\to\infty} P(W_{n+1}|W_1 \cap W_2 \cap .. \cap W_n) = \frac{4}{6}$
- ☐ $\lim_{n\to\infty} P(A_2|B_1 \cap B_2 \cap .. \cap B_n) = 0$, $\lim_{n\to\infty} P(W_{n+1}|W_1 \cap W_2 \cap .. \cap W_n) = \frac{4}{6}$

|Q-5⟩ What does the equation $x^2 + 4y^2 + 2x + 16y + 3 = 0$ represent?

- ☐ Ellipse with focus $(-1, -2)$
- ☐ Ellipse with centre $(1, -2)$
- ☐ Ellipse with focus $(1, -2)$
- ☐ Ellipse with centre $(-1, -2)$

► |Q-6⟩ If c is a real number such that the function $\cos(x) + \cos(x + c)$ can take a value 2, then which of the following is/are POSSIBLE value(s) of c?

☐ $\frac{\pi}{2}$ ☐ π ☐ $-\pi$ ☐ 46π ☐ 0

#44/ NEATLY write your full name AS ON ROLLS:	TTC 2016/IITG Mathematics Evaluation II 8th JAN 2016

INSTRUCTIONS: This is a fully-objective/multiple-choice type of test. Questions marked with ► may have more than one answer correct. You need to indicate your answer by bubbling the box to the left of the correct answer. Use only a ball–point pen. The right way to fill a bubble like ☐ is as in ■. **No overwriting, no rewriting, no erasing and no cancellation**. Use supplementary sheets ONLY FOR ROUGH WORK. {Note: $\mathbb{N}, \mathbb{Z}, \mathbb{Q}$ and $\mathbb{R}$ denote the sets of natural numbers, integers, rational numbers and real numbers respectively.}

|Q-1⟩ Odometer is a device which measures distance covered by a vehicle. The odometer reading of an aircraft flying straight at various times are given as:

Time (seconds)	Odometer (metres)
0	120
1	335
0.1	142.1
0.01	122.22
0.001	120.2227
0.0001	120.02229
0.00001	120.0022296

From the given data, what is the best approximate to the speed of the aircraft in metres/second at time 0?

☐ 120 ☐ 215 ☐ 220 ☐ 221 ☐ 223 ☐ 225

|Q-2⟩ We want to make 12-digit natural numbers in which odd digits are in the odd positions (from left) and even digits are in the even positions. How many such numbers are there which contain all the digits?

☐ $\left(6\frac{6!}{2!}\right)^2$ ☐ $\frac{12!}{2!2!}$ ☐ $\left(5\frac{6!}{2!}\right)^2$ ☐ $\frac{12!}{2!2!2!}$

|Q-3⟩ Let $A \subset \mathbb{R}$ and $f : A \to \mathbb{R}$ be defined by

$$f(x) = \begin{cases} \frac{x-5}{x-2} & \text{if } x \neq 2 \\ 1 & \text{if } x = 2. \end{cases}$$

Which of the following is true?

☐ f is a bijective mapping
☐ Domain(f)=$\mathbb{R}$ and Range(f)= $\mathbb{R} - \{1\}$
☐ Domain(f)=$\mathbb{R} - \{2\}$ and Range(f)= $\mathbb{R} - \{1\}$
☐ f is not one-one but an onto mapping
☐ f is one-one but not an onto mapping

► |Q-4⟩ Balls are placed in an urn according to the following experiment: Pick one chit at random among 6 chits numbered 1,2,3,4, 5 and 6. If the number drawn is 1,2,3 or 4, then 2 black balls and 4 white balls are kept in the urn, otherwise 3 black balls and 2 white balls are kept in the urn. Balls are drawn at random repeatedly, and with replacement from this urn (after

the balls are placed once and for all).
Let A_1, A_2 be the events that the the ratio of black balls to white balls in the urn is $2:4$, $3:2$, respectively. Let B_i be the event that the i-th ball drawn is black.
Which of the following are TRUE?

- ☐ $\lim_{n\to\infty} P(A_1|B_1 \cap B_2 \cap .. \cap B_n) = 1$, $\lim_{n\to\infty} P(W_{n+1}|W_1 \cap W_2 \cap .. \cap W_n) = \frac{4}{6}$
- ☐ $\lim_{n\to\infty} P(A_1|B_1 \cap B_2 \cap .. \cap B_n) = 0$, $\lim_{n\to\infty} P(W_{n+1}|W_1 \cap W_2 \cap .. \cap W_n) = \frac{4}{6}$
- ☐ $\lim_{n\to\infty} P(A_1|B_1 \cap B_2 \cap .. \cap B_n) = 0$, $\lim_{n\to\infty} P(W_{n+1}|B_1 \cap B_2 \cap .. \cap B_n) = \frac{2}{5}$
- ☐ $\lim_{n\to\infty} P(A_1|W_1 \cap W_2 \cap .. \cap W_n) = 1$, $\lim_{n\to\infty} P(W_{n+1}|W_1 \cap W_2 \cap .. \cap W_n) = \frac{4}{6}$
- ☐ $\lim_{n\to\infty} P(A_2|B_1 \cap B_2 \cap .. \cap B_n) = 1$, $\lim_{n\to\infty} P(B_{n+1}|W_1 \cap W_2 \cap .. \cap W_n) = \frac{2}{6}$
- ☐ $\lim_{n\to\infty} P(A_2|B_1 \cap B_2 \cap .. \cap B_n) = 0$, $\lim_{n\to\infty} P(W_{n+1}|W_1 \cap W_2 \cap .. \cap W_n) = \frac{4}{6}$

|Q-5⟩ What does the equation $x^2 + 4y^2 + 2x + 16y + 3 = 0$ represent?

- ☐ Ellipse with centre $(-1, -2)$
- ☐ Ellipse with focus $(-1, -2)$
- ☐ Ellipse with focus $(1, -2)$
- ☐ Ellipse with centre $(1, -2)$

► |Q-6⟩ If c is a real number such that the function $\cos(x) + \cos(x + c)$ can take a value 2, then which of the following is/are POSSIBLE value(s) of c?

☐ $\frac{\pi}{2}$ ☐ $-\pi$ ☐ π ☐ 46π ☐ 0

#45/ NEATLY write your full name AS ON ROLLS:	TTC 2016/IITG Mathematics Evaluation II 8th JAN 2016

INSTRUCTIONS: This is a fully-objective/multiple-choice type of test. Questions marked with ► may have more than one answer correct. You need to indicate your answer by bubbling the box to the left of the correct answer. Use only a ball–point pen. The right way to fill a bubble like ☐ is as in ■. **No overwriting, no rewriting, no erasing and no cancellation**. Use supplementary sheets ONLY FOR ROUGH WORK. {Note: $\mathbb{N}, \mathbb{Z}, \mathbb{Q}$ and $\mathbb{R}$ denote the sets of natural numbers, integers, rational numbers and real numbers respectively.}

|Q-1⟩ Odometer is a device which measures distance covered by a vehicle. The odometer reading of an aircraft flying straight at various times are given as:

Time (seconds)	Odometer (metres)
0	120
1	335
0.1	142.1
0.01	122.22
0.001	120.2227
0.0001	120.02229
0.00001	120.0022296

From the given data, what is the best approximate to the speed of the aircraft in metres/second at time 0?

☐ 120 ☐ 215 ☐ 220 ☐ 221 ☐ 223 ☐ 225

|Q-2⟩ We want to make 12-digit natural numbers in which odd digits are in the odd positions (from left) and even digits are in the even positions. How many such numbers are there which contain all the digits?

☐ $\left(6\frac{6!}{2!}\right)^2$ ☐ $\frac{12!}{2!2!}$ ☐ $\left(5\frac{6!}{2!}\right)^2$ ☐ $\frac{12!}{2!2!2!}$

|Q-3⟩ Let $A \subset \mathbb{R}$ and $f : A \to \mathbb{R}$ be defined by

$$f(x) = \begin{cases} \frac{x-5}{x-2} & \text{if } x \neq 2 \\ 1 & \text{if } x = 2. \end{cases}$$

Which of the following is true?

☐ f is one-one but not an onto mapping
☐ Domain(f)=$\mathbb{R} - \{2\}$ and Range(f)= $\mathbb{R} - \{1\}$
☐ f is not one-one but an onto mapping
☐ Domain(f)=$\mathbb{R}$ and Range(f)= $\mathbb{R} - \{1\}$
☐ f is a bijective mapping

► |Q-4⟩ Balls are placed in an urn according to the following experiment: Pick one chit at random among 6 chits numbered 1,2,3,4, 5 and 6. If the number drawn is 1,2,3 or 4, then 2 black balls and 4 white balls are kept in the urn, otherwise 3 black balls and 2 white balls are kept in the urn. Balls are drawn at random repeatedly, and with replacement from this urn (after

the balls are placed once and for all).
Let A_1, A_2 be the events that the the ratio of black balls to white balls in the urn is $2:4$, $3:2$, respectively. Let B_i be the event that the i-th ball drawn is black.
Which of the following are TRUE?

- ☐ $\lim_{n\to\infty} P(A_2|B_1 \cap B_2 \cap .. \cap B_n) = 1$, $\lim_{n\to\infty} P(B_{n+1}|W_1 \cap W_2 \cap .. \cap W_n) = \frac{2}{6}$
- ☐ $\lim_{n\to\infty} P(A_1|W_1 \cap W_2 \cap .. \cap W_n) = 1$, $\lim_{n\to\infty} P(W_{n+1}|W_1 \cap W_2 \cap .. \cap W_n) = \frac{4}{6}$
- ☐ $\lim_{n\to\infty} P(A_1|B_1 \cap B_2 \cap .. \cap B_n) = 0$, $\lim_{n\to\infty} P(W_{n+1}|B_1 \cap B_2 \cap .. \cap B_n) = \frac{2}{5}$
- ☐ $\lim_{n\to\infty} P(A_1|B_1 \cap B_2 \cap .. \cap B_n) = 0$, $\lim_{n\to\infty} P(W_{n+1}|W_1 \cap W_2 \cap .. \cap W_n) = \frac{4}{6}$
- ☐ $\lim_{n\to\infty} P(A_2|B_1 \cap B_2 \cap .. \cap B_n) = 0$, $\lim_{n\to\infty} P(W_{n+1}|W_1 \cap W_2 \cap .. \cap W_n) = \frac{4}{6}$
- ☐ $\lim_{n\to\infty} P(A_1|B_1 \cap B_2 \cap .. \cap B_n) = 1$, $\lim_{n\to\infty} P(W_{n+1}|W_1 \cap W_2 \cap .. \cap W_n) = \frac{4}{6}$

|Q-5⟩ What does the equation $x^2 + 4y^2 + 2x + 16y + 3 = 0$ represent?

- ☐ Ellipse with centre $(-1, -2)$
- ☐ Ellipse with focus $(-1, -2)$
- ☐ Ellipse with focus $(1, -2)$
- ☐ Ellipse with centre $(1, -2)$

► |Q-6⟩ If c is a real number such that the function $\cos(x) + \cos(x + c)$ can take a value 2, then which of the following is/are POSSIBLE value(s) of c?

☐ 46π ☐ π ☐ 0 ☐ $\frac{\pi}{2}$ ☐ $-\pi$

#46/ NEATLY write your full name AS ON ROLLS:	TTC 2016/IITG Mathematics Evaluation II 8th JAN 2016

INSTRUCTIONS: This is a fully-objective/multiple-choice type of test. Questions marked with ► may have more than one answer correct. You need to indicate your answer by bubbling the box to the left of the correct answer. Use only a ball–point pen. The right way to fill a bubble like ☐ is as in ■. **No overwriting, no rewriting, no erasing and no cancellation**. Use supplementary sheets ONLY FOR ROUGH WORK. {Note: $\mathbb{N}, \mathbb{Z}, \mathbb{Q}$ and $\mathbb{R}$ denote the sets of natural numbers, integers, rational numbers and real numbers respectively.}

|Q-1⟩ Odometer is a device which measures distance covered by a vehicle. The odometer reading of an aircraft flying straight at various times are given as:

Time (seconds)	Odometer (metres)
0	120
1	335
0.1	142.1
0.01	122.22
0.001	120.2227
0.0001	120.02229
0.00001	120.0022296

From the given data, what is the best approximate to the speed of the aircraft in metres/second at time 0?

☐ 120 ☐ 215 ☐ 220 ☐ 221 ☐ 223 ☐ 225

|Q-2⟩ We want to make 12-digit natural numbers in which odd digits are in the odd positions (from left) and even digits are in the even positions. How many such numbers are there which contain all the digits?

☐ $\left(6\frac{6!}{2!}\right)^2$ ☐ $\frac{12!}{2!2!}$ ☐ $\left(5\frac{6!}{2!}\right)^2$ ☐ $\frac{12!}{2!2!2!}$

|Q-3⟩ Let $A \subset \mathbb{R}$ and $f : A \to \mathbb{R}$ be defined by

$$f(x) = \begin{cases} \frac{x-5}{x-2} & \text{if } x \neq 2 \\ 1 & \text{if } x = 2. \end{cases}$$

Which of the following is true?

☐ f is not one-one but an onto mapping
☐ Domain(f)=$\mathbb{R}$ and Range(f)= $\mathbb{R} - \{1\}$
☐ f is one-one but not an onto mapping
☐ f is a bijective mapping
☐ Domain(f)=$\mathbb{R} - \{2\}$ and Range(f)= $\mathbb{R} - \{1\}$

► |Q-4⟩ Balls are placed in an urn according to the following experiment: Pick one chit at random among 6 chits numbered 1,2,3,4, 5 and 6. If the number drawn is 1,2,3 or 4, then 2 black balls and 4 white balls are kept in the urn, otherwise 3 black balls and 2 white balls are kept in the urn. Balls are drawn at random repeatedly, and with replacement from this urn (after

the balls are placed once and for all).
Let A_1, A_2 be the events that the the ratio of black balls to white balls in the urn is $2:4$, $3:2$, respectively. Let B_i be the event that the i-th ball drawn is black.
Which of the following are TRUE?

- ☐ $\lim_{n\to\infty} P(A_1|B_1 \cap B_2 \cap .. \cap B_n) = 0$, $\lim_{n\to\infty} P(W_{n+1}|W_1 \cap W_2 \cap .. \cap W_n) = \frac{4}{6}$
- ☐ $\lim_{n\to\infty} P(A_1|B_1 \cap B_2 \cap .. \cap B_n) = 1$, $\lim_{n\to\infty} P(W_{n+1}|W_1 \cap W_2 \cap .. \cap W_n) = \frac{4}{6}$
- ☐ $\lim_{n\to\infty} P(A_2|B_1 \cap B_2 \cap .. \cap B_n) = 0$, $\lim_{n\to\infty} P(W_{n+1}|W_1 \cap W_2 \cap .. \cap W_n) = \frac{4}{6}$
- ☐ $\lim_{n\to\infty} P(A_2|B_1 \cap B_2 \cap .. \cap B_n) = 1$, $\lim_{n\to\infty} P(B_{n+1}|W_1 \cap W_2 \cap .. \cap W_n) = \frac{2}{6}$
- ☐ $\lim_{n\to\infty} P(A_1|B_1 \cap B_2 \cap .. \cap B_n) = 0$, $\lim_{n\to\infty} P(W_{n+1}|B_1 \cap B_2 \cap .. \cap B_n) = \frac{2}{5}$
- ☐ $\lim_{n\to\infty} P(A_1|W_1 \cap W_2 \cap .. \cap W_n) = 1$, $\lim_{n\to\infty} P(W_{n+1}|W_1 \cap W_2 \cap .. \cap W_n) = \frac{4}{6}$

|Q-5⟩ What does the equation $x^2 + 4y^2 + 2x + 16y + 3 = 0$ represent?

- ☐ Ellipse with focus $(-1, -2)$
- ☐ Ellipse with centre $(-1, -2)$
- ☐ Ellipse with centre $(1, -2)$
- ☐ Ellipse with focus $(1, -2)$

► |Q-6⟩ If c is a real number such that the function $\cos(x) + \cos(x + c)$ can take a value 2, then which of the following is/are POSSIBLE value(s) of c?

☐ 0 ☐ π ☐ $-\pi$ ☐ $\frac{\pi}{2}$ ☐ 46π

#47/ NEATLY write your full name AS ON ROLLS:	TTC 2016/IITG Mathematics Evaluation II 8th JAN 2016

INSTRUCTIONS: This is a fully-objective/multiple-choice type of test. Questions marked with ► may have more than one answer correct. You need to indicate your answer by bubbling the box to the left of the correct answer. Use only a ball–point pen. The right way to fill a bubble like ☐ is as in ■. **No overwriting, no rewriting, no erasing and no cancellation**. Use supplementary sheets ONLY FOR ROUGH WORK. {Note: $\mathbb{N}, \mathbb{Z}, \mathbb{Q}$ and $\mathbb{R}$ denote the sets of natural numbers, integers, rational numbers and real numbers respectively.}

|Q-1⟩ Odometer is a device which measures distance covered by a vehicle. The odometer reading of an aircraft flying straight at various times are given as:

Time (seconds)	Odometer (metres)
0	120
1	335
0.1	142.1
0.01	122.22
0.001	120.2227
0.0001	120.02229
0.00001	120.0022296

From the given data, what is the best approximate to the speed of the aircraft in metres/second at time 0?

☐ 120 ☐ 215 ☐ 220 ☐ 221 ☐ 223 ☐ 225

|Q-2⟩ We want to make 12-digit natural numbers in which odd digits are in the odd positions (from left) and even digits are in the even positions. How many such numbers are there which contain all the digits?

☐ $\left(6\frac{6!}{2!}\right)^2$ ☐ $\frac{12!}{2!2!}$ ☐ $\left(5\frac{6!}{2!}\right)^2$ ☐ $\frac{12!}{2!2!2!}$

|Q-3⟩ Let $A \subset \mathbb{R}$ and $f : A \to \mathbb{R}$ be defined by

$$f(x) = \begin{cases} \frac{x-5}{x-2} & \text{if } x \neq 2 \\ 1 & \text{if } x = 2. \end{cases}$$

Which of the following is true?

☐ Domain(f)=$\mathbb{R} - \{2\}$ and Range(f)= $\mathbb{R} - \{1\}$
☐ f is a bijective mapping
☐ Domain(f)=$\mathbb{R}$ and Range(f)= $\mathbb{R} - \{1\}$
☐ f is one-one but not an onto mapping
☐ f is not one-one but an onto mapping

► |Q-4⟩ Balls are placed in an urn according to the following experiment: Pick one chit at random among 6 chits numbered 1,2,3,4, 5 and 6. If the number drawn is 1,2,3 or 4, then 2 black balls and 4 white balls are kept in the urn, otherwise 3 black balls and 2 white balls are kept in the urn. Balls are drawn at random repeatedly, and with replacement from this urn (after

the balls are placed once and for all).
Let A_1, A_2 be the events that the the ratio of black balls to white balls in the urn is $2:4$, $3:2$, respectively. Let B_i be the event that the i-th ball drawn is black.
Which of the following are TRUE?

- ☐ $\lim_{n\to\infty} P(A_1|B_1 \cap B_2 \cap .. \cap B_n) = 0$, $\lim_{n\to\infty} P(W_{n+1}|B_1 \cap B_2 \cap .. \cap B_n) = \frac{2}{5}$
- ☐ $\lim_{n\to\infty} P(A_2|B_1 \cap B_2 \cap .. \cap B_n) = 0$, $\lim_{n\to\infty} P(W_{n+1}|W_1 \cap W_2 \cap .. \cap W_n) = \frac{4}{6}$
- ☐ $\lim_{n\to\infty} P(A_2|B_1 \cap B_2 \cap .. \cap B_n) = 1$, $\lim_{n\to\infty} P(B_{n+1}|W_1 \cap W_2 \cap .. \cap W_n) = \frac{2}{6}$
- ☐ $\lim_{n\to\infty} P(A_1|B_1 \cap B_2 \cap .. \cap B_n) = 1$, $\lim_{n\to\infty} P(W_{n+1}|W_1 \cap W_2 \cap .. \cap W_n) = \frac{4}{6}$
- ☐ $\lim_{n\to\infty} P(A_1|W_1 \cap W_2 \cap .. \cap W_n) = 1$, $\lim_{n\to\infty} P(W_{n+1}|W_1 \cap W_2 \cap .. \cap W_n) = \frac{4}{6}$
- ☐ $\lim_{n\to\infty} P(A_1|B_1 \cap B_2 \cap .. \cap B_n) = 0$, $\lim_{n\to\infty} P(W_{n+1}|W_1 \cap W_2 \cap .. \cap W_n) = \frac{4}{6}$

|Q-5⟩ What does the equation $x^2 + 4y^2 + 2x + 16y + 3 = 0$ represent?

- ☐ Ellipse with focus $(-1, -2)$
- ☐ Ellipse with centre $(1, -2)$
- ☐ Ellipse with focus $(1, -2)$
- ☐ Ellipse with centre $(-1, -2)$

► |Q-6⟩ If c is a real number such that the function $\cos(x) + \cos(x + c)$ can take a value 2, then which of the following is/are POSSIBLE value(s) of c?

☐ π ☐ 0 ☐ $\frac{\pi}{2}$ ☐ 46π ☐ $-\pi$

#48/ NEATLY write your full name AS ON ROLLS:	TTC 2016/IITG Mathematics Evaluation II 8th JAN 2016

INSTRUCTIONS: This is a fully-objective/multiple-choice type of test. Questions marked with ► may have more than one answer correct. You need to indicate your answer by bubbling the box to the left of the correct answer. Use only a ball–point pen. The right way to fill a bubble like ☐ is as in ■. **No overwriting, no rewriting, no erasing and no cancellation**. Use supplementary sheets ONLY FOR ROUGH WORK. {Note: $\mathbb{N}, \mathbb{Z}, \mathbb{Q}$ and $\mathbb{R}$ denote the sets of natural numbers, integers, rational numbers and real numbers respectively.}

|Q-1⟩ Odometer is a device which measures distance covered by a vehicle. The odometer reading of an aircraft flying straight at various times are given as:

Time (seconds)	Odometer (metres)
0	120
1	335
0.1	142.1
0.01	122.22
0.001	120.2227
0.0001	120.02229
0.00001	120.0022296

From the given data, what is the best approximate to the speed of the aircraft in metres/second at time 0?

☐ 120 ☐ 215 ☐ 220 ☐ 221 ☐ 223 ☐ 225

|Q-2⟩ We want to make 12-digit natural numbers in which odd digits are in the odd positions (from left) and even digits are in the even positions. How many such numbers are there which contain all the digits?

☐ $\left(6\frac{6!}{2!}\right)^2$ ☐ $\frac{12!}{2!2!}$ ☐ $\left(5\frac{6!}{2!}\right)^2$ ☐ $\frac{12!}{2!2!2!}$

|Q-3⟩ Let $A \subset \mathbb{R}$ and $f : A \to \mathbb{R}$ be defined by

$$f(x) = \begin{cases} \frac{x-5}{x-2} & \text{if } x \neq 2 \\ 1 & \text{if } x = 2. \end{cases}$$

Which of the following is true?

☐ Domain(f)=$\mathbb{R} - \{2\}$ and Range(f)= $\mathbb{R} - \{1\}$
☐ f is not one-one but an onto mapping
☐ Domain(f)=$\mathbb{R}$ and Range(f)= $\mathbb{R} - \{1\}$
☐ f is one-one but not an onto mapping
☐ f is a bijective mapping

► |Q-4⟩ Balls are placed in an urn according to the following experiment: Pick one chit at random among 6 chits numbered 1,2,3,4, 5 and 6. If the number drawn is 1,2,3 or 4, then 2 black balls and 4 white balls are kept in the urn, otherwise 3 black balls and 2 white balls are kept in the urn. Balls are drawn at random repeatedly, and with replacement from this urn (after

the balls are placed once and for all).
Let A_1, A_2 be the events that the the ratio of black balls to white balls in the urn is $2:4$, $3:2$, respectively. Let B_i be the event that the i-th ball drawn is black.
Which of the following are TRUE?

- ☐ $\lim_{n\to\infty} P(A_1|B_1 \cap B_2 \cap .. \cap B_n) = 1$, $\lim_{n\to\infty} P(W_{n+1}|W_1 \cap W_2 \cap .. \cap W_n) = \frac{4}{6}$
- ☐ $\lim_{n\to\infty} P(A_1|W_1 \cap W_2 \cap .. \cap W_n) = 1$, $\lim_{n\to\infty} P(W_{n+1}|W_1 \cap W_2 \cap .. \cap W_n) = \frac{4}{6}$
- ☐ $\lim_{n\to\infty} P(A_2|B_1 \cap B_2 \cap .. \cap B_n) = 0$, $\lim_{n\to\infty} P(W_{n+1}|W_1 \cap W_2 \cap .. \cap W_n) = \frac{4}{6}$
- ☐ $\lim_{n\to\infty} P(A_1|B_1 \cap B_2 \cap .. \cap B_n) = 0$, $\lim_{n\to\infty} P(W_{n+1}|B_1 \cap B_2 \cap .. \cap B_n) = \frac{2}{5}$
- ☐ $\lim_{n\to\infty} P(A_1|B_1 \cap B_2 \cap .. \cap B_n) = 0$, $\lim_{n\to\infty} P(W_{n+1}|W_1 \cap W_2 \cap .. \cap W_n) = \frac{4}{6}$
- ☐ $\lim_{n\to\infty} P(A_2|B_1 \cap B_2 \cap .. \cap B_n) = 1$, $\lim_{n\to\infty} P(B_{n+1}|W_1 \cap W_2 \cap .. \cap W_n) = \frac{2}{6}$

|Q-5⟩ What does the equation $x^2 + 4y^2 + 2x + 16y + 3 = 0$ represent?

- ☐ Ellipse with centre $(-1, -2)$
- ☐ Ellipse with centre $(1, -2)$
- ☐ Ellipse with focus $(-1, -2)$
- ☐ Ellipse with focus $(1, -2)$

► |Q-6⟩ If c is a real number such that the function $\cos(x) + \cos(x + c)$ can take a value 2, then which of the following is/are POSSIBLE value(s) of c?

☐ $\frac{\pi}{2}$ ☐ π ☐ 0 ☐ $-\pi$ ☐ 46π

#49/ NEATLY write your full name AS ON ROLLS:	TTC 2016/IITG Mathematics Evaluation II 8th JAN 2016

INSTRUCTIONS: This is a fully-objective/multiple-choice type of test. Questions marked with ► may have more than one answer correct. You need to indicate your answer by bubbling the box to the left of the correct answer. Use only a ball–point pen. The right way to fill a bubble like ☐ is as in ■. **No overwriting, no rewriting, no erasing and no cancellation**. Use supplementary sheets ONLY FOR ROUGH WORK. {Note: $\mathbb{N}, \mathbb{Z}, \mathbb{Q}$ and $\mathbb{R}$ denote the sets of natural numbers, integers, rational numbers and real numbers respectively.}

|Q-1⟩ Odometer is a device which measures distance covered by a vehicle. The odometer reading of an aircraft flying straight at various times are given as:

Time (seconds)	Odometer (metres)
0	120
1	335
0.1	142.1
0.01	122.22
0.001	120.2227
0.0001	120.02229
0.00001	120.0022296

From the given data, what is the best approximate to the speed of the aircraft in metres/second at time 0?

☐ 120 ☐ 215 ☐ 220 ☐ 221 ☐ 223 ☐ 225

|Q-2⟩ We want to make 12-digit natural numbers in which odd digits are in the odd positions (from left) and even digits are in the even positions. How many such numbers are there which contain all the digits?

☐ $\left(6\frac{6!}{2!}\right)^2$ ☐ $\frac{12!}{2!2!}$ ☐ $\left(5\frac{6!}{2!}\right)^2$ ☐ $\frac{12!}{2!2!2!}$

|Q-3⟩ Let $A \subset \mathbb{R}$ and $f : A \to \mathbb{R}$ be defined by

$$f(x) = \begin{cases} \frac{x-5}{x-2} & \text{if } x \neq 2 \\ 1 & \text{if } x = 2. \end{cases}$$

Which of the following is true?

☐ f is one-one but not an onto mapping
☐ Domain(f)=$\mathbb{R} - \{2\}$ and Range(f)= $\mathbb{R} - \{1\}$
☐ f is not one-one but an onto mapping
☐ f is a bijective mapping
☐ Domain(f)=$\mathbb{R}$ and Range(f)= $\mathbb{R} - \{1\}$

► |Q-4⟩ Balls are placed in an urn according to the following experiment: Pick one chit at random among 6 chits numbered 1,2,3,4, 5 and 6. If the number drawn is 1,2,3 or 4, then 2 black balls and 4 white balls are kept in the urn, otherwise 3 black balls and 2 white balls are kept in the urn. Balls are drawn at random repeatedly, and with replacement from this urn (after

the balls are placed once and for all).
Let A_1, A_2 be the events that the the ratio of black balls to white balls in the urn is $2:4$, $3:2$, respectively. Let B_i be the event that the i-th ball drawn is black.
Which of the following are TRUE?

- ☐ $\lim_{n\to\infty} P(A_2|B_1 \cap B_2 \cap .. \cap B_n) = 0$, $\lim_{n\to\infty} P(W_{n+1}|W_1 \cap W_2 \cap .. \cap W_n) = \frac{4}{6}$
- ☐ $\lim_{n\to\infty} P(A_1|B_1 \cap B_2 \cap .. \cap B_n) = 1$, $\lim_{n\to\infty} P(W_{n+1}|W_1 \cap W_2 \cap .. \cap W_n) = \frac{4}{6}$
- ☐ $\lim_{n\to\infty} P(A_1|W_1 \cap W_2 \cap .. \cap W_n) = 1$, $\lim_{n\to\infty} P(W_{n+1}|W_1 \cap W_2 \cap .. \cap W_n) = \frac{4}{6}$
- ☐ $\lim_{n\to\infty} P(A_1|B_1 \cap B_2 \cap .. \cap B_n) = 0$, $\lim_{n\to\infty} P(W_{n+1}|B_1 \cap B_2 \cap .. \cap B_n) = \frac{2}{5}$
- ☐ $\lim_{n\to\infty} P(A_2|B_1 \cap B_2 \cap .. \cap B_n) = 1$, $\lim_{n\to\infty} P(B_{n+1}|W_1 \cap W_2 \cap .. \cap W_n) = \frac{2}{6}$
- ☐ $\lim_{n\to\infty} P(A_1|B_1 \cap B_2 \cap .. \cap B_n) = 0$, $\lim_{n\to\infty} P(W_{n+1}|W_1 \cap W_2 \cap .. \cap W_n) = \frac{4}{6}$

|Q-5⟩ What does the equation $x^2 + 4y^2 + 2x + 16y + 3 = 0$ represent?

- ☐ Ellipse with focus $(-1, -2)$
- ☐ Ellipse with centre $(-1, -2)$
- ☐ Ellipse with centre $(1, -2)$
- ☐ Ellipse with focus $(1, -2)$

► |Q-6⟩ If c is a real number such that the function $\cos(x) + \cos(x + c)$ can take a value 2, then which of the following is/are POSSIBLE value(s) of c?

☐ $-\pi$ ☐ $\frac{\pi}{2}$ ☐ π ☐ 46π ☐ 0

#50/ NEATLY write your full name AS ON ROLLS:	TTC 2016/IITG Mathematics Evaluation II 8th JAN 2016

INSTRUCTIONS: This is a fully-objective/multiple-choice type of test. Questions marked with ► may have more than one answer correct. You need to indicate your answer by bubbling the box to the left of the correct answer. Use only a ball–point pen. The right way to fill a bubble like ☐ is as in ■. **No overwriting, no rewriting, no erasing and no cancellation**. Use supplementary sheets ONLY FOR ROUGH WORK. {Note: $\mathbb{N}, \mathbb{Z}, \mathbb{Q}$ and $\mathbb{R}$ denote the sets of natural numbers, integers, rational numbers and real numbers respectively.}

|Q-1⟩ Odometer is a device which measures distance covered by a vehicle. The odometer reading of an aircraft flying straight at various times are given as:

Time (seconds)	Odometer (metres)
0	120
1	335
0.1	142.1
0.01	122.22
0.001	120.2227
0.0001	120.02229
0.00001	120.0022296

From the given data, what is the best approximate to the speed of the aircraft in metres/second at time 0?

☐ 120 ☐ 215 ☐ 220 ☐ 221 ☐ 223 ☐ 225

|Q-2⟩ We want to make 12-digit natural numbers in which odd digits are in the odd positions (from left) and even digits are in the even positions. How many such numbers are there which contain all the digits?

☐ $\left(6\frac{6!}{2!}\right)^2$ ☐ $\frac{12!}{2!2!}$ ☐ $\left(5\frac{6!}{2!}\right)^2$ ☐ $\frac{12!}{2!2!2!}$

|Q-3⟩ Let $A \subset \mathbb{R}$ and $f : A \to \mathbb{R}$ be defined by

$$f(x) = \begin{cases} \frac{x-5}{x-2} & \text{if } x \neq 2 \\ 1 & \text{if } x = 2. \end{cases}$$

Which of the following is true?

☐ Domain(f)=$\mathbb{R} - \{2\}$ and Range(f)= $\mathbb{R} - \{1\}$
☐ Domain(f)=$\mathbb{R}$ and Range(f)= $\mathbb{R} - \{1\}$
☐ f is not one-one but an onto mapping
☐ f is a bijective mapping
☐ f is one-one but not an onto mapping

► |Q-4⟩ Balls are placed in an urn according to the following experiment: Pick one chit at random among 6 chits numbered 1,2,3,4, 5 and 6. If the number drawn is 1,2,3 or 4, then 2 black balls and 4 white balls are kept in the urn, otherwise 3 black balls and 2 white balls are kept in the urn. Balls are drawn at random repeatedly, and with replacement from this urn (after

the balls are placed once and for all).
Let A_1, A_2 be the events that the the ratio of black balls to white balls in the urn is $2:4$, $3:2$, respectively. Let B_i be the event that the i-th ball drawn is black.
Which of the following are TRUE?

- ☐ $\lim_{n\to\infty} P(A_1|B_1 \cap B_2 \cap .. \cap B_n) = 0$, $\lim_{n\to\infty} P(W_{n+1}|W_1 \cap W_2 \cap .. \cap W_n) = \frac{4}{6}$
- ☐ $\lim_{n\to\infty} P(A_2|B_1 \cap B_2 \cap .. \cap B_n) = 0$, $\lim_{n\to\infty} P(W_{n+1}|W_1 \cap W_2 \cap .. \cap W_n) = \frac{4}{6}$
- ☐ $\lim_{n\to\infty} P(A_2|B_1 \cap B_2 \cap .. \cap B_n) = 1$, $\lim_{n\to\infty} P(B_{n+1}|W_1 \cap W_2 \cap .. \cap W_n) = \frac{2}{6}$
- ☐ $\lim_{n\to\infty} P(A_1|B_1 \cap B_2 \cap .. \cap B_n) = 1$, $\lim_{n\to\infty} P(W_{n+1}|W_1 \cap W_2 \cap .. \cap W_n) = \frac{4}{6}$
- ☐ $\lim_{n\to\infty} P(A_1|W_1 \cap W_2 \cap .. \cap W_n) = 1$, $\lim_{n\to\infty} P(W_{n+1}|W_1 \cap W_2 \cap .. \cap W_n) = \frac{4}{6}$
- ☐ $\lim_{n\to\infty} P(A_1|B_1 \cap B_2 \cap .. \cap B_n) = 0$, $\lim_{n\to\infty} P(W_{n+1}|B_1 \cap B_2 \cap .. \cap B_n) = \frac{2}{5}$

|Q-5⟩ What does the equation $x^2 + 4y^2 + 2x + 16y + 3 = 0$ represent?

- ☐ Ellipse with centre $(1, -2)$
- ☐ Ellipse with centre $(-1, -2)$
- ☐ Ellipse with focus $(-1, -2)$
- ☐ Ellipse with focus $(1, -2)$

► |Q-6⟩ If c is a real number such that the function $\cos(x) + \cos(x + c)$ can take a value 2, then which of the following is/are POSSIBLE value(s) of c?

☐ 0 ☐ 46π ☐ $-\pi$ ☐ $\frac{\pi}{2}$ ☐ π