CUET (UG) – MATHEMATICS

Chapter Test - Section B2: Applied Mathematics - Numbers and Numerical Applications

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General Instructions

1. Total Questions: **20**

2. Duration: **60 Minutes**

3. All questions are compulsory.

4. Each question carries **5 marks**.

5. For each correct answer: **+5 marks**.

6. For each incorrect answer: **-1 mark**.

7. No negative marking for unanswered questions.

8. Use of calculator or electronic devices is strictly prohibited.

9. Choose the most appropriate answer from the given options.

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1. Find the last digit of the number 3^{2024}.
   (A) 1
   (B) 3
   (C) 7
   (D) 9

2. If $a \equiv b \pmod{m}$ and $c \equiv d \pmod{m}$, then which of the following is NOT necessarily true?
   (A) $a + c \equiv b + d \pmod{m}$
   (B) $a - c \equiv b - d \pmod{m}$
   (C) $ac \equiv bd \pmod{m}$
   (D) $a/c \equiv b/d \pmod{m}$

3. A mixture contains wine and water in the ratio 3 : 2 and another mixture contains them in the ratio 4 : 5. In what ratio should the two mixtures be mixed so that the new mixture contains equal quantities of wine and water?
   (A) 3 : 5
   (B) 5 : 9
   (C) 9 : 5
   (D) 5 : 3

4. A boat takes half the time to move a certain distance downstream than upstream. The ratio of the speed of the boat in still water to that of the current is:
   (A) 3 : 1
   (B) 1 : 3
   (C) 2 : 1
   (D) 1 : 2

5. Two pipes can fill a cistern in 14 and 16 hours respectively. They are opened together and it is found that due to a leak in the bottom, it takes 32 minutes extra to fill the cistern. When the cistern is full, in what time will the leak empty it?

(A) 90 hours
(B) 112 hours
(C) 100 hours
(D) 80 hours

6. In a 100 m race, A can beat B by 25 m and B can beat C by 4 m. In the same race, A can beat C by:
   (A) 29 m
   (B) 21 m
   (C) 28 m
   (D) 26 m

7. Find the value of x for the linear congruence $4x \equiv 3 \pmod{7}$.
   (A) 5
   (B) 6
   (C) 4
   (D) 3

8. A merchant has 1000 kg of sugar, part of which he sells at 8% profit and the rest at 18% profit. He gains 14% on the whole. The quantity sold at 18% profit is:
   (A) 400 kg
   (B) 600 kg
   (C) 500 kg
   (D) 700 kg

9. A can run 1 km in 3 min 10 sec and B can cover the same distance in 3 min 20 sec. By what distance can A beat B?
   (A) 50 m
   (B) 40 m
   (C) 45 m
   (D) 60 m

10. If $2x + 3 \geq 11$ and $5x - 4 \leq 21$, the range of x is:
    (A) $4 \leq x \leq 5$
    (B) $x \geq 4$
    (C) $x \leq 5$
    (D) $4 < x < 5$

11. A pipe can fill a tank in 12 hours. Due to a leak at the bottom, it is filled in 15 hours. If the tank is full, how much time will the leak take to empty it?
    (A) 40 hours
    (B) 50 hours
    (C) 60 hours
    (D) 30 hours

12. The speed of a boat in still water is 10 km/h. If it can travel 26 km downstream and 14 km upstream in the same time, the speed of the stream is:
    (A) 2 km/h
    (B) 3 km/h
    (C) 4 km/h
    (D) 2.5 km/h

13. Find the remainder when 7^{100} is divided by 4.
    (A) 1

(B) 2
(C) 3
(D) 0

14. In a game of 100 points, A can give B 20 points and C 28 points. Then B can give C:
    (A) 8 points
    (B) 10 points
    (C) 12 points
    (D) 14 points

15. A vessel is filled with liquid, 3 parts of which are water and 5 parts syrup. How much of the mixture must be drawn off and replaced with water so that the mixture may be half water and half syrup?
    (A) 1/3
    (B) 1/4
    (C) 1/5
    (D) 1/7

16. If $n \equiv 3 \pmod 4$, then $n^2 \pmod 4$ is:
    (A) 1
    (B) 2
    (C) 3
    (D) 0

17. A tap can fill a tank in 6 hours. After the tank is half full, three more similar taps are opened. What is the total time taken to fill the tank completely?
    (A) 3 hrs 15 min
    (B) 3 hrs 45 min
    (C) 4 hrs
    (D) 4 hrs 15 min

18. The speed of a boat upstream is 12 km/h and downstream is 18 km/h. The speed of the boat in still water is:
    (A) 15 km/h
    (B) 3 km/h
    (C) 6 km/h
    (D) 14 km/h

19. Solve for x: $x \equiv 5 \pmod 6$ and x is the smallest two-digit prime number.
    (A) 11
    (B) 13
    (C) 17
    (D) 19

20. A milkman has two cans of milk. The first contains 25% water and the rest milk. The second contains 50% water and 50% milk. How much milk should he mix from each container so as to get 12 litres of milk such that the ratio of water to milk is 3 : 5?
    (A) 6 litres, 6 litres
    (B) 4 litres, 8 litres
    (C) 5 litres, 7 litres
    (D) 3 litres, 9 litres

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