

# Institute of Actuaries of India

ACET June 2022

## Mathematics

1. Let  $f(x): R \rightarrow R$  be the function defined by  $f(x) = 5x^3 + 9$ . Then  $f$  is
- A. neither one-one nor onto.
  - B. one-one but not onto.
  - C. onto but not one-one.
  - D. one-one and onto.

1 mark

2. The value of

$$\lim_{x \rightarrow 0} \frac{(4+x)^{\frac{1}{2}} - 2}{x}$$

- A. is  $\frac{1}{4}$ .
- B. is  $\frac{1}{2}$ .
- C. is  $\frac{1}{8}$ .
- D. does not exist.

1 mark

3. One of the zeroes of the polynomial  $2x^3 + x^2 - 5x + 2$  is 1. The other zeroes are

- A.  $2, \frac{1}{2}$ .
- B.  $2, -\frac{1}{2}$ .
- C.  $-2, \frac{1}{2}$ .
- D.  $-2, -\frac{1}{2}$ .

2 marks

4. If  $4 \log_x 3 + 2 \log_x 2 = 2$ , then the value of  $x$  is equal to

- A. 18.
- B. 36.
- C. 12.
- D. 9.

1 mark

5. The 20<sup>th</sup> and 21<sup>st</sup> terms in the expansion of  $(3+a)^{39}$  are equal. Then, the value of  $a$  is equal to

- A.  $\frac{1}{3}$ .
- B. 3.
- C.  $\frac{19}{7}$ .
- D.  $\frac{7}{19}$ .

1 mark

6. The sum of the first 15 terms of an *AP* is 705 and its first term is 12. Then the 20<sup>th</sup> term is
- A. 102.
  - B. 107.
  - C. 112.
  - D. 117.

1 mark

7. The complex conjugate of  $\frac{(4-3i)(3+2i)}{(1+3i)(3-i)}$  is
- A.  $1 + 1.5i$ .
  - B.  $1.16 + 1.5i$ .
  - C.  $1.5 + 1i$ .
  - D.  $1 - 1.5i$ .

2 marks

8. The value of

$$\sin\left(\cos^{-1}\frac{4}{5}\right)$$

is

- A.  $\pm\frac{3}{4}$ .
- B.  $\pm\frac{1}{5}$ .
- C.  $\pm\frac{3}{5}$ .
- D.  $\pm\frac{4}{5}$ .

1 mark

9. Suppose  $f(x)$  is a polynomial of degree 3, and the values of  $y = f(x)$  at  $x = 0, 1, 2, 3, 4$  are, respectively,

$$y_0 = 0, \quad y_1 = 2, \quad y_2 = 13, \quad y_3 = 44, \quad y_4 = 85.$$

It is found that there is an error in the value of  $y_2$ . The correct value of  $y_2$  should be

- A. 3.5.
- B. 16.5.
- C. 13.

D. 9.5.

3 marks

10. If the position vectors of two points  $P$  and  $Q$  are  $2\vec{i} + 3\vec{j} - 4\vec{k}$  and  $3\vec{i} - 5\vec{j} + 2\vec{k}$  respectively, then  $|\overrightarrow{PQ}|$  is

- A.  $\sqrt{15}$ .
- B. 15.
- C. 10.
- D.  $\sqrt{101}$ .

1 mark

11. The value of  $c$  for which the vectors  $\vec{a} = 3\vec{i} + c\vec{j} + 2\vec{k}$  and  $\vec{b} = 2\vec{i} + \vec{j} + 4\vec{k}$  are perpendicular to each other is

- A. 14.
- B. -14.
- C.  $\frac{1}{48}$ .
- D.  $\frac{2}{3}$ .

1 mark

12. Let  $y = \log_e \sqrt{\sin \sqrt{e^x}}$ . Then  $\frac{dy}{dx}$  is equal to

- A.  $\frac{\cot \sqrt{e^x}}{4} \sqrt{e^x}$ .
- B.  $\frac{\cot \sqrt{e^x}}{2} \sqrt{e^x}$ .
- C.  $2\sqrt{e^x} \cot \sqrt{e^x}$ .
- D.  $4\sqrt{e^x} \cot \sqrt{e^x}$ .

2 marks

13. If  $y = 2x^x$ ,  $x > 0$ , then  $\frac{dy}{dx}$  at  $x = e$  is

- A.  $e^e$ .
- B.  $2e^e$ .
- C.  $3e^e$ .
- D.  $4e^e$ .

1 mark

14. Let

$$f(x) = \frac{\log_e x}{2x}, \quad x > 0.$$

Then, the maximum of  $f(x)$  is attained where  $x$  is equal to

- A.  $e$ .

- B.  $\frac{1}{e}$ .
- C. 1.
- D.  $e^2$ .

2 marks

15. The value of the integral

$$\int \frac{e^{2x} + e^{-2x}}{e^{2x} - e^{-2x}} dx$$

is

- A.  $\frac{1}{2} \log_e(e^{2x} - e^{-2x}) + C$ .
- B.  $2 \log_e(e^{2x} - e^{-2x}) + C$ .
- C.  $\frac{1}{2} \log_e(e^{2x} + e^{-2x}) + C$ .
- D.  $2 \log_e(e^{2x} + e^{-2x}) + C$ .

2 marks

16. The value of the integral

$$\int_0^{\frac{\pi}{2}} \frac{\sin x}{\sin x + \cos x} dx$$

is

- A.  $\pi$ .
- B.  $2\pi$ .
- C.  $\frac{\pi}{2}$ .
- D.  $\frac{\pi}{4}$ .

2 marks

17. Let

$$A = \begin{vmatrix} 1 & \sin \theta & 1 \\ -\sin \theta & 1 & \sin \theta \\ -1 & -\sin \theta & 1 \end{vmatrix}.$$

Then, the value of  $A$  when  $\theta = \frac{\pi}{4}$  is

- A. 4.
- B. 3.
- C. 2.
- D. 1.

1 mark

18. Let

$$M = \begin{bmatrix} \sin x & \tan x \\ -\tan x & \sin x \end{bmatrix}.$$

The value of  $x$  when  $0 \leq x \leq \frac{\pi}{2}$  and  $M + M^T = I$  is

- A.  $\frac{\pi}{2}$ .
- B.  $\frac{\pi}{3}$ .
- C.  $\frac{\pi}{4}$ .
- D.  $\frac{\pi}{6}$ .

1 mark

19. If  $A$  and  $B$  are symmetric matrices of the same order, then  $AB - BA$  is

- A. a symmetric matrix.
- B. an identity matrix.
- C. a scalar matrix.
- D. a skew symmetric matrix.

1 mark

20. The inverse of the matrix

$$M = \begin{bmatrix} 2 & 1 & 3 \\ 4 & -1 & 0 \\ -7 & 2 & 1 \end{bmatrix}$$

is

- A.  $\frac{1}{3} \begin{bmatrix} -1 & 5 & 3 \\ -4 & 23 & 12 \\ 1 & -11 & -6 \end{bmatrix}$ .
- B.  $-\frac{1}{3} \begin{bmatrix} -1 & -4 & 1 \\ 5 & 23 & -11 \\ 3 & 12 & -6 \end{bmatrix}$ .
- C.  $-\frac{1}{3} \begin{bmatrix} -1 & 5 & 3 \\ -4 & 23 & 12 \\ 1 & -11 & -6 \end{bmatrix}$ .
- D.  $\frac{1}{3} \begin{bmatrix} -1 & -4 & 1 \\ 5 & 23 & -11 \\ 3 & 12 & -6 \end{bmatrix}$ .

3 marks

# Statistics

21. The following observations have been arranged in ascending order.

5, 7, 10, 12, 15,  $x$ ,  $x + 2$ , 23, 25, 26, 28,  $y$

If the mean and median of the observations are 18.5 and 18 respectively, then the values of  $x$  and  $y$  are

- A. 17, 30.
- B. 17, 35.
- C. 17.5, 30.
- D. 18, 32.

2 marks

22. The mean and standard deviation of  $n$  observations  $x_1, x_2, \dots, x_n$  are  $\bar{x}$  and  $s$ , respectively. Then the mean and standard deviation of  $ax_1, ax_2, \dots, ax_n$ , where  $a$  is a constant, are

- A.  $a\bar{x}, \sqrt{|a|}s$ .
- B.  $a\bar{x}, \sqrt{a}s$ .
- C.  $|a|\bar{x}, |a|s$ .
- D.  $a\bar{x}, |a|s$ .

1 mark

23. The daily number of road accidents in a city for 20 days are given below.

6, 5, 6, 5, 1, 2, 5, 6, 4, 1, 2, 5, 6, 5, 7, 6, 5, 9, 10, 8

Suppose highest 10% and lowest 10% of the observations are discarded. Then only one of the following statements is true. Which one is it?

- A. The mean of the remaining observations is greater than that of the original observations.
- B. The median of the new observations is same as that of the original observations.
- C. The range of the new observations is 8.
- D. The mode of the new observations is 6.

2 marks

24. The class X of a school has two sections, A and B. Sections A and B have 48 and 52 students, respectively. The average marks of class X students in Mathematics in an examination is 65. If the average mark of Section A is 78, then the average mark of Section B is

- A. 53.
- B. 55.
- C. 58.
- D. 60.

1 mark

25. Which of the following statements is true?
- A. If each observation is multiplied by a constant  $k$ , the inter-quartile range of the new observations does not change.
  - B. For positively skewed distribution mean  $>$  median  $>$  mode.
  - C. For positively skewed distribution, the frequency curve has the longer tail towards the left.
  - D. For negatively skewed distribution, frequency curve has longer tails toward the right.

1 mark

26. The correlation coefficient between two variables  $x$  and  $y$  is  $r = 0.75$ . The means of  $x$  and  $y$  are  $\bar{x} = 10$  and  $\bar{y} = 15$ , respectively. The standard deviations of  $x$  and  $y$  are  $s_x = 1.5$  and  $s_y = 2.5$ , respectively. Then which of the following statements are true?
- A. The regression line of  $x$  on  $y$  is  $x = 3 + 0.45y$ .
  - B. The regression line of  $x$  on  $y$  is  $x = 3.25 + 1.25y$ .
  - C. The regression line of  $y$  on  $x$  is  $y = 2.5 + 1.25x$ .
  - D. The regression line of  $y$  on  $x$  is  $y = 2.5 + 0.45x$ .

2 marks

27. A bag contains 10 white and 6 black balls. Two balls are drawn at random with replacement. The probability of getting one white and one black ball is
- A.  $15/64$ .
  - B.  $15/32$ .
  - C.  $1/4$ .
  - D.  $1/2$ .

1 mark

28. If  $E$  and  $F$  are independent events associated with a random experiment, then which of the following statements is *not* necessarily true?
- A.  $\bar{E}$  and  $F$  are independent.
  - B.  $E$  and  $\bar{F}$  are independent.
  - C.  $P(E|\bar{F}) > P(E)$ .
  - D.  $\bar{E}$  and  $\bar{F}$  are independent.

1 mark

29. In a factory light bulbs are produced by three machines  $M_1$ ,  $M_2$  and  $M_3$ . The machines manufacture 50%, 20% and 30% of the light bulbs. Of their outputs, 4%, 1% and 2% are defective light bulbs. A light bulb is selected at random from the product and is found to defective. Then the probability that it is not manufactured by machine  $M_3$  is
- A.  $\frac{5}{7}$ .
  - B.  $\frac{2}{7}$ .

- C.  $\frac{3}{14}$ .  
D.  $\frac{11}{14}$ .

2 marks

30. Consider an equilateral triangle whose common side length is  $X$ , which is uniformly distributed over  $(0, 2)$ . The expected area of the triangle is

- A.  $\frac{2}{\sqrt{3}}$ .  
B.  $\frac{\sqrt{3}}{4}$ .  
C.  $\frac{1}{\sqrt{3}}$ .  
D.  $\frac{1}{2\sqrt{3}}$ .

1 mark

31. Five unbiased coins are tossed simultaneously. The probability of getting 3 heads and 2 tails is

- A.  $5/16$ .  
B.  $5/32$ .  
C.  $5/8$ .  
D.  $2/3$ .

1 mark

32. A random variable  $X$  takes values 0, 1, 2, 3 and its mean is 1.8. If  $P(X = 3) = 2P(X = 1)$  and  $P(X = 2) = 0.2$ , then  $P(X = 0)$  is

- A. 0.10.  
B. 0.15.  
C. 0.20.  
D. 0.30.

1 mark

33. A discrete random variable  $X$  assume values  $x_1, x_2, \dots, x_m$  with the respective probabilities  $p_1, p_2, \dots, p_m$ . Then the variance of  $X$  is

- A.  $\sum_{i=1}^m x_i^2 - (\sum_{i=1}^m p_i x_i)^2$ .  
B.  $\sum_{i=1}^m p_i^2 x_i^2 - (\sum_{i=1}^m p_i^2 x_i)^2$ .  
C.  $\sum_{i=1}^m p_i x_i^2 - \sum_{i=1}^m p_i x_i$ .  
D.  $\sum_{i=1}^m p_i x_i^2 - (\sum_{i=1}^m p_i x_i)^2$ .

1 mark

34. The 25<sup>th</sup> and 75<sup>th</sup> percentile of a normal distribution with mean  $\mu$  and variance  $\sigma^2$  are  $-1$  and  $1$ , respectively. The 25<sup>th</sup> and 75<sup>th</sup> percentile of standard normal distribution are  $Q_1$  and  $Q_3$ , respectively. Then  $\mu$  and  $\sigma$  are

- A.  $\frac{Q_1+Q_3}{Q_1-Q_3}$  and  $\frac{1}{Q_3-Q_1}$ .



- B.  $\frac{Q_1+Q_3}{Q_1-Q_3}$  and  $\frac{2}{Q_3-Q_1}$ .
- C.  $\frac{2Q_1+Q_3}{Q_1-Q_3}$  and  $\frac{2}{Q_3-Q_1}$ .
- D.  $\frac{Q_1+0.5Q_3}{Q_3-Q_1}$  and  $\frac{1}{Q_3-Q_1}$ .

2 marks

35. Let  $X$  be a random variable with the probability mass function

$$P(X = x) = p(1 - p)^{x-1}, \quad x = 1, 2, 3, \dots$$

with  $0 < p < 1$ . Then for  $a > 0$  and  $b > 0$ ,  $P(X > a + b | X > b)$  equals

- A.  $P(X > a + b)$ .
- B.  $P(X \geq a + b)$ .
- C.  $P(X > a)$ .
- D.  $P(X \geq a)$ .

2 marks

36. Suppose  $X \sim N(\mu, \sigma^2)$ , with  $\mu = 2, \sigma^2 = 3$ , is independent of  $Y \sim U(2, 4)$ . Then  $\text{Var}(XY)$  equals

- A.  $88/3$ .
- B.  $30$ .
- C.  $32$ .
- D.  $80/3$ .

2 marks

37. The number of trucks arriving on any one day at a truck depot in a certain city follows a Poisson distribution with mean  $\lambda > 0$ . Suppose it is known that  $P(X = 5) = 2P(X = 4)$ . The probability that on a given day at most one truck will arrive at this depot is

- A.  $11e^{-10}$ .
- B.  $10e^{-10}$ .
- C.  $11e^{-5}$ .
- D.  $5e^{-5}$ .

1 mark

38. Let  $X$  be a random variable with probability density function  $f(x) = \lambda e^{-\lambda(x-\theta)}$ ,  $x > \theta, \lambda > 0$ . Then which of the following statements is true?

- A.  $E(X) = \lambda + \theta, \text{Var}(X) = \frac{1}{\lambda^2}$ .
- B.  $E(X) = \lambda + \theta, \text{Var}(X) = \theta + \frac{1}{\lambda^2}$ .
- C.  $E(X) = \frac{1}{\lambda} + \theta, \text{Var}(X) = \frac{1}{\lambda^2}$ .
- D.  $E(X) = \frac{1}{\lambda} + \theta, \text{Var}(X) = \theta^2 + \frac{1}{\lambda^2}$ .

2 marks

39. Consider two random variables  $X$  and  $Y$  with joint probability density function given by

$$f(x, y) = kxy(1 - y), \quad \text{for } 0 < x < y < 1.$$

for some value of  $k$ . The correlation coefficient between  $X$  and  $Y$

- A. is positive.
- B. is negative.
- C. is zero.
- D. depends on the value of  $k$ .

3 marks

40. Let  $X$  be a random variable with the probability mass function

$$P(X = \pm 1) = p, \quad P(X = 0) = 1 - 2p, \quad 0 < p < \frac{1}{2}.$$

Let  $Y = X^2$ . Then the correlation between  $X$  and  $Y$  is

- A. 1.
- B. 0.5.
- C. 0.25.
- D. 0.

1 mark

## Data Interpretation

The following table gives the cumulative frequency distribution of sales (in Rs.) of two outlets I & II of a restaurant chain. Answer the questions 41-44 based on your interpretation of the table.

Sales in Rs.	Number of days	
	Outlet I	Outlet II
Less than 20000	5	8
Less than 30000	12	15
Less than 40000	18	20
Less than 50000	25	28
Less than 60000	35	32
Less than 70000	40	38
Less than 80000	42	45
Less than 90000	45	48
Less than 100000	50	50

41. The proportion of days having sales at least Rs.50000 in outlet I is
- A. 0.30.
  - B. 0.40.
  - C. 0.50.
  - D. 0.64.

1 mark

42. The percentage of days having sales less than Rs. 40000 in Outlet I is
- A. 36.
  - B. 34.
  - C. 24.
  - D. 70.

1 mark

43. The proportion of days having sales Rs.20000 or more but less than Rs.50000 in Outlet II is
- A. 0.34.
  - B. 0.40.
  - C. 0.48.
  - D. 0.50.

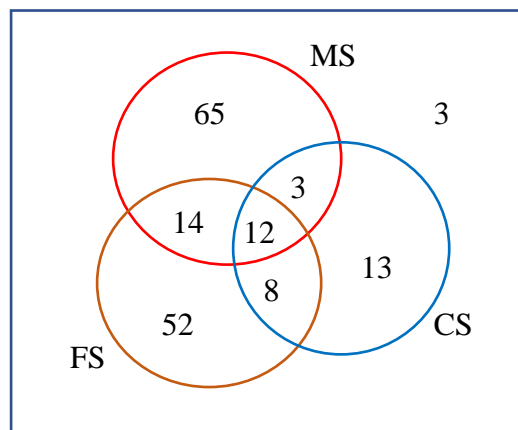
1 mark

44. Which of the following is true?
- A. The percentage of days having sales at least Rs. 70000 in Outlet I is more than that in outlet II.

- B. The percentage of days having sales at least Rs. 30000 in Outlet II is more than that in outlet I.
- C. The percentage of days having sales less than Rs. 60000 in Outlet I is more than that of Outlet II by 10%.
- D. The percentage of days having sales at least Rs. 50000 but less than Rs. 80000 is same for both Outlets I and II.

2 marks

A survey was done among 170 students in a College to find out what type of music they would like to be played in the canteen during lunch time. The survey had three choices: movie songs (MS), classical songs (CS) and folk songs (FS). The data is summarized in the following Venn Diagram. Answer questions 45-48 based on this diagram.



45. The number of students indicated preference for MS is
- A. 65.
  - B. 77.
  - C. 80.
  - D. 94.

1 mark

46. The number of students who do not like CS to be played is
- A. 134.
  - B. 131.
  - C. 154.
  - D. 157.

1 mark

47. The number of students preferring only one type of music is
- A. 84.
  - B. 36.
  - C. 86.
  - D. 130.

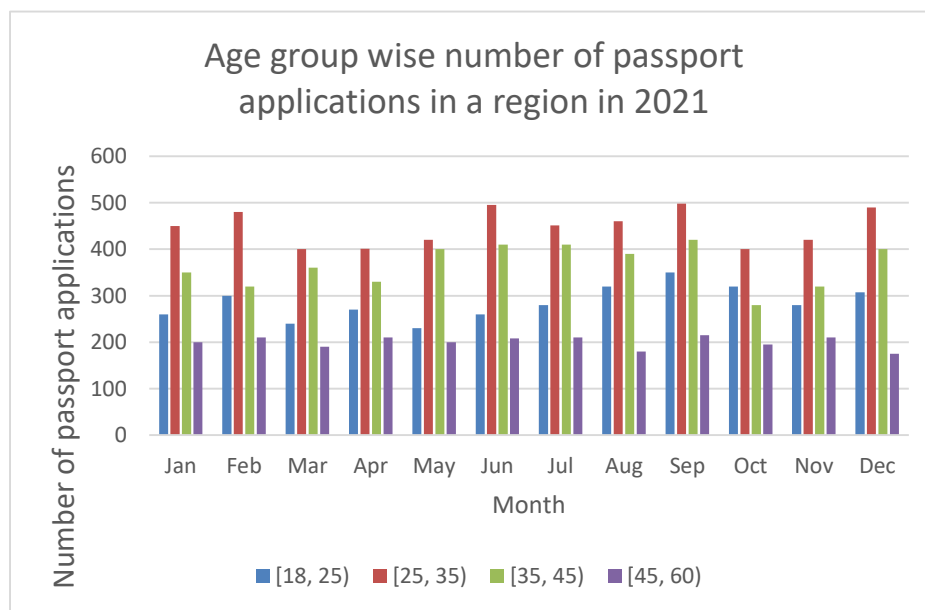
1 mark

48. The number of students who like both MS and CS is

- A. 15.
- B. 3.
- C. 23.
- D. 115.

1 mark

Answer questions 49-51 based on the following chart, which shows monthly number of passport applications of four age groups received in a regional passport center in 2021.



49. The number of applications received considering all age groups together is maximum in the month of

- A. Jun.
- B. Aug.
- C. Sep.
- D. Dec.

2 marks

50. Which age group has the lowest total number of applications in the whole year?

- A. [18, 25).
- B. [25, 35).
- C. [35, 45).
- D. [45, 60).

1 mark

51. Which of the following statements is true?

- A. The number of applications in the age group [18, 25) does not exceed 3000.
- B. The maximum number of applications is received in the age group [25, 35) which is more than 5000.

- C. The total number of applications does not exceed 14000.
- D. The number of applications received in the age group [25, 35) is maximum in the month of Dec.

3 marks

# English

52. Select the word that correctly completes the following sentence.

I am expecting a salary \_\_\_\_\_ with my experience.

- A. commensal.
- B. commensurate.
- C. equal.
- D. similar.

1 mark

53. Choose the word closest in meaning to the word “Charlatan”

- A. Cleaning lady.
- B. Fraud.
- C. Pudding.
- D. Rude person.

1 mark

54. Choose the word closest in meaning to the word “Taciturn”.

- A. Old man.
- B. Small pot.
- C. Understood.
- D. Reserved.

1 mark

55. Select the word that is closest in meaning to the word ‘Somnolence’.

- A. Loudness.
- B. Boredom.
- C. Sleepiness.
- D. Silence.

1 mark

56. Which of the following sentences is not correct?

- A. The committee comprised of older people.
- B. The committee was comprised of older people.
- C. The committee comprised older people.
- D. Older people comprised the committee.

1 mark

57. If you took an extra sheet and then found you didn’t need it, you would

- A. keep it back.

- B. put it up.
- C. put it back.
- D. keep it up.

1 mark

58. Which of these pairs has the same relationship as: “Colorful, colorless” ?

- A. Torrid, frigid.
- B. Torrid, horrid.
- C. Smelly, fragrant.
- D. Frigid, gelid.

1 mark

59. Choose the pair of words that most appropriately completes the following sentence:

The granting of your application is \_\_\_\_\_ upon your clearing all the requirements and your recommendation by a (an) \_\_\_\_\_ party.

- A. contingency, uninterested.
- B. contingency, disinterested.
- C. contingent, uninterested.
- D. contingent, disinterested.

1 mark

60. The following sentences are jumbled up. Choose the correct sequence from the options below.

- I. There remain major gaps, however, in our understanding of the larger picture of how organizational representatives describe their strategies to reach out to and partner with men and boys.
  - II. The strategies literature has also most often been constructed in a toolkit fashion for workers and agencies that may be engaging men and boys already and shaped by the conceptual framework of the organization creating the toolkit.
  - III. Current information is largely limited to some organizations' program descriptions and evaluations, thus focusing on broader program activities and likely omitting the subtler strategies involved in reaching out and appealing to men.
  - IV. Organizations and activists throughout the world have taken up the work of engaging men and boys in preventing violence against women and girls.
- A. I, II, III, IV.
  - B. IV, II, I, III.
  - C. IV, I, III, II.
  - D. II, III, IV, I.

2 marks

61. “Good preparation is the key to success in anything. If your foundations are weak, anything you build on them is likely to topple over. Foresight is always better than



hindsight, although until you acquire enough experience, hindsight is likely to be your only teacher.”

Which of these statements can we infer from the above passage?

- A. Good preparation depends on success.
- B. Foresight is a substitute for experience.
- C. Strong foundations are better than experience.
- D. Foresight develops after hindsight.

2 marks

Read the passage below and answer Question No. 62.

By the year 2050, nearly 80% of the Earth's population will live in urban centers. Applying the most conservative estimates to current demographic trends, the human population will increase by about three billion people by then. An estimated 10 hectares of new land (about 20% larger than Brazil) will be needed to grow enough food to feed them if traditional farming methods continue as they are practiced today. At present, throughout the world, over 80% of the land that is suitable for raising crops is in use. Historically, some 15% of that has been laid waste by poor management practices. What can be done to ensure enough food for the world's population to live on?

The concept of indoor farming is not new, since the hothouse production of tomatoes and other produce has been in vogue for some time. What is new is the urgent need to scale up this technology to accommodate another three billion people. Many believe an entirely new approach to indoor farming is required, employing cutting-edge technologies. One such proposal is for the 'Vertical Farm'. The concept is of multi-story buildings in which food crops are grown in environmentally controlled conditions. Situated in the heart of urban centers, they would drastically reduce the amount of transportation required to bring food to consumers. Vertical farms would need to be efficient, cheap to construct, and safe to operate. If successfully implemented, proponents claim, vertical farms offer the promise of urban renewal, sustainable production of a safe and varied food supply (through year-round production of all crops), and the eventual repair of ecosystems that have been sacrificed for horizontal farming.

It took humans 10,000 years to learn how to grow most of the crops we now take for granted. Along the way, we despoiled most of the land we worked on, often turning verdant, natural ecozones into semi-arid deserts. Within that same time frame, we evolved into an urban species, in which 60% of the human population now lives vertically in cities. This means that, for the majority, we humans have shelter from the elements, yet we subject our food-bearing plants to the rigors of the great outdoors and can do no more than hope for a good weather year. However, more often than not now, due to a rapidly changing climate, that is not what happens. Massive floods, long droughts, hurricanes, and severe monsoons take their toll each year, destroying millions of tons of valuable crops.

- I. What is a vertical farm?
  - i. Multi-storied buildings.
  - ii. Environmentally controlled crops.
  - iii. Multi-story buildings in which food crops are grown in environmentally controlled conditions.
- II. Which of the following statements may be concluded from the passage?
  - i. 60% of the human population will live in cities by 2050.
  - ii. Agriculture is responsible for despoiling land.
  - iii. Bad management practices have despoiled land.

- III. Which of the following statements may not be concluded from the passage?
- i. Climate change has made the future of agriculture uncertain.
  - ii. Vertical farming is a sustainable option for the future of agriculture.
  - iii. Vertical farming has no negative implications on agriculture.

62. The correct answers to I, II and III are

- A. iii, ii, iii, respectively.
- B. ii, i, i, respectively.
- C. ii, ii, iii, respectively.
- D. i, iii, ii, respectively.

3 marks

# Logical Reasoning

63. B said while introducing A “His brother’s father is the only son of my grandfather.” How is B related to A?
- A. Sister.
  - B. Daughter.
  - C. Mother.
  - D. Niece.

1 mark

64. If 1st January of 1996 was Monday, then how many Tuesdays did 1996 have?
- A. 53.
  - B. 52.
  - C. 51.
  - D. Cannot be determined.

1 mark

65. A clock shows 7 O’clock in the morning. By how much angle will the hour’s hand rotate when the clock shows 9 O’clock in the morning.
- A. 40 degrees.
  - B. 60 degrees.
  - C. 45 degrees.
  - D. 90 degrees.

1 mark

66. From a  $10 \times 10 \times 10$  cube, which is formed by combinations of  $1 \times 1 \times 1$  cubes, a layer of the smaller cubes is removed. What will be the number of  $1 \times 1 \times 1$  cubes present in this new cube?
- A. 488.
  - B. 900.
  - C. 512.
  - D. 729.

1 mark

67. Zafar and Yatika skip a class if any one of Arsal and Sujatha attend it, Which of the following inferences is correct?
- A. If it is found that Sujatha skipped a class, it may be concluded that Yatika attended it.
  - B. If it is found that Yatika skipped a class, it may be concluded that Zafar skipped it.
  - C. If it is found that Zafar attended a class, it may be concluded that Arsal skipped it.
  - D. If it is found that Zafar skipped a class, it may be concluded that Sujatha attended it.

1 mark

68. In a group of 85 persons, 45 play football and 37 play basketball and 8 play neither basketball nor football. Find the number of persons who play both football and basketball.
- A. 5.
  - B. 6.
  - C. 7.
  - D. 8.

1 mark

69. There are five friends – Seema, Leena, Elly, Hemant and Omkar. They have chosen to sit around a circular table facing center, each of them wearing a dress of unique colour – white, blue, purple, yellow and orange. The person wearing blue is seated second place to the right of the one wearing white. The one wearing yellow does not sit beside the one wearing purple. Hemant is seated exactly between the one wearing yellow and the one wearing orange. Hemant is wearing blue and seated second to the left of the Elly.

Who is wearing purple?

- A. Seema.
- B. Hemant.
- C. Omkar.
- D. Elly.

2 marks

70. In the question below some statements are given, followed by some conclusions. You have to take the given statements to be true even if they seem to be in variance with commonly known facts. Read all the conclusions and then decide which of the given conclusions logically follows from the given statements disregarding commonly known facts.

Statements:

- I. Only a mango can be an apple.
- II. No orange is grape.
- III. Some grape is guava.
- IV. Some guava is mango.

Conclusions:

- I. Some apple being guava is a possibility.
- II. Some grape is mango.
- III. Some mango being orange is a possibility.

- A. Only conclusion II follows.
- B. Both conclusion I and II follow.
- C. Only conclusion III follows.
- D. Both conclusion II and III follow.

2 marks

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