

mixture worth Rs $\frac{32}{3}$ a litre?

- a. 10 litres b. 15 litres c. 5 litres d. 20 litres

- Q14.** A man can row upstream at 10 km/hr and downstream at 18km/hr. Man's rate in still water in km/hr is
a. 14 b. 4 c. 12 d. 10
- Q15.** A boat covers 8 km in one hour along the stream and 12 km in one hour against the stream. The speed of the stream in km/hr is
a. 3 b. 5 c. 2 d. 4
- Q16.** Two pipes A and B can fill a tank in 20 minutes and 30 minutes respectively. If both the pipes are opened together , the time taken by them to half- full the cistern is
a. 12 minutes b. 6 minutes c. 9 minutes d. 18 minutes
- Q17.** A man can row a boat in still water at 15 km/hr and speed of water is 5 km/hr. The distance covered by the boat downstream in 24 minutes is
a. 4 km b. 8 km c. 6km d. 16 km
- Q18.** A pipe can empty $\frac{5}{6}$ of a cistern in 20 minutes. What part of cistern will be emptied in 9 minutes?
a. $\frac{3}{5}$ b. $\frac{4}{5}$ c. $\frac{3}{8}$ d. $\frac{5}{8}$
- Q19.** The ratio of investments of two partners A and B is 11:12 and the ratio of their profits is 2:3. If A invested the money for 8 months, then for how much time B invested his money?
a. 11 months b. 10 months c. 9 months d. 5 months
- Q20.** In a kilometer race, A beats B by 50 metres or 10 seconds. What time does A take to complete the race?
a. 200 seconds b. 190 seconds c. 210 seconds d. 150 seconds
- Q21.** In a game of 100 points, A can give B 10 points and C 18 points. Then, B can give C
a. 35:12 b. 45:41 c. 55:25 d. 35:41
- Q22.** If $x < 7$, then
a. $-x < -7$ b. $-x \leq -7$ c. $-x > -7$ d. $-x \geq -7$
- Q23.** If $-3x + 17 < -13$, then
a. $x \in (10, \infty)$ b. $x \in [10, \infty)$ c. $x \in (-\infty, 10]$ d. $x \in [-10, 10]$
- Q24.** If x is a real number and $|x| < 5$, then
a. $x \geq 5$ b. $-5 < x < 5$ c. $x \leq -5$ d. $-5 \leq x \leq 5$
- Q25.** Compute $2^{123} \pmod{29}$
- Q26.** There are total 50 coins of Rs. 1 and 50 paise in a bag. Total value of the coins is Rs. 35. What is the number of 50 paise coins in the bag?
- Q27.** 50 litres of glycerine is mixed with 200 litres of rose water. D litres of total mixture is taken out and 40 litres of glycerine and 50 litres of rose water is added in the mixture . The final mixture contains 30% glycerine. Find the quantity of the mixture that has taken out.

- Q29.** A pipe can fill a tank in 8 hours and another pipe can empty it in 10 hours. If both the pipes are opened simultaneously, find the time in which the tank is filled.
- Q30.** In a 100 m race, A can beat B by 10 m and B beats C by 5 m. In the same race find by how many meters A can beat C?
- Q31.** A sailor goes 12 km downstream in 48 minutes and return in 1 hr 20 minutes. Find the speed of the sailor in still water.
- Q32.** If $a > 0, b < 0$ such that $a > b$. Does $a^2 > b^2$ always hold?
- Q33.** Solve graphically: i. $3x + 2y \leq 6$ ii. $4x + 3y > 12$
- Q34.** The cost and revenue functions of a product are given by $C(x) = 3x + 700$ and $R(x) = 4x + 102$ respectively, where x is the number of items produced by the manufacturer. How many items manufacturer must sell to realize some profit?

Case-study based question

- Q35.** On her birthday, Seema decided to donate some money to children of an orphanage home. If there were 8 children less, everyone would have got Rs 10 more. However, if there were 16 children more, everyone would have got Rs 10 less. Let the number of children be x and the amount distributed by Seema for one child be y (in Rs). Based on the information given above, answer the following questions.
- i. The equations in terms x and y are
- | | |
|----------------------------------|----------------------------------|
| a. $5x - 4y = 40, 5x - 8y = -80$ | b. $5x - 4y = 40, 5x + 8y = 80$ |
| c. $5x - 4y = 40, 5x + 8y = -80$ | d. $5x + 4y = 40, 5x - 8y = -80$ |
- ii. The number of children who were given some money by Seema, is
- | | | | |
|-------|-------|-------|-------|
| a. 30 | b. 40 | c. 23 | d. 32 |
|-------|-------|-------|-------|
- iii. How much amount is given to each child by Seema?
- | | | | |
|----------|----------|----------|----------|
| a. Rs 32 | b. Rs 30 | c. Rs 62 | d. Rs 26 |
|----------|----------|----------|----------|
- iv. How much amount Seema spends in distributing the money to all the students of the Orphanage?
- | | | | |
|-----------|-----------|-----------|-----------|
| a. Rs 609 | b. Rs 960 | c. Rs 906 | d. Rs 690 |
|-----------|-----------|-----------|-----------|

UNIT-II (ALGEBRA)

Solve the following questions:-

- Q1.** If A and B are two matrices such that $AB = A$ and $BA = B$, then B^2 is equal to
- | | | | |
|--------|--------|------|------|
| a. B | b. A | c. 1 | d. 0 |
|--------|--------|------|------|

- Q2.** If $\begin{bmatrix} 2 & -1 & 3 \\ -4 & 5 & 1 \end{bmatrix}$ and $B \begin{bmatrix} 2 & 3 \\ 4 & -2 \\ 1 & 5 \end{bmatrix}$ then

- | | |
|-----------------------------------|---------------------------------------|
| a. Only AB is defined | b. Only BA is defined |
| c. AB and BA both are defined | d. AB and BA both are not defined |

- Q3.** If A is square matrix such that $A^2 = A$, then $(I + A)^3 - 7A$ is equal to:

- a. A b. I – A c. I d. 3A

- Q4.** If a matrix A is both symmetric and skew symmetric, then
a. A is a diagonal matrix b. A is a zero matrix
c. A is a scalar matrix d. A is a square matrix
- Q5.** If A and B are two matrices such that $AB = B$ and $BA = A$, then $A^2 + B^2$ is equal to
a. 2 AB b. 2 BA c. A + B d. AB
- Q6.** If A, B are square matrices of order 3, A is non singular and $AB = 0$, then B is a
a. Null matrix b. Singular matrix c. Unit matrix d. Non singular matrix
- Q7.** The number of all possible matrices of order 3 X 3 with each entry 0 or 1 is
a. 27 b. 18 c. 81 d. 512
- Q8.** If A and B are matrices of the same order, then $AB^T - B^T A$ is a
a. Skew Symmetric Matrix b. Null matrix c. Unit matrix d. Symmetric matrix

- Q9.** If $A = \begin{bmatrix} 2 & 0 & 0 \\ 0 & 2 & 0 \\ 0 & 0 & 2 \end{bmatrix}$, then A^5 is
a. 5 A b. 10 A c. 16 A d. 32 A

- Q10.** If A and B are square matrices of the same order and B is a skew-symmetric matrix, ABA' is a
a. Null matrix b. Symmetric matrix c. Skew-symmetric matrix d. None of these

- Q11.** If $\begin{vmatrix} 2x & 5 \\ 8 & x \end{vmatrix} = \begin{vmatrix} 6 & -2 \\ 7 & 3 \end{vmatrix}$, then value of x is
a. 3 b. ± 3 c. ± 6 d. 6

- Q12.** If $A = \begin{bmatrix} 2 & \lambda & -3 \\ 0 & 2 & 5 \\ 1 & 1 & 3 \end{bmatrix}$ then A^{-1} exist if the value of λ is
a. 2 b. 3 c. 15 d. None of these

- Q13.** Given $y = ax^2 + bx + c$ ($a, b, c \in R$), find the value of a, b and c if the graph of the given equation passes through (1,7), (-1,4) and (2,10).

- Q14.** If $A^2 = A$ find value of $(I + A)^2 - 3A$.

- Q15.** If $A = \begin{bmatrix} \cos \theta & \sin \theta \\ -\sin \theta & \cos \theta \end{bmatrix}$ then prove that $A^n = \begin{bmatrix} \cos n\theta & \sin n\theta \\ -\sin n\theta & \cos n\theta \end{bmatrix}, n \in N$.

- Q16.** Using E_R - transformation find the inverse of $A = \begin{bmatrix} 3 & 0 & -1 \\ 2 & 3 & 0 \\ 0 & 4 & 1 \end{bmatrix}$

Q17. Use the product $\begin{bmatrix} 1 & -1 & 2 \\ 0 & 2 & -3 \\ 3 & -2 & 4 \end{bmatrix} \begin{bmatrix} -2 & 0 & 1 \\ 9 & 2 & -3 \\ 6 & 1 & -2 \end{bmatrix}$ to solve the following system of equations:

$$x - y + 2z = 1; 2y - 3z = 1; 3x - 2y + 4z = 2.$$

Q18. Prove that $\begin{vmatrix} a^2 + 1 & ab & ac \\ ab & b^2 + 1 & bc \\ ca & cb & c^2 + 1 \end{vmatrix} = (1 + a^2 + b^2 + c^2)$

Q19. Evaluate using properties of determinant

$$\begin{vmatrix} 1 + a^2 - b^2 & 2ab & -2b \\ 2ab & 1 - a^2 + b^2 & 2a \\ 2b & -2a & 1 - a^2 - b^2 \end{vmatrix} = (1 + a^2 + b^2)^3$$

Q20. Using properties of determinants, prove the following $\begin{vmatrix} a^2 & bc & ac + c^2 \\ a^2 + ab & b^2 & ac \\ ab & b^2 + bc & c^2 \end{vmatrix} = 4a^2b^2c^2.$

Q21. Construct a 3×2 matrix, whose elements are given by $a_{ij} = e^{ix} \sin_j x$.

Q22. If $\begin{bmatrix} a + 4 & 3b \\ 8 & -6 \end{bmatrix} = \begin{bmatrix} 2a + 2 & b + 2 \\ 8 & a - 8b \end{bmatrix}$, then write the value of $a - 2b$.

Q23. Solve the given system of equations using determinants

$$x + y + z = 1, ax + by + cz = k \text{ and } a^2x + b^2y + c^2z = k^2$$

Q24. There are 2 co-dependent industries in an company producing 2 products- Product 1 and Product 2. It takes 0.3 units of Product 1 and 0.2 units of Product 2 to make each unit of Product 1. It takes 0.5 units of Products 1 and 0.4 units of Product 2 to make each unit of Product 2. There is no external demand. Calculate the required production of the 2 industries.

Case-study based question

Q25. Two organizations A and b want to award their selected employees on the values of Honesty, Hard work and Punctuality. The organization A wants to awards Rs x each, Rs y each and Rs z each for the three respective values to its 3, 2 and 1 employees respectively with a total award money of Rs 2000. Organization B wants to spends Rs 3000 to awards its 4, 1 and 3 employees on the respective values (by giving the same award money to the three values as organization A).

The total amount of award for one prize on each values is Rs 900.

On the basis of the above information, answer the following questions.

i. What is the award money for Honesty?

a. Rs 350

b. Rs 300

c. Rs 500

d. Rs 400

- ii. What is the award money for Punctuality?
 a. Rs 300 b. Rs 280 c. Rs 500 d. Rs 450
- iii. What is the award money for Hard work?
 a. Rs 500 b. Rs300 c. Rs100 d. Rs5500
- iv. If a matrix B is both symmetric and skew symmetric , then $|B|$ is equal to
 a. 1 b. 0 c. -1 d. None of these
- v. If P and Q are two matrices such that $PQ = Q$ and $QP = P$, then $|Q^2|$ is equal to
 a. $|Q|$ b. $|P|$ c. 1 d. 0

UNIT-III (CALCULUS)

Solve the following questions:-

- Q1.** The function $f(x) = x^x$ decreases on the interval
 a. $(0, e)$ b. $(0, 1)$ c. $\left(0, \frac{1}{e}\right)$ d. $\left(\frac{1}{e}, e\right)$
- Q2.** The function $f(x) = x^9 + 3x^7 + 64$ is increasing on
 a. \mathbb{R} b. $(-\infty, 2)$ c. $(0, \infty)$ d. \mathbb{R}_0
- Q3.** The interval on which the function $f(x) = 2x^3 + 9x^2 + 12x - 1$ is decreasing, is
 a. $[-1, \infty]$ b. $[-2, -1]$ c. $(-\infty, 2]$ d. $[-1, 1]$
- Q4.** Function $f(x) = a^x$ is increasing on \mathbb{R} , if
 a. $a > 0$ b. $a < 0$ c. $0 < a < 1$ d. $a > 1$
- Q5.** The maximum value of $\left(\frac{1}{x}\right)^x$ is
 a. e b. e^e c. $(e)^{\frac{1}{e}}$ d. $\left(\frac{1}{e}\right)^{\frac{1}{e}}$
- Q6.** The minimum value of the function $f(x) = 2x^3 - 21x^2 + 36x - 20$ is
 a. -128 b. -126 c. -120 d. 2
- Q7.** If $x + y = 8$, then the maximum value of xy is
 a. 8 b. 16 c. 20 d. 24
- Q8.** The function $f(x) = 2x^3 - 3x^2 - 12x + 4$, has
 a. two points of local maximum b. two points of local minimum
 c. one maximum and one minimum d. no maximum no minimum
- Q9.** Find an approximate value of $f(2.02)$, where $f(x) = 2x^2 + 5x + 3$
- Q10.** Find the interval on which the function $f(x) = 2 \log(x-2) - x^2 + 4x + 1$ is increasing or decreasing.

Q11. Find the points of local maximum and minimum (if any) and the corresponding maximum and minimum values of the following functions:

i. $f(x) = x + \frac{1}{x}, x \neq 0$

ii. $f(x) = (\log x)^2, x > 0$

Q12. If the sum of the surface areas of cube and a sphere is constant, what is the ratio of an edge of the cube to the diameter of the sphere, when the sum of their volumes is minimum.

Q13. Find the equation of the tangent and the normal, to the curve $16x^2 + 9y^2 = 145$ at the point (x_1, y_1) , where $x_1 = 2$ and $y_1 > 0$.

Q14. Find the intervals in which the function $f(x) = \frac{x^4}{4} - x^3 - 5x^2 + 24x + 12$ is

i. strictly increasing

ii. strictly decreasing.

Q15. The volume of a cube increases at a constant rate. Prove that the increase in its surface area varies inversely as the length of the side.

Q16. If the length of three sides of a trapezium other than the base are each equal to 10cm, then find the area of the trapezium, when it is maximum.

Q17. Evaluate :-

i. $\int \cos^{-1}(\sin x) dx$	ii. $\int \frac{3x+5}{x^2+3x-18} dx.$
iii. $\int (3-2x)\sqrt{2+x-x^2} dx$	iv. $\int e^{-3x} \cos^3 x dx$
v. $\int \frac{\sec^2 x}{\sqrt{\tan^2 x + 4}} dx$	vi. $\int_0^\pi \frac{x \sin x}{1 + \cos^2 x} dx$
vii. $\int_0^2 (x^2 + 3) dx$	viii. $\int_0^\pi \frac{5 \sin x + 3 \cos x}{\sin x + \cos x} dx$
ix. $\int_1^2 \frac{x}{(x+1)(x+2)} dx$	x. $\int x \log(1+2x) dx$
xi. $\int \sqrt{x^2 - 9} dx$	xii. $\int_2^4 (x-2 + x-3 + x-4) dx$

Q18. Find the area bounded by the curve $x^2 = 4y$ and the straight line $x = 4y - 2$.

Q19. Find the area of the region bounded by the parabola $y = x^2$ and $y = |x|$.

Q20. Find the area of the region bounded by the parabola $y^2 = 4ax$ and $x^2 = 4ay$.

Q21. Using integration, find the area of the region bounded by the line $x - y + 2 = 0$, the curve $x = \sqrt{y}$ and y axis.

Q22. Using integration, find the area of the region in the first quadrant enclosed by the x - axis, the line $y = x$ and the circle $x^2 + y^2 = 32$.

Q23. Find the order and degree of the following differential equations -

i. $\frac{d^4 y}{dx^4} + \sin x = \left(\frac{d^2 y}{dx^2}\right)^5$ ii. $\left[1 + \left(\frac{dy}{dx}\right)^2\right]^{\frac{3}{2}} = k \frac{d^2 y}{dx^2}$

Q24. $(x^2 - 1)\frac{dy}{dx} + 2xy = \frac{1}{x^2 - 1}$.

Q25. $x^2 dy + y(x + y) dx = 0$ given that $y = 1$ when $x = 1$.

Q26. $x dy - y dx = \sqrt{x^2 + y^2} dx$

Q27. $(y + 3x^2)\frac{dx}{dy} = x$

Q28. $x dy + (y - x^3) dx = 0$

Case-study based question

Q29. Vihan's father wants to construct a rectangular field using a brick wall on one side of the garden and wire fencing for the other three sides as shown in figure. He has 400 ft of wire fencing.



Based on the above information, answer the following questions

- i. To construct a field using 400 ft of fencing, we need to maximize its
 - a. volume
 - b. area
 - c. perimeter
 - d. length of the side
- ii. If a denotes the length of side field perpendicular to brick wall and b denotes the length of side field parallel to brick wall, then find the relation representing total amount of fencing wire
 - a. $a + 2b = 150$
 - b. $a + 2b = 500$
 - c. $b + 2a = 400$
 - d. $b + 2a = 100$
- iii. Area of the field as a function of a say $A(a)$ can be represented as
 - a. $400 + 2a^2$
 - b. $a - 2a^2$
 - c. $400a - 2a^2$
 - d. $400 - a^2$
- iv. Maximum value of $A(a)$ occurs at a equals
 - a. 100 ft
 - b. 50 ft
 - c. 26 ft
 - d. 31 ft
- v. Maximum area of field will be
 - a. 2500 sq ft
 - b. 4000 sq ft
 - c. 20000 sq ft
 - d. 6000 sq ft

UNIT-IV (PROBABILITY DISTRIBUTIONS)

- Q1.** A random variable X takes the values 0,1,2,3 and its mean is 1.3. If $P(X = 3) = 2P(X = 1)$ and $P(X = 2) = 0.3$, then $P(X = 0)$ is
a. 0.1 b. 0.2 c. 0.3 d. 0.4

- Q2.** For the following probability distribution

X	-4	-3	-2	-1	0
P(X)	0.1	0.2	0.3	0.2	0.2

The value of $E(X)$ is:

- a. 0 b. -1 c. -2 d. -1.8
- Q3.** If X follows a binomial distribution with parameters $n = 100$ and $p = 1/3$, then $P(X = r)$ is maximum when r is equal to
a. 32 b. 34 c. 33 d. 31
- Q4.** A coin is tossed 10 times. The probability of getting exactly six heads is
a. $\frac{512}{515}$ b. $\frac{105}{512}$ c. $\frac{100}{153}$ d. ${}^{10}C_6$
- Q5.** In a binomial distribution, the probability of getting success is $\frac{1}{4}$ and standard deviation is 3. Then, its mean is
a. 6 b. 8 c. 12 d. 10
- Q6.** A coin is tossed n times. The probability of getting at least once is greater than 0.8. Then, the least value of n, is
a. 2 b. 3 c. 4 d. 5
- Q7.** The probability of guessing correctly at least 8 out of 10 answers of a true false type examination is
a. $7/64$ b. $7/128$ c. $45/1024$ d. $7/41$
- Q8.** A five digit number is written down at random. The probability that the number is divisible by 5 and no two consecutive digits are identical, is
a. $\frac{1}{5}$ b. $\frac{1}{5} \left(\frac{9}{10}\right)^3$ c. $(3/5)^4$ d. none of these
- Q9.** A coin is tossed 4 times. The probability that at least one head turns up, is
a. $1/16$ b. $2/16$ c. $14/16$ d. $15/16$
- Q10.** Find the probability distribution of the number of heads when three coins are tossed.
- Q11.** Two cards are drawn successively with replacement from a well shuffled deck of 52 cards. Find the probability distribution of the number of aces.
- Q12.** 3 defective bulbs are mixed with 7 good ones. Find the probability distribution of the number of defective bulbs, if three bulbs are drawn at random.
- Q13.** A dice is thrown thrice. Find the mean and variance of the number of times a 'six' is obtained.
- Q14.** Find the variance of the following distribution :

X	0	1	2	3	4	5
P(X)	1/6	5/18	2/9	1/6	1/9	1/18

- Q15.** It is known that 10% of certain articles manufactured are defective . What is the probability that in a random sample of 12 such articles, 9 are defective?
- Q16.** How many times must a fair coin be tossed so that the probability of getting at least one head is more than 80% ?
- Q17.** If on an average, 9 ships out of 10 return safely to ports, find the mean and standard deviation of ships returning safely, out of a total of 500 ships.
- Q18.** If the standard deviation of a Poisson variable X is $\sqrt{3}$, then find $P(X > 0)$
- Q19.** The income distribution of officers of a certain company was found to follow normal distribution. The average income of an officer was Rs. 15000. The standard deviation of the income of officers was Rs. 5000. If there were 242 officers drawing salary above Rs.18500, how many officers were there in the company?
- Q20.** The I.Q.'s of army volunteers in a given year are normally distributed with mean $\mu = 110$ and standard deviation (σ) = 10. The army wants to give advanced training to 20% of those recruits with the highest scores. What is the lowest I.Q. score acceptable for the advanced training?
- Q21.** The probability distribution of a random variable X is given as under:

$$P(X = x) = \begin{cases} kx^2, & x = 1, 2, 3 \\ 2kx, & x = 4, 5, 6 \\ 0, & \text{otherwise} \end{cases}$$

where k is constant.

Based on the above information, answer the following questions:

- i. What is the value of k?
- a. $\frac{1}{22}$ b. $\frac{1}{44}$ c. $\frac{1}{46}$ d. $\frac{1}{56}$
- ii. $P(X < 4) =$
- a. $\frac{3}{22}$ b. $\frac{7}{22}$ c. $\frac{15}{22}$ d. $\frac{17}{22}$
- iii. $P(X \geq 4) =$
- a. $\frac{3}{22}$ b. $\frac{7}{22}$ c. $\frac{15}{22}$ d. $\frac{17}{22}$
- iv. $E(X) =$
- a. $\frac{95}{22}$ b. $\frac{81}{22}$ c. $\frac{75}{22}$ d. $\frac{67}{22}$
- v. $E(3X^2) =$
- a. $\frac{532}{11}$ b. $\frac{643}{22}$ c. $\frac{785}{11}$ d. $\frac{681}{11}$

UNIT-V(INFERENTIAL STATISTICS)

Solve the following questions:-

- Q1.** An observed set of the population that has been selected for analysis is called
a. a sample b. a process c. a forecast d. a parameter
- Q2.** A population consists of four observations 1, 3, 5, 7. What is the variance?
a. 2 b. 4 c. 5 d. 6
- Q3.** A specific characteristic of a population is known as
a. parameter b. a sample c. statistic d. mean
- Q4.** If we reject the null hypothesis, we might be making
a. type-I error b. type-II error c. a correct decision d. none of these
- Q5.** A statement made about a population parameter for testing purpose is called
a. statistic b. parameter c. hypothesis d. level of significance
- Q6.** A population consists of five numbers (5, 3, 6, 7,9). Find the point estimate for population mean and population variance.
- Q7.** The marks scored by five students in a test of Mathematics carrying 100 marks are 50,50,60,60 and 40. Find the standard error of the sample mean.
- Q8.** The mean and variance of a random sample of 64 observations were computed as 160 and 100 respectively .
i. Compute the 95% confidence limits for population mean.
ii. In view of 95% confidence interval in estimating population mean, if error should not exceed ± 1.4 , how many additional observations are required?
- Q9.** The average number of articles produced by two machines per day are 150 and 100 with $S = 18$. On the basis of records of 14 day's production, can you regard both machines equally efficient at 1% level of significance?
- Q10.** Find the t-test value for the following two samples from a population:
SET-I 6, 4, 9, 5
SET-II 2, 5, 6, 3
- Q11.** Certain medicine is packed in bags by a machine. A random sample of 10 bags were drawn and their contents are found to weigh (in kg) as follows
40, 45, 48, 50, 52, 55, 45, 52, 63, 40.
Test if the average packing can be taken to be 50 kg.[Given : $t_{9,0.05} = 1.833$]

Case-study based question

The American Association of Individual Investors conduct an investor sentiment survey every week to determine the number of investors who are Bullish, Bearish or Neutral on the short term prospects for the stock market. A Bullish investor believes that price of one or more securities will rise.

A Bearish investor believes that price of one or more securities will fall.

An investor who is neither bullish nor bearish i.e. insensitive to the market price is called Neutral. The poll results of AAI for the week ending November 29,2008 are as follows:
Bullish 208, Bearish 150, Neutral 142

Based on the above information, answer the following questions:

- i. The point estimate of the population proportion of all AAI subscribers who are bullish, is

- a. 0.416 b. 0.284 c. 0.3 d. 0.208
- ii. The point estimate of the population proportion of all AAI subscribers who are bearish, is
a. 0.416 b. 0.284 c. 0.3 d. 0.208
- iii. The point estimate of the population proportion of all AAI subscribers who are neutral, is
a. 0.416 b. 0.284 c. 0.3 d. 0.208
- iv. A 95% confidence interval for the population proportion of AAI subscribers who are bullish, is
a. (0.379, 0.452) b. (0.386, 0.423) c. (0.365, 0.478) d. (0.373, 0.459)

UNIT-VI (INDEX NUMBERS AND TIME-BASED DATA)

Solve the following questions:-

- Q1.** Price relative of coal is 125 in 2011 compared to 2010. If the coal cost Rs. 8 per kg in 2010, then its cost in 2011 is
a. Rs. 6 per kg b. Rs. 8 per kg c. Rs. 10 per kg d. Rs. 12 per kg
- Q2.** The wholesale price index(or price relative) of rice in 2018 compared to 2015 is 150. If the cost of rice was Rs 24 per kg in 2015, the cost in 2018 is:
a. Rs 36 per kg b. Rs 34 per kg c. Rs 40 per kg d. Rs 38 per kg
- Q3.** Net monthly income of an employee was Rs 6000 per month in 2010 and Rs 9000 per month in 2015. If consumer price index in 2010 was 150, find the consumer price index for 2015, given that net income of the employee linked to consumer price index.
a. 225 b. 250 c. 200 d. 275
- Q4.** During a certain period, the cost of living index number goes from 110 to 200 and the salary of a worker is also from Rs 3250 to Rs 5000. Does the worker really gains or losses, and by how much amount in real terms?
a. loses Rs 45450 b. Gains Rs 45450 c. Loses Rs 50000 d. Gains Rs 50000
- Q5.** Calculate index number for 2020 from the following data using simple average of price relatives.

Item	Price in 2019(in Rs)	Price in 2020(in Rs)
A	200	320
B	400	420
C	100	120
D	40	60
E	20	28

- a. 150 b.135 c.145 d.155
- Q6.** From the following data, calculate index number by simple aggregate method.

Commodity :	A	B	C	D
Price in 1981(Rs):	166	228	264	125
Price in 1982(Rs):	169	132	195	135

- Q7.** From the following data calculate the price index numbers for 1990 with 1980 as base year
- Laspeyre's method
 - Paasche's method
 - Marshall edge worth method and
 - Fisher's ideal method

Commodities	1980		1990	
	Price	Quantity	Price	Quantity
A	30	7	50	12
B	60	13	70	6
C	30	16	60	16
D	10	23	30	26

- Q8.** Calculate the weighted price index from the following data :

Material Required	Unit	Quantity Required	Price	
			1954	1964
Rubber	100 lb	600 lb	6.0	9.0
Timber	cft	3000 cft	8.5	12.2
Steel sheets	cwt	60 cwt	30.0	44.4
Bricks	per 000	20000	12.5	24.0

- Q9.** A business corporation spent Rs. 10, Rs. 50 and Rs. 20 on three commodities in 1995. The corporation raised their expenditure to Rs. 100, Rs.60 and Rs. 40 in 2000 respectively. If the number of units of the three commodities bought in 1995 and 2000 similar, calculate the price index for 2000 using any suitable method.
- Q10.** For the following series of observations verify that the 4 years centered moving average is equivalent to a 5 years, weighted moving average with weights 1, 2, 2, 2, 1 respectively.

Year	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
Annual sales Rs.(000)	2	6	1	5	3	7	2	6	4	8	3

- Q11.** What is moving average? What are its uses in analysis of time series? Given the numbers 3, 7, 4,9, 2, 6, 1 write down the weighted moving average of period 3, the weights being 1,4,1.
- Q12.** The linear trend of sales of a company is Rs. 6,50,000 in 2000 and it is rises by Rs. 16,500 per year.
- Write down the trend equation.
 - The sales of the company will be 10% below the forecast trend sales in 2003, find its expected values of sales in 2003.

Q13. Verify for the observations below that the 2 year centered moving average is equivalent to a 3 year weighted moving average with 1, 2, 1 respectively.

Year	1980	1981	1982	1983	1984	1985	1986
Values	2	4	5	7	8	10	13

Case-study based question

Q14. The prices and the quantities of some commodities are given below:

Commodity	Prices (Rs)		Quantities	
	p_0	p_1	q_0	q_1
A	38	35	6	7
B	12	18	7	y
C	x	15	10	15
D	25	30	12	16
E	30	33	8	10

Given that $\sum p_0q_0 = 952$ and $\sum p_1q_1 = 1460$.

Based on the above information, answer the following questions:

- i. The value of x is
 - a. 10
 - b. 12
 - c. 15
 - d. 20
- ii. The value of y is
 - a. 7
 - b. 10
 - c. 15
 - d. 18
- iii. Laspeyre's index number is
 - a. 116.6
 - b. 115.8
 - c. 114.9
 - d. 113.8
- iv. Paasche's index number is
 - a. 116.8
 - b. 115.9
 - c. 117.46
 - d. 118.12
- v. Fisher's ideal index number is
 - a. 116.82
 - b. 117.36
 - c. 117.98
 - d. 118.39

UNIT-VII(FINANCIAL MATHEMATICS)

Solve the following questions:-

- Q1.** The present value of a sequence of payments of Rs 800 made at the end of every 6 month and continuing forever, if money is worth 4% p.a. compounded semi-annually, is
 - a. Rs 20000
 - b. Rs 40000
 - c. Rs 60000
 - d. Rs 80000
- Q2.** At what rate of interest will the present value of a perpetuity of Rs 500 payable at the end of each quarter be Rs 40000?
 - a. 1.25% p.a.
 - b. 2.5% p.a.
 - c. 5% p.a.
 - d. 6% p.a.
- Q3.** If Jagbeer invests Rs 10320 on Rs 199 shares at a discount of Rs 14, then the number of shares he buys is
 - a. 110
 - b. 120
 - c. 130
 - d. 150
- Q4.** At what price should a 6.25%, Rs 50 shares be quoted, when the money is worth 10%?
 - a. Rs 55
 - b. Rs 56.25
 - c. Rs 53.125
 - d. Rs 31.25
- Q5.** The dividend received on 60 shares of Rs 20 each, if 9% dividend is declared is

a. Rs 54

b. Rs 108

c. Rs 162

d. Rs 18

- Q6.** Find the effective rate of interest corresponding to 12% nominal rate compounded quarterly.
- Q7.** Find the force of interest corresponding to the effective rate 8%.
- Q8.** Which is the better investment from the stand point of the investor 5.5% compounded semi annually or 6% compounded monthly?
- Q9.** A money lender charges interest at the rate of 15 paise per rupee per month, payable in advance. What effective rate of interest does he charge per annum?
- Q10.** Find the nominal rate compounded quarterly equivalent to 6% compounded semi-annually.
- Q11.** A sum of Rs. 54,000 invested at $r\%$ compounded quarterly will provide payments of Rs. 600 each at the end of every 3 months. Find the value of r .
- Q12.** A company has a machine whose life is 10 years. If the rate of interest is calculated @ 10% effective, how much money must be set aside at the end of every year into a sinking fund to replace the old machine by a new one that will cost Rs. 70,000 at the end of 10th year?
- Q13.** Mr. Ramesh have set up a sinking fund in order to have Rs. 50,000 in 10 years for his son's higher education . What amount he has to set aside at the end of every month into the fund paying 6% per annum compounded monthly?
- Q15.** A machine costing Rs. 50,000 is expected to have a useful life of 5 years and a final scrap value of Rs. 20,000. Using linear method of depreciation:
- Find annual depreciation
 - Construct the depreciation schedule
- Q16.** A music band company has gained much popularity all over the country. They buy a bus to travel to their destination. The purchase price is \$2,00,000. The bus will be depreciated linearly over 10 years and will have a scrap value of \$1,00,000.
Answer the following questions:
- What is the rate of depreciation ?
 - Write the linear equation of depreciation ?
 - What will be the book value of the bus at the end of seventh year?
 - When will the bus be worth \$1,50,000?
- Q17.** A person invests Rs. 14880 partly in 5% debentures at Rs. 216 and partly in 4% debentures At Rs. 224. His income from each debenture is same . How much does he invest in each debenture?
- Q18.** Mr. Sharma has taken a loan of Rs. 10,00,000 with interest rate 11% for the period of 15 years. Calculate (reducing) EMI for the above data.

Case-study based question

A man has invested Rs. 5,00,000 in a financial plan and after the completion of 8 years, he received a sum of Rs. 7,80,000.

On the basis of above information, answer the following questions

- Absolute Return is

Based on the above information, answer the following questions

- i. Objective function of a LPP is
 - a. a constant
 - b. a function to be optimized
 - c. a relation between the variables
 - d. None of these

- ii. Which of the following statement is true?
 - a. Every LPP has at least one optimal solution
 - b. Every LPP has a unique optimal solution
 - c. If an LPP has two optimal solutions, then it has infinitely many solutions
 - d. None of these

- iii. In solving the LPP: "minimize $f = 6x + 10y$ subject to the constraints:
 $x \geq 6, y \geq 6, 2x + y \geq 10, x \geq 0, y \geq 0$ redundant constraints are
 - a. $x \geq 6, y \geq 6$
 - b. $2x + y \geq 10, x \geq 0, y \geq 0$
 - c. $x \geq 6$
 - d. None of these

- iv. If the corner points of the feasible region for the LPP are $(0, 3), (5, 0), (6, 8), (0, 8)$.
Let $Z = 4x - 6y$ be the objective function. Then minimum value of Z occurs at
 - a. $(6, 8)$
 - b. $(5, 0)$
 - c. $(0, 3)$
 - d. $(0, 8)$

- v. Corner points of the feasible region for the LPP are $(0, 3), (5, 0), (6, 8), (0, 8)$.
Let $Z = 4x - 6y$ be the objective function. Then maximum value of Z occurs at
 - a. $(6, 8)$
 - b. $(5, 0)$
 - c. $(0, 3)$
 - d. $(0, 8)$