

Seat No.:

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Sl. No. :

135(E)
(February, 2026)

Time : 3 Hours]**[Maximum Marks : 100****Instructions :**

- (1) This question paper contains 6 sections and overall 61 questions.
- (2) Use of simple calculator is allowed.
- (3) Z-table can be used.
- (4) General options are given in question paper. The questions related to diagram/graph/picture are given with internal option and they are only for blind students.
- (5) In this question paper Q. No. 52 (B), 53 (B) are only for blind students.

SECTION - A

■ Choose the correct alternatives from the following multiple choice type questions and write them. Each question carries 1 mark : [20]

- 1) Which expenditure of items is assigned as weights in the method of family budget?
 - (A) Expenditure of selected year
 - (B) Average annual expenditure
 - (C) Expenditure of base year
 - (D) Expenditure of current year
- 2) If $I_P = I_F$, which of the following statements is true?
 - (A) $I_P = 2I_L$
 - (B) $I_F = \frac{I_L}{2}$
 - (C) $I_F = I_P = I_L$
 - (D) $4I_F = I_L$

- 3) Which kind of the correlation can be obtained if the two variables are varying in opposite direction in constant proportion?
- (A) Partial Positive Correlation
(B) Perfect Negative Correlation
(C) Perfect Positive Correlation
(D) Partial Negative Correlation
- 4) If $r(x, y) = 0.7$ then what is the value of $r(x + 0.2, y + 0.2)$?
- (A) 0.7 (B) 0.9
(C) 1.1 (D) -0.7
- 5) The best fitted line of regression can be obtained by which method?
- (A) Least Square Method
(B) Karl Pearson's Method
(C) Maximum Square Method
(D) Bowley's Method
- 6) The regression line of Y on X is $\hat{y} = 30 - 1.5x$. What is the value of \bar{y} if $\bar{x} = 10$?
- (A) 28.5 (B) 20
(C) 15 (D) 45
- 7) Which component of the time series is impossible to predict?
- (A) Random component
(B) Trend
(C) Seasonal component
(D) Cyclical component
- 8) Which method of finding trend is best to eliminate the effect of repetitive short-time variations?
- (A) Graphical method
(B) Method of least square
(C) Karl Pearson's method
(D) Method of moving average

- 9) Which of the following options is true for any event A of the sample space?
- (A) $P(A) < 0$ (B) $0 \leq P(A) \leq 1$
 (C) $0 \leq P(A) \leq 1$ (D) $P(A) > 1$
- 10) What is the total number of sample points in the sample space formed by throwing three six-faced balanced dice simultaneously?
- (A) 6^2 (B) 3^6
 (C) 6×3 (D) 6^3
- 11) Which variable of the following will be an illustration of discrete variable?
- (A) Height of a student
 (B) Weight of a student
 (C) Blood pressure of a student
 (D) Birth year of a student
- 12) Mean and variance of a discrete probability distribution are 3 and 7 respectively. What will be $E(X^2)$ for this distribution?
- (A) 10 (B) 4
 (C) 40 (D) 16
- 13) For which value of x , the value of $p(x)$ of binomial distribution with parameters $n = 4$ and $p = \frac{1}{2}$ becomes maximum?
- (A) 0 (B) 2
 (C) 3 (D) 4
- 14) For a normal variable X with mean μ and standard deviation σ , which of the following is standard normal variable Z for it?
- (A) $Z = \frac{x - \sigma}{\mu}$ (B) $Z = \frac{\sigma - x}{\mu}$
 (C) $Z = \frac{\mu - x}{\sigma}$ (D) $Z = \frac{x - \mu}{\sigma}$

- 15) In normal distribution, usually which limits include 99% of the observations?
- (A) $\mu \pm 1.96\sigma$
(B) $\mu \pm 2\sigma$
(C) $\mu \pm 3\sigma$
(D) $\mu \pm 2.57\sigma$
- 16) For a normal distribution, approximate value of mean deviation is 20. Which of the following is the value of quartile deviation?
- (A) $\frac{25}{3}$
(B) $\frac{32}{3}$
(C) 24
(D) $\frac{50}{3}$
- 17) What is the modulus form of 0.3 neighbourhood of 3?
- (A) $|x - 0.3| < 3$
(B) $|x - 3| < 0.3$
(C) $|x + 3| < 0.3$
(D) $|x - 3| > 0.3$
- 18) What is the value of $\lim_{x \rightarrow 4} \sqrt{4x+9}$?
- (A) 5
(B) 25
(C) $\frac{7}{4}$
(D) 7
- 19) If $y = ax + b$, a and b are constant then what will be $\frac{dy}{dx}$?
- (A) a (B) b
(C) $a + b$ (D) 0

- 20) If the function $f(x)$ is increasing at $x = a$ then which is the correct option from the following?
- (A) $f'(a) < 0$
(B) $f'(a) > 0$
(C) $f'(a) = 0$
(D) $f''(a) > 0$

SECTION - B

- Answer the following questions in one sentence each. Each question carries 1 mark :

[10]

- 21) Write the formula to find Real wage.
- 22) Define correlation coefficient.
- 23) State the Linear Regression model.
- 24) What is the notation to show the cyclical component of the time series?
- 25) Arrange $P(A \cup B), P(A), P(A \cap B), 0, P(A) + P(B)$ in the ascending order.
- 26) The probability of failure in a binomial distribution is 0.6 and the number of trials in it is 5. Find the probability of success.
- 27) What is the shape of normal curve?
- 28) For a probability distribution of standard normal variable, state the estimated limits for the middle 50% observations.
- 29) Express $|x - 10| < \frac{1}{10}$ in neighbourhood form.
- 30) How will be the first order derivative of a function at $x = a$ if function is decreasing at $x = a$?

SECTION - C

- Answer the following Any 7 out of 9 questions as directed.
Each question carries 2 marks :

[14]

- 31) If the cost of living index number of the current year has increased to 180 from the base year index number 100 and if the average income of workers has increased from ₹ 6,000 to ₹ 9,000, is there an increase or decrease in the purchasing power of the workers? How much is it?
- 32) The following results are obtained from a bivariate data $n=10, \Sigma(x-\bar{x})(y-\bar{y})=72, S_x=3$ and $\Sigma(y-\bar{y})^2=160$. Find the correlation coefficient.
- 33) The fitted regression line of Y on X is $\hat{y}=23.2-1.2x$ and one of the observations used in fitting of the line is (6, 17). Find the error in estimating Y for X=6.
- 34) State the limitations of graphical method.
- 35) State the law of addition of probability for two events A and B. Write the law of addition of probability if these two events are mutually exclusive.
- 36) Write any 2 properties of Bernoulli's Trials?
- 37) If $N(3, b) = (2.95, k)$ then find the values of b and k.
- 38) Find the value of $\lim_{x \rightarrow 1} \frac{3x^2 - 4x + 1}{x - 1}$.
- 39) If $f(x) = 3x^2 + 2x + 1$ then find $f'(x)$ and hence obtain $f'(-1)$.

SECTION - D

- Answer the following Any 8 out of 12 questions as directed.
Each question carries 3 marks :

[24]

- 40) The chain base index numbers of agricultural production of a state from the year 2008-2013 are as follows. Compute the fixed base index numbers (Take 2007 as base year) :

| Year | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 |
|---|------|------|------|------|------|------|
| Index Number of Agricultural Production | 100 | 110 | 95 | 108 | 120 | 106 |

- 41) The information about six different items used in the furniture items is as follows. Find the index number for the year 2015 with the base year 2014 and interpret it :

| Items | A | B | C | D | E | F |
|------------------------|----|----|----|----|----|----|
| Weight | 17 | 15 | 22 | 16 | 12 | 18 |
| Price in Year 2014 (₹) | 30 | 20 | 50 | 32 | 40 | 16 |
| Price in Year 2015 (₹) | 24 | 24 | 70 | 40 | 48 | 24 |

- 42) The following data is available for two variables rainfall in mm(X) and yield of crop Qtl/Hec(Y): $n = 10, \bar{x} = 120, \bar{y} = 150,$
 $S_x = 30, S_y = 40$ and $\Sigma xy = 1,89,000$. Find correlation coefficient.
- 43) The following measures obtained to study the relation between rainfall in cm(X) and yield of Bajri in Quintal per hectare (Y) in ten different regions during monsoon:

$$n = 10, \bar{x} = 40, \bar{y} = 175, S_x = 12, \text{Cov}(x, y) = 360$$

Obtain the regression line of yield Y on rainfall X .

- 44) The following information is obtained to study the relationship between average rainfall (in cm) and the yield of Maize (in quintal per hectare) in different taluka of Gujarat :

| Particulars | Rainfall (cm) x | Yield of Maize (Quintal Per Hectare) y |
|--------------------------------|----------------------|---|
| Mean | 82 | 180 |
| Variance | 64 | 225 |
| Correlation Coefficient = 0.82 | | |

Estimate the yield of Maize when the rainfall is 60 cm.

- 45) Write a short note on seasonal component.
- 46) Two cards are drawn from a well shuffled pack of 52 cards. Find the probability that
- (1) Both the cards are of different colours.
 - (2) Both the cards are face cards.
- 47) For two events A and B in the sample space of a random experiment $P(A')=0.3, P(B)=0.6$ and $P(A \cup B)=0.83$, find $P(A \cap B')$ and $P(A' \cap B)$. <https://www.gujaratboardonline.com>
- 48) There are two children in a family. If the first child is a girl then find the probability that both the children in the family are girls.
- 49) The probability distribution of a random variable X is defined as follows :
- $$p(x) = \frac{K}{(x+1)!}, x=1, 2, 3; K = \text{Constant}$$
- Hence find constant $K, P(3)$.
- 50) A person has kept 4 cars to run on rent. The probability that any car is rented during the day is 0.6. Find the probability that more-than one but less-than 4 cars are rented during a day.
- 51) If the demand function of pizza is $p = 150 - 4x$ then find the marginal revenue when demand is of 3 pizzas.

SECTION - E

- Answer the following Any 3 out of 4 questions as directed.
Each question carries 4 marks :

[12]

52) (A) This question is only for normal students.

The weight of randomly selected 500 adult persons from a region of a city follows normal distribution. The average weight of these persons is 55 kg and its standard deviation is 7 kg.

- (i) Estimate the number of persons having weight between 41 kg to 62 kg.
- (ii) Estimate the number of persons having weight less than 41 kg.

52) (B) This question is only for blind students.

State the properties of standard normal distribution.

53) (A) This question is only for normal students.

The profit in daily business of a businessman having grocery shop follows normal distribution. Variance of profit is 22,500 (₹)², and the probability that the daily profit is less than ₹ 1,000 is 0.0918. Find the average daily profit.

53) (B) This question is only for blind students.

The probability density function of a normal variable X is defined as under

$$f(x) = \text{Constant } e^{-\frac{1}{2}\left(\frac{x-25}{10}\right)^2}, \quad -\infty < x < \infty$$



For this normal distribution estimate the values of the following :

- (1) Third Quartile
- (2) Quartile deviation
- (3) Mean deviation

- 54) Find the value of $\lim_{h \rightarrow 0} \frac{f(x+h) - f(x)}{h}$ where $f(x) = \sqrt{x}, x > 0$.
- 55) The daily cost of production for x tons of a commodity is $10x^2 - 1000x + 50,000$. How many units should be produced for the minimum cost? Also, find the minimum cost.

SECTION - F

Answer the following Any 4 out of 6 questions as directed.
Each question carries 5 marks :

[20]

- 56) Find Fisher's index number for the year 2015 by taking the year 2014 as the base year from the data given below about consumption and total expenditure of five different items :

| Items | Base Year 2014 | | Current Year 2015 | |
|-------|----------------|-------------------|-------------------|-------------------|
| | Consumption | Total Expenditure | Consumption | Total Expenditure |
| A | 50 kg | 2500 | 60 kg | 4200 |
| B | 120 kg | 600 | 140 kg | 700 |
| C | 30 litre | 330 | 20 litre | 200 |
| D | 20 kg | 360 | 15 kg | 300 |
| E | 5 kg | 40 | 5 kg | 50 |

- 57) To know the relation between the average monthly income (in ₹) and income due to overtime of workers (in ₹), the following information is obtained from six different factories of an area manufacturing similar kind of products. Find the correlation coefficient between the average monthly income and income due to overtime :

| Year | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 |
|--------------------------------|--------|--------|--------|--------|--------|--------|
| Average monthly Income (₹) x | 14,900 | 15,100 | 15,000 | 15,500 | 15,700 | 15,800 |
| Income due to overtime (₹) y | 100 | 105 | 115 | 160 | 220 | 255 |

- 58) The following data is obtained to know the relation between maximum day temperature and the sale of ice-cream in Ahmedabad city :

| | | | | | | | | |
|--------------------------------------|-----|-----|-----|-----|-----|-----|-----|-----|
| Maximum Temperature (Celsius) | 35 | 42 | 40 | 39 | 44 | 40 | 45 | 40 |
| Sales of ice-cream (kg) | 600 | 680 | 750 | 630 | 920 | 750 | 900 | 720 |

Calculate the rank correlation coefficient.

- 59) Obtain the regression line of the demand on the price using the following information collected for the demand and the price of a commodity. Estimate the demand of the commodity if price is ₹40 :

| | | | | | | | | | |
|-------------------------------|----|----|----|----|----|----|----|----|----|
| Price (₹) | 38 | 36 | 37 | 37 | 36 | 38 | 39 | 36 | 38 |
| Demand (hundred units) | 12 | 18 | 15 | 12 | 17 | 13 | 13 | 15 | 12 |

- 60) The profit earned (in lakh ₹) by a company making computers is as follows. Find the linear equation for the trend from these data by least square method and estimate the profit for the year 2017:

| | | | | | |
|------------------------|------|------|------|------|------|
| Year | 2011 | 2012 | 2013 | 2014 | 2015 |
| Profit (lakh ₹) | 31 | 35 | 39 | 41 | 44 |

- 61) The number of students studying in a college are shown in the following table. Find the trend by four yearly moving averages :

| | | | | | | | | | | |
|------------------------|------|------|------|------|------|------|------|------|------|------|
| Year | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 |
| No. of Students | 332 | 317 | 357 | 392 | 402 | 405 | 410 | 427 | 405 | 438 |

