QUESTION PAPER 1

[Board's Sample Question Paper For Annual Exam]

Time : 3 Hours] **[Total Marks : 100**

Instructions : (1) This question paper contains **six** sections and total **61** questions.
(2) Answers should be written according to the instruction of question only.
(3) Figures to the right side indicate full marks of the questions.
(4) Use of Z-table and simple calculator are allowed.

SECTION A

Answer the following questions by selecting the correct option from the given options : [Questions 1 to 20 – *1 mark each*] **20**

1. Which method is useful to compare the long term variations in the values of the variable ?

(a) Chain base method (b) Laspeyre's method
(c) Fixed base method (d) Paasche's method

2. Which prices are considered in the construction of the cost of living index number ?

(a) Market price (b) Wholesale price (c) Average price (d) Retail price

3. What is the range of the correlation coefficient r ?

(a) $-1 < r < 1$ (b) 0 to 1 (c) $-1 \leq r \leq 1$ (d) -1 to 0

4. 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

5. Which of the following indicates the functional relation between the two variables ?

(a) Correlation (b) Regression (c) Mean (d) Variance

6. For which value of the correlation coefficient (r), the regression coefficient becomes zero ?

(a) 1 (b) -1 (c) $\frac{1}{2}$ (d) 0

7. Which variation is shown in 'decrease in the production of a company' due to strike ?

(a) Random (b) Trend (c) Seasonal (d) Cyclical

8. State the independent variable of time series.

(a) y_t (b) S_t (c) t (d) x_t

9. What is the value of $P(A \cap A')$ for events A and A' ?

(a) 1 (b) 0 (c) 0.5 (d) between 0 and 1

10. What is the other name of the classical definition of probability ?

(a) Mathematical definition (b) Axiomatic definition
(c) Statistical definition (d) Geometric definition

11. Which variable of the following is 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. For a positively skewed binomial distribution with $n = 10$, which of the following values might be the value of mean ?

(a) 5 (b) 3 (c) 9 (d) 7

13. Which of the following is the formula of probability of an event of not getting success in the binomial distribution with parameters n and p?
(a) ${}^nC_0p^nq^0$ (b) ${}^nC_0p^0q^n$ (c) ${}^nC_0pq^n$ (d) ${}^nC_0p^nq$

14. What is the area under the normal curve to the right hand side of perpendicu line at $X = \mu$?
(a) 0 (b) 0.5 (c) 1 (d) – 0.5

15. In normal distribution, usually what percentage of the observations are included the limits $\mu \pm \sigma$?
(a) 34.13 % (b) 95.45 % (c) 68.26 % (d) 50 %

16. Which of the following is approximate value of mean deviation for normal variabl
(a) $\frac{4}{5}\sigma$ (b) $\frac{4}{5}\mu$ (c) $\frac{2}{3}\sigma$ (d) $\frac{2}{3}\mu$

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 $\lim_{x \to -2} 10$?
(a) 10 (b) – 2 (c) 8 (d) Indeterminate

19. What is $\frac{dy}{dx}$ if $y = ax^n$, a is a constant?
(a) nx^{n-1} (b) $an\,x^{n-1}$ (c) 0 (d) $an\,x^{n+1}$

20. If u and v are functions of x, then what is the formula of derivative of $\frac{v}{u}$?
(a) $\frac{v\cdot\frac{du}{dx}-u\cdot\frac{dv}{dx}}{v^2}$ (b) $\frac{v\cdot\frac{du}{dx}+u\cdot\frac{dv}{dx}}{v^2}$ (c) $\frac{u\cdot\frac{dv}{dx}+v\cdot\frac{du}{dx}}{u^2}$ (d) $\frac{u\cdot\frac{dv}{dx}-v\cdot\frac{du}{dx}}{u^2}$

SECTION B

Answer the following questions in *one* sentence each:
[Questions 21 to 30 – *1 mark each*] 10

21. Which index number is used to find the rate of inflation? Write the formula to find the rate of inflation.

22. Give the definition of correlation.

23. State the Linear Regression model.

24. State the names of methods of measuring trend.

25. Write definition of an event.

26. Define discrete random variable.

27. What is the skewness of normal distribution?

28. For which value of standard normal variable, the standard normal curve is symmetric on both the sides?

29. Express 0.09 neighbourhood of 0 in interval form.

30. Find $\frac{dy}{dx}$ if $y = a^n$, a is constant.

SECTION C

14

QUESTION PAPER 2

Time : 3 Hours] **[Total Marks : 100**

Instructions : As per Question Paper **1**.

SECTION A

Answer the following questions by selecting the correct option from the given options : [Questions 1 to 20 – *1 mark each*] **20**

1. If the purchasing power of money is 0.75 in the year 2019 with respect to the base year 2018, then what will be the price index number for the year 2019 ? *(March 20, 22)*

(a) 750 (b) 175 (c) 133.33 (d) 275

2. Which consumption is used in the calculation of Laspeyre's index number ?

(a) Consumption of base year (b) Consumption of current year

(c) Consumption of average year (d) Consumption of any year

3. Which of the following values is not possible as a value of '*r*' ? *(March 20)*

(a) 0.99 (b) – 1.07 (c) – 0.85 (d) 0

4. Which kind of correlation will you get between the number of units sold and its revenue at constant price ? *(July 22)*

(a) Perfect positive (b) Partial positive (c) Perfect negative (d) Partial negative

5. If $r = 0.8$, how much part of the total variation in the dependent variable can be explained by the regression model ?

(a) 80 % (b) 64 % (c) 36 % (d) 20 %

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 type of variations are produced in the time series variable due to seasonal component? *(March 20)*
(a) Long-term (b) Irregular (c) Regular (d) Zero

8. Which variation is shown in 'decrease in the agricultural production due to floods' epidemic? *(March 23)*
(a) Random (b) Trend (c) Seasonal (d) Cyclical

9. Which event is given by a special subset ϕ of the sample space U? *(July 22)*
(a) Certain event (b) Complementary event of ϕ
(c) Union of events U and ϕ (d) Impossible event

10. Which of the following options is true for any event A of the sample space?
(a) $P(A) < 0$ (b) $0 \leq P(A) \geqslant 1$ (c) $0 \leqslant P(A) \leqslant 1$ (d) $P(A) > 1$

11. 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

12. For a discrete probability distribution, variance is 12 and $E(X^2) = 21$. What will be the mean of this distribution?
(a) 9 (b) 3 (c) 6 (d) 5.7

13. The probability distribution of a random variable X is $p(x) = A \cdot x^2$; $x = 1, 2, 3$, then what is the value of A?
(a) $\frac{1}{6}$ (b) $\frac{1}{11}$ (c) $\frac{1}{14}$ (d) $\frac{1}{13}$

14. In normal distribution, usually what percentage of the observations are included in the limits $\mu \pm 2\sigma$?
(a) 34.13 % (b) 95.45 % (c) 68.26 % (d) 50 %

15. Which of the following is probability density function for normal variable X with mean μ and standard deviation σ? *(March 20, July 22)*

(a) $f(x) = \frac{1}{\sigma\sqrt{2\pi}} e^{-\frac{1}{2}\left(\frac{x-\mu}{\sigma}\right)}$, $-\infty < x < \infty$ (b) $f(x) = \frac{1}{\sigma\sqrt{2\pi}} e^{-\left(\frac{x-\mu}{\sigma}\right)^2}$, $-\infty < x < \infty$

(c) $f(x) = \frac{1}{\sigma\sqrt{2\pi}} e^{-\frac{1}{2}\left(\frac{x-\mu}{\sigma}\right)^2}$, $-\infty < x < \infty$ (d) $f(x) = \frac{1}{\sigma\sqrt{2\pi}} e^{-\frac{1}{2}\left(\frac{x-\mu}{\sigma}\right)^2}$, $0 \leqslant x < \infty$

16. How are the values of Z to the right of perpendicular at $Z = 0$?
(a) Negative (b) Positive (c) Integers (d) Fraction

17. What is the interval form of $|x-5| < 0.25$?
(a) (4.75, 5.25) (b) (−4.75, + 5.25) (c) (−5.25, −4.75) (d) (−5.25, 4.75)

18. What is the value of $\lim_{x \to 3} \frac{x^4 - 81}{x - 3}$? *(March 22)*
(a) 192 (b) 324 (c) 36 (d) 108

19. What are the necessary and sufficient conditions for a function to be minimum $x = a$?
(a) $f'(a) = 0$, $f''(a) < 0$ (b) $f'(a) > 0$, $f''(a) > 0$
(c) $f'(a) = 0$, $f''(a) > 0$ (d) $f'(a) < 0$, $f''(a) > 0$

20. The values of x obtained by solving the equation $\frac{dy}{dx} = 0$ are called ..... .

(a) Decreasing values (b) Increasing values (c) Stationary values (d) Finite values

SECTION B

Answer the following questions in *one* sentence each: **10**

[Questions 21 to 30 – *1 mark each*]

21. Which index number is used to find the rate of inflation and to find the rate of dearness allowance?

22. What is Scatter Diagram? What is the main limitation of its? *(March 22, July 22)*

23. State the Linear Regression model. *(July 22)*

24. Which method of finding trend is best to eliminate the effect of repetitive short-term variations? *(August 20)*

25. Define Random experiment and Favourable outcomes. *(July 22)*

26. Define Bernoulli trials. *(March 20, May 21)*

27. Give the values of the constants used in probability density function of normal variable. *(August 20, March 22)*

28. "Standard score is independent of unit of measurement." Is this statement true or false? *(July 22)*

29. Express 0.001 neighbourhood of -5 in modulus form. *(March 23)*

30. Find $f'(x)$, if $f(x) = 9x^2 - 8x + 6$. *(March 23)*

SECTION C

Answer the following questions as asked: **14**

[Any *seven* from questions 31 to 39 – *2 marks each*]

31. If $\Sigma p_1 q_0 : \Sigma p_0 q_0 = 5 : 3$ and $\Sigma p_1 q_1 : \Sigma p_0 q_1 = 3 : 2$, compute the Laspeyre's, Paasche's and Fisher's index numbers.

QUESTION PAPER 3

Time : 3 Hours] **[Total Marks : 100**

Instructions : As per Question Paper **1**.

SECTION A

Answer the following questions by selecting the correct option from the given options : [Questions 1 to 20 – *1 mark each*] 20

1. Which prices are considered in the construction of the cost of living index number ? *(July 22)*

(a) Market price (b) Wholesale price (c) Average price (d) Retail price

2. What weight is assigned as expenditure to the price relatives $\frac{p_1}{p_0}$ of the items to obtain the formula for Paasche's index number ?

(a) p_0q_0 (b) p_1q_1 (c) p_0q_1 (d) p_1q_0

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. What is the range of the Rank correlation coefficient r ?

(a) $-1 < r < 1$ (b) 0 to 1 (c) $-1 \leq r \leq 1$ (d) -1 to 0

5. What is coefficient of determination in the study of regression for two variables ? *(March 22, 23)*

(a) Product of two standard deviations (b) Square of correlation coefficient
(c) Square of covariance (d) Product of two variances

6. Which of the following is correct formula for b_{yx} ?

(a) $b_{yx} = r \cdot \frac{S_x}{S_y}$ (b) $b_{yx} = r \cdot \frac{S_y^2}{S_x^2}$ (c) $b_{yx} = \frac{\text{Cov } (x, y)}{S_y^2}$ (d) $b_{yx} = r \cdot \frac{S_y}{S_x}$

7. Which method of finding trend is best to eliminate the effect of repetitive short-term variations ?

(a) Graphical method (b) Method of least squares
(c) Karl Pearson's method (d) Method of moving average

8. State the dependent variable of time series. *(August 20, July 22)*

(a) y_t (b) S_t (c) t (d) x_t

9. According to the mathematical definition of probability, what is the probability of each outcome among the n outcomes of a random experiment ? *(August 20)*

(a) 0 (b) $\frac{1}{n}$ (c) 1 (d) cannot say

10. What is the other name of the mathematical definition of probability ?

(a) Classical definition (b) Axiomatic definition
(c) Statistical definition (d) Geometric definition

11. For a positively skewed binomial distribution with $n = 10$, which of the following values might be the value of mean ? *(May 21, March 22)*

(a) 5 (b) 3 (c) 9 (d) 7

12. For a probability distribution, $\mu = 2.1$ and $E(X^2) = 10$, find its variance.
(a) 7.9 (b) 5.59 (c) 12.1 (d) 5.9

13. Which of the following is the formula of probability of an event of not getting failure in the binomial distribution with parameters n and p?
(a) ${}^nC_0p^nq^0$ (b) ${}^nC_0p^0q^n$ (c) ${}^nC_0pq^n$ (d) ${}^nC_0p^nq$

14. Which of the following is probability density function for standard normal variable *(May 2*

(a) $f(z) = e^{-\frac{1}{2}z^2}, \ -\infty < z < \infty$ (b) $f(z) = \frac{1}{\sqrt{2\pi}}e^{-\frac{1}{2}z^2}, \ -\infty < z < \infty$

(c) $f(z) = \frac{1}{\sqrt{2\pi}}e^{-\frac{1}{2}z^2}, \ 0 < z < \infty$ (d) $f(z) = \frac{1}{\sqrt{2\pi}}e^{-z^2}, \ -\infty < z < \infty$

15. In normal distribution, usually which limits include 99 % of the observations? *(March 2*

(a) $\mu \pm 1.96\sigma$ (b) $\mu \pm 2\sigma$ (c) $\mu \pm 3\sigma$ (d) $\mu \pm 2.575\sigma$

16. Mean and the first quartile for a normal distribution are 11 and 3 respectivel Which of the following is the value of the third quartile? *(March 20)*
(a) 8 (b) 14 (c) 19 (d) 10

17. How is the modulus of a real number?
(a) Non-negative (b) Negative (c) Zero (d) (a) or (c)

18. What is the value of $\lim_{x \to -3} 8$?
(a) 10 (b) – 3 (c) 8 (d) Indeterminate

19. If the function $f(x)$ is increasing at $x = a$, then which is the correct option fro the following?
(a) $f'(a) < 0$ (b) $f'(a) > 0$ (c) $f'(a) = 0$ (d) $f''(a) > 0$

20. At $x = 1$, what is the function $f(x) = x^3 - 4x + 1$?
(a) Increasing (b) Decreasing (c) Minimum (d) Maximum

SECTION B

Answer the following questions in *one* sentence each : 1
[Questions 21 to 30 – *1 mark each*]

21. Define the index number and the cost of living index number. *(August 20)*

22. On what does the sign (r) of correlation coefficient depend? Explain it in breif. *(August 2*

23. Of which transformation, the regression coefficient is independent and is n independent?

24. How many years does it take to know the trend in agricultural yield or industri production and the sale of electronic goods?

25. Draw a Venn diagram for Mutually Exclusive events A and B and for A – B, th difference event of A and B. *(May 21)*

26. Mean of a symmetrical binomial distribution is 7. Find the value of its parameter *(May 2*

27. Mean and the first quartile for a normal distribution are 11 and 3 respectivel Which of the following is the value of the third quartile? *(March 20, 23)*

28. What percentage of area is covered under the normal curve within the range $\mu - 2\sigma$ to $\mu + 2\sigma$? *(March 22)*

29. If $\lim_{x \to -1} 4x + k = 6$, then find the value of k. *(July 22)*

30. What is marginal revenue and marginal cost? *(August 20, July 22)*

SECTION C

Answer the following questions as asked : 14

[Any *seven* from questions 31 to 39 – *2 marks each*]

31. The wholesale price index numbers of the year 2015 and 2016 are found to be 150.2 and 165.7 respectively. Find the rate of inflation using index numbers of both the years. *(March 22)*

32. Find the value of r from the following data : *(May 21)*
$n = 10$, $\Sigma (x - \bar{x})\ (y - \bar{y}) = 60$, Variance of X = 25, Variance of Y = 36.

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. *(March 22)*

monthly sales (in lakh ₹) of a shop : *(March 22)*

Month	March	April	May	June	July	August	Sept.	Oct.	Nov.	9
Sales (lakh ₹)	5	3	7	6	4	8	9	10	8	

QUESTION PAPER 4

Time : 3 Hours] **[Total Marks : 10**

Instructions : As per Question Paper **1**.

SECTION A

Answer the following questions by selecting the correct option from the give options : [Questions 1 to 20 – *1 mark each*] 2

1. The price of an item increased by 4.5 times in the current year as compare to the base year. What will be the price index number ? *(March 22)*

(a) 45 (b) 450 (c) 550 (d) 350

2. Which method is useful to compare the long term variations in the values the variable ?

(a) Chain base method (b) Laspeyre's method

(c) Fixed base method (d) Paasche's method

3. What is the value of *r*, if all the points plotted in a scatter diagram lie on single line only ?

(a) 0 (b) 1 or – 1 (c) 0.5 (d) – 0.5

4. What does the numerator indicate in the formula for calculating the correlatio coefficient by Karl Pearson's method ? *(March 23)*

(a) Product of variance of X and Y (b) Covariance of X and Y

(c) Variance of X (d) Variance of Y

5. Which statistician used term 'regression' for the first time ? *(July 22)*

(a) Karl Pearson (b) Sir Francis Galton (c) Spearman (d) Fisher

6. If $u = \frac{x-15}{10}$ and $v = \frac{y-50}{2}$ and $b_{yx} = 7.5$, what is the value of b_{vu} ?

(a) 7.5 (b) 1.5 (c) 37.5 (d) 150

7. Due to new technology if there is abnormal changes in the demand of an item, then what is that component of time series called ?

(a) Long-term component (b) Cyclical component

(c) Seasonal component (d) Irregular component

8. Which component of the time series is impossible to predict? *(May 21)*
(a) Random component (b) Trend (c) Seasonal component (d) Cyclical component

9. What is the total number of sample points in the sample space formed by throwing three six-faced balanced dice simultaneously? *(May 21, March 23)*
(a) 6^2 (b) 3^6 (c) 6×3 (d) 6^3

10. What is the value of $P(A \cap A')$ for events A and A'? *(March 20)*
(a) 1 (b) 0 (c) 0.5 (d) between 0 and 1

11. What are the parameters of Binomial Probability distribution? *(August 20)*
(a) n and q (b) n and p (c) p and q (d) n, p and q

12. For a symmetrical binomial distribution with $n = 10$, which of the following values might be the value of mean?
(a) 5 (b) 3 (c) 9 (d) 7

13. A random variable X assumes the values -2, 0 and 2 only with respective probabilities $\frac{1}{5}$, $\frac{3}{5}$ and k. If $0 < k < 1$, what will be the value of k?
(a) $\frac{1}{5}$ (b) $\frac{4}{5}$ (c) $\frac{2}{5}$ (d) $\frac{3}{5}$

14. If the distribution of normal variable is shown as N(20, 4), then which of the following intervals includes 99.73 % of observations? *(March 22)*
(a) (18, 22) (b) (16, 24) (c) (14, 26) (d) (12, 28)

15. What is the total area under normal curve among the following? *(May 21)*
(a) -1 (b) 0 (c) 1 (d) 0.5

16. What is the value of 'e' in the probability density function of a normal distribution?
(a) 2.7831 (b) 2.7381 (c) 2.7138 (d) 2.7183

17. How is x tends to 2 expressed?
(a) $x = 2$ (b) $x \neq 2$ (c) $x \to 2$ (d) x is close to 2

18. What is the modulus form of N(5, 0.02)?
(a) $|x + 5| < 0.02$ (b) $|x - 0.02| < 5$ (c) $|x - 5| > 0.02$ (d) $|x - 5| < 0.02$

19. What is the derivative of $f(x) = \frac{4}{x^2}$? *(August 20)*
(a) $\frac{4}{2x}$ (b) $-\frac{8}{x^3}$ (c) $\frac{8}{x^3}$ (d) 0

20. What is the necessary condition for profit function to be maximum?
(a) $\frac{dp}{dx} < 0$ (b) $\frac{dp}{dx} > 0$ (c) $\frac{dp}{dx} = 0$ (d) $\frac{d^2p}{dx^2} = 0$

SECTION B

Answer the following questions in *one* sentence each: **10**

[Question 21 to 30 – *1 mark each*]

21. What is weight in index number formation? State the two popular methods of assigning explicit weight. *(March 23)*

22. Write the assumptions of Karl Pearson's Correlation Coefficient.

23. Interpret Regression coefficient $b > 0$ and $b < 0$. *(March 23)*

24. When is the method of moving average more useful to find trend?

25. State the formula for the probability of occurrence of at least one event out of three events A, B and C. *(March 22)*

26. State the type of skewness for binomial distribution if the value of $p = \frac{1}{4}$. *(August 20)*

27. For which value of standard normal variable, the standard normal curve is symmetric on both the sides? *(March 20)*

28. For a normal distribution, the estimated value of quartile deviation is 12. Find the value of its standard deviation.

29. Express N(16, 0.5) in the interval and modulus form. *(May 21)*

30. Find $\frac{dy}{dx}$, if $y = 6x^3 + \frac{7}{2}x^2 + \frac{6}{5}x - 8$. *(March 22)*

SECTION C

Answer the following questions as asked: 14

[Any *seven* from question 31 to 39 – 2 *marks each*]

31. If the average disposable income of family of a class is ₹ 25000 in the year 2014 and if the cost of living index number of that class for the year 2016 with the base year 2014 is 120, estimate the average disposable income of the family of that class in the year 2016. *(March 23)*

32. Find the value of r from the following data:
$n = 10$, $\Sigma xy = 1500$, Mean of X = 12, Mean of Y = 15, S.D. of X = 9, S.D. of Y = 5.

33. If $\bar{x} = 60$, $\bar{y} = 75$ and $Sx^2 : \text{Cov}(x, y) = 5 : 3$, obtain the regression line of Y on X.

34. How does seasonal component differ from the cyclical component?

35. Find $P(A \cup B \cup C)$ using the following information about three events A, B and C in a sample space:

Obtain

QUESTION PAPER 5

Time : 3 Hours] **[Total Marks : 100**

Instructions : As per Question Paper 1.

SECTION A

Answer the following questions by selecting the correct option from the given options : [Questions 1 to 20 – *1 mark each*] **20**

1. 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) $4I_F = I_L$

2. 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

3. The measurement unit of a variable 'Weight' is kg and that of 'Height' is cm. What can you say about the measurement unit of the correlation coefficient between them ?

(a) kg (b) cm (c) km / cm (d) does not have any unit

4. In usual notations, which term is added in Σd^2 for each repeated observation in the rank correlation ?

(a) $\frac{m^2-1}{12}$ (b) $\frac{m^3-m}{12}$ (c) $\frac{6m^3-m}{12}$ (d) $n(n^2-1)$

5. What is error e in estimation in case of line of regression of Y on X? *(March 20, July*

(a) $y - \hat{y}$ (b) $\hat{x} - \hat{y}$ (c) $x - \hat{x}$ (d) $\hat{y} - \hat{x}$

6. Which of the following is a regression line of Y on X?

(a) $\hat{y} = a + bx + cx^2$ (b) $\hat{x} = c + by$ (c) $\hat{y} = a + bx$ (d) $\hat{y} = a + bx^2$

7. The trend equation obtained from a time series from January 2020 to Decem 2020 is $\hat{y} = 30.1 + 1.5\,t$. Find the value of trend for May 2020.

(a) 30.1 (b) 34.6 (c) 36.1 (d) 37.6

8. How do you show the additive model of the time series? *(May 21)*

(a) $y_t = T_t + S_t + C_t - R_t$ (b) $y_t = T_t + S_t + C_t + R_t$

(c) $y_t = T_t \times S_t + C_t \times R_t$ (d) $y_t = S_t + C_t + R_t$

9. If $P(A|B) = P(A)$ and $P(B|A) = P(B)$, then what type of events are A and B? *(March 2*

(a) Independent events (b) Complementary events

(c) Certain events (d) Impossible events

10. Two events A and B of a sample space are mutually exclusive. Which of the following will be equal to $P(B - A)$?

(a) $P(A)$ (b) $P(B)$ (c) $P(A \cap B)$ (d) $P(A \cup B)$

11. The binomial distribution has mean 5 and variance $\frac{10}{7}$. What will be the type of this distribution? *(March 20, 23)*

(a) Positively skewed (b) Negatively skewed

(c) Symmetric (d) Nothing can be said about the distribution

12. If $P(S) = p$ and $P(F) = q$, then what is the value of $p + q$?

(a) 0 (b) 1 (c) Between 0 and 1 (d) Between -1 and 1

13. 'Temperature of a place.' Which type of random variable is it?

(a) Finite random variable (b) Infinite random variable

(c) Discrete random variable (d) Continuous random variable

14. Which of the following is approximate value of mean deviation for normal variable? *(August 20, March 22, July 22)*

(a) $\frac{4}{5}\sigma$ (b) $\frac{4}{5}\mu$ (c) $\frac{2}{3}\sigma$ (d) $\frac{2}{3}\mu$

15. 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) $Z = \frac{x - \mu}{\sigma}$

16. Mode and third quartile in a normal distribution are 11 and 19 respectively. Which of the following is the value of the first quartile?

(a) 3 (b) 14 (c) 19 (d) 10

17. What is the set of real numbers between any two real numbers called?

(a) Open interval (b) Interval (c) Closed interval (d) Open-closed interval

18. What is the interval form of 0.02 neighbourhood of -2? *(May 21)*

(a) (1.98, 2.02) (b) (−1.98, 2.02) (c) (−2.02, −1.98) (d) (−2.02, 1.98)

19. If $y = ax + b$, a and b are constants, then what will be $\frac{dy}{dx}$? *(March 20, 22; May 21)*

(a) a (b) b (c) $a + b$ (d) 0

20. If demand function is $p = a - bx$, then what is revenue function?

(a) $R = a - bx^2$ (b) $R = ax - (bx)^2$ (c) $R = ax - bx$ (d) $R = ax - bx^2$

SECTION B

Answer the following questions in *one* sentence each: **10**

[Questions 21 to 30 – *1 mark each*]

21. Name the important basic tests of index number. *(March 22)*

22. In which situation, the values of Karl Pearson's correlation coefficient and Spearman's rank correlation coefficient are equal? *(March 20)*

23. Which are the methods for fitting a regression line? Mention the name of best method out of its. *(March 22)*

24. Which of the components of time series produce short-term variations? *(March 23)*

25. Write the sample space of a random experiment of throwing one balanced die and a balanced coin simultaneously. *(March 20, August 20)*

26. Define Binomial Random Variable.

27. Which is approximate value of quartile deviation and mean deviation for standard normal variable? *(May 21)*

28. Mean of a normal distribution is 13.25 and its standard deviation is 10. Estimate the value of its third quartile.

29. Express $|2x| < \frac{1}{2}$ in interval form.

30. How will be the second order derivative of a function at $x = a$ if function is maximum at $x = a$?

SECTION C

Answer the following questions as asked: **14**

[Any seven from questions 31 to 39 – *2 marks each*]

31. The percentage increase in the price relatives of three items are 315, 328 and

QUESTION PAPER 6

Time : 3 Hours] **[Total Marks : 100**

Instructions : As per Question Paper 1.

SECTION A

Answer the following questions by selecting the correct option from the given options : [Questions 1 to 20 – 1 mark each] **20**

1. Which index number is used by the Reserve Bank of India to take necessary steps to control inflation by studying the changes in price levels? *(August 20)*

(a) Index number for Trade (b) Wholesale price index number

(c) Cost of living index number (d) Index number of National Income

2. Which index number gives idea of the standard of living of people?

(a) Index number of industrial production (b) Quantity index number

(c) Fisher's index number (d) Cost of living index number

3. Where there is more dispersion in the values of two variables, which method is used to find correlation coefficient?

(a) Karl Pearson's method (b) Scatter diagram method

(c) Least square method (d) Spearman's method

4. In the method of rank correlation, if the ranks of two variables are exactly in reverse order, then what is the value of r?

(a) $r = 0$ (b) $r = -1$ (c) $r = 1$ (d) $r = 0.1$

5. The best fitted line of regression can be obtained by which method? *(May 21)*

(a) By Least Square Method (b) By Karl Pearson's Method

(c) By Maximum Square Method (d) By Bowley's Method

6. The regression line always passes through which point?

(a) $(\bar{x}, \bar{y})$ (b) $(0, \bar{y})$ (c) $(\bar{x}, 0)$ (d) $(0, 0)$

7. State the model of linear trend of time series.

(a) $y_t = \alpha + \beta t + u_t$ (b) $y_t = \alpha + \beta t$ (c) $y_t = \alpha + bt + u_t$ (d) $y'_t = \alpha + \beta t + u_t$

8. Which of the following fluctuations is the effect of seasonal component?

(a) Increase in the migration to cities from rural areas

(b) Increasing number of vehicles on roads in a city

(c) Increase in the number of tourists during school vacation

(d) Increased death rate during a certain epidemic

9. What is the probability of having 5 Thursdays in the month of February in a year which is not a leap year?

(a) 0 (b) $\frac{1}{7}$ (c) $\frac{2}{7}$ (d) $\frac{3}{7}$

10. Which random experiment from the following random experiments has an infinite sample space?

(a) Throwing two dice (b) Selecting two employees from an office

(c) To measure the life of electric bulb (d) Select a card from 52 cards

11. 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

12. How many types of random variables are there?
(a) Two (b) Three (c) Four (d) Infinite

13. For a random variable $X = \{-1, 0, 1\}$ and $p(-1) = 0.15$, $p(0) = 0.60$ and $p(1) = 0.25$ Find the mean of X.
(a) 0.40 (b) 0.70 (c) 0.10 (d) 1.0

14. Which of the following are mean and variance of standard normal variable? *(March 22*
(a) Mean = 0, Variance = 1 (b) Mean = 1, Variance = 0
(c) Mean = 0, Variance = 0 (d) Mean = 1, Variance = 1

15. Mean of a normal variable X is 50. If the value of Z-score is -2.5 for $x = 25$ then which of the following is a variance of the distribution?
(a) 10 (b) 100 (c) 50 (d) 25

16. Which of the following is approximate value of quartile deviation for standard norma variable?
(a) $\frac{2}{3}\sigma$ (b) $\frac{2}{3}$ (c) $\frac{4}{5}\sigma$ (d) $\frac{4}{5}$

17. How is an open-closed interval expressed?
(a) [ ) (b) ( ) (c) ( ] (d) { }

18. If $y = 10 - 3x$ and $x \to -3$, then y tends to which value?
(a) 1 (b) 9 (c) 19 (d) 7

19. If u and v are functions of x, then what is the formula of derivative of $\frac{v}{u}$? *(May 21*
(a) $\frac{v\cdot\frac{du}{dx} - u\cdot\frac{dv}{dx}}{v^2}$ (b) $\frac{v\cdot\frac{du}{dx} + u\cdot\frac{dv}{dx}}{v^2}$ (c) $\frac{u\cdot\frac{dv}{dx} + v\cdot\frac{du}{dx}}{u^2}$ (d) $\frac{u\cdot\frac{dv}{dx} - v\cdot\frac{du}{dx}}{u^2}$

20. What is differentiation?
(a) A process (b) A technique (c) A method (d) A science

SECTION B

Answer the following questions in one sentence each :
[Questions 21 to 30 – 1 mark each] 1

21. Which is the best average and which is the appropriate average for the constructio of index number? *(July 22)*

22. What is the value of r, it all the points plotted in a scatter diagram lie on th same (single) line and not on the same line? *(March 23)*

23. What is an error in context with a regression line?

24. What is meant by analysis of time series? *(March 20)*

25. Arrange $P(A \cup B)$, $P(A)$, $P(A \cap B)$, 0, $P(A) + P(B)$ in the ascending order. *(May 21)*

26. State the relation between mean and variance of binomial distribution. *(May 21)*

27. Which value of normal variable divides the area of normal curve in two equal parts?

28. The approximate value of mean deviation for a normal distribution is 8. Find the value of its standard deviation.

29. If $\lim_{x \to 3} \frac{2}{3x + k} = \frac{1}{7}$, then find the value of k.

30. What is elasticity of demand? State the formula of its.