Royal science school Dhoraji

Date:- 23-10-24

Subject: STAT | Round test -2

Standard: 12 | Marks: 100

Chapter: Part-1 (ch-1, 2,3,4) and part-2 (ch-1, 3) | Exam Time: 3 hours

Section - A

▸Choose the correct option from those given below each question. (Each question carries 1 Marks) (20)

01. Which of the following is approximate value of mean deviation for normal variable?

A. $\frac{2}{3}\mu$ B. $\frac{2}{3}\sigma$ C. $\frac{4}{5}\mu$ D. $\frac{4}{5}\sigma$

02. what Is the area under the normal curve to the right hand side of perpendicular line at $X = \mu$?

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

03. If P(A) = 0.4 and P(B') = 0.3 for two independent events A and B of a sample space, then state the value of $P(A \cap B)$.

A. 0.18 B. 0.28 C. 0.42 D. 0.12

04. If one number Is randomly selected between 1 and 20, what is the probability that the number is a multiple of 5?

A. $\frac{1}{3}$ B. $\frac{1}{5}$ C. $\frac{1}{6}$ D. $\frac{1}{2}$

05. If $A \cup A' = U$, then what type of events are A and A'?

A. Impossible events B. Certain events C. Complementary events D. Independent events

06. Which of the following variations are due to cyclical component?

A. Continuously decreasing death rate
B. Decrease in the agricultural produce due to excessive rains
C. Decrease in the share prices due to recession in share market
D. Rise in demand during winter

07. Which component of the time series is impossible to predict?

A. Cyclical component B. Seasonal component C. Trend D. Random component

08. How do you show the additive model of the time series?

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. $y_t = S_t + C_t + R_t$

09. Which type of component is "Increase in the sales of readymade garments in festivals"?

A. Long-term B. Random C. Seasonal D. Cyclical

10. State the interval of R^2

A. $-1 \leq R^2 \leq 0$ B. $0 < R^2 < 1$

C. $0 \leq R^2 \leq 1$ D. $-1 \leq R^2 \leq 1$

11. What is coefficient of determination in the study of regression for two variables?

A. Product of two variances B. Square of covariance

C. Square of correlation coefficient D. Product of two standard deviations

12. Which of the following is correct?

A. $b_{yx} = r \cdot \frac{s_x}{s_y}$

B. $b_{yx} = r \cdot \frac{s_y^2}{s_x^2}$

C. $b_{yx} = \frac{cov(x,y)}{s_y^2}$

D. $b_{yx} = r \cdot \frac{s_y}{s_x}$

13. State the error term in linear regression model.

A. e = y — $\hat{y}$ B. e = x — $\hat{x}$

C. e =Y — X D. e = Y — $\hat{v}$

14. In the method of rank correlation, in usual notations if $R_x = R_y$ for each pair of observations, then what is the value of the r?

A. 0.1 B. 1 C. - 1 D. 0

15. What is the value of the rank correlation coefficient if $\sum d^2 = 0$?

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

16. If $u = \frac{x-A}{C_x}$ and $v = \frac{y-B}{C_y}$, $C_x > 0, C_y > 0$, then which of the following statement is correct?

A. $r(x,y) \neq r(u,v)$

B. $r(x,y) > r(u,v)$

C. $r(x,y) < r(u,v)$

D. $r(x,y) = r(u,v)$

17. In context with correlation, what do you call the graph, if the points of paired observations (x, y) are shown in a graph?

A. Frequency curve
B. Scatter diagram
C. Histogram
D. Circle diagram

18. If $I_L = I_F$ which of the following statements is true?
    A. $4I_F = I_L$
    B. $I_F = I_P = I_L$
    C. $I_p = 2I_L$
    D. $I_F = \frac{I_L}{2}$
19. Which method is useful to compare the long term variations in the values of the variable?
    A. Paasche's method
    B. Fixed base method
    C. Laspeyre's method
    D. Chain base method
20. State the formula showing the relation among Laspeyre's, Paasche's and Fisher's index numbers.
    A. $I_f = \sqrt{I_l} + I_p$
    B. $I_f = \sqrt{(I_l \times I_p)}$
    C. $I_f = \frac{I_L}{I_p}$
    D. $I_f = I_l \times I_p$

Section - B

▸ **Answer the following questions in one sentence. (Each question carries 1 Marks)** (10)

21. Define the cost of living index number.
22. What is a price relative?
23. What is tie in observation?
24. What is the duration of oscillation of components?
25. State the components of time series.
26. State the number of sample points in the random experiment of tossing five balanced coins.
27. 2 % items in a lot are defective. What is the probability that an item randomly selected from this lot is non-defective?
28. Give two examples of random experiment.
29. What is the skewness of normal distribution?
30. What is the shape of normal curve?

Section - C

▸ **Write the answers to any 7 (seven) questions out of the 9 questions from 31 to 39 below. (2 marks each)** (14)

31. If $I_l = 221.5$ and $I_f = 222$,find I_p.

32. Why is Fisher's index number called an ideal number?
33. What is spurious correlation?
34. Define: Scatter Diagram
35. What are the constants a and b in the regression line $\hat{y} = a + bx$?
36. If $\bar{x} = 60, \bar{Y} = 75$ and $s_x{}^2 : Cov(x,y) = 5:3$, obtain the regression line of Y on X and estimate y for X = 65 from it.
37. The price of petrol rises in 80 % of the cases and the price of diesel rises in 77 % of the cases after the rise in price of crude oil. The price of petrol and diesel rises in 68 % cases. Find the probability that the price of diesel rises under the condition that there is a rise in the price of petrol.
38. 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.
39. State the merits of the method of moving average to measure trend.

Section - D

▸Write the answers to any 8 (eight) questions out of the 13 questions from 40 to 51 given below. (3 marks each) (24)

40. There are 12 screws in a box of which 4 screws are defective. Two screws are randomly selected one by one without replacement from this box. Find the probability that both the screws selected are defective.
41. A medicine is tested on a group of rabbits and mice to know its effect. It was observed that 7 rabbits show the effect of medicine in a group of 10 rabbits who were given the medicine and 5 mice show the effect of medicine in a group of 9 mice who were given the medicine. One animal is selected at random from each group. Find the probability that (1) both the selected animals show the effect of medicine and (2) one of the two selected animals shows the effect of medicine and the other animal does not show the effect of medicine. **The given information will be shown as follows :**

Animals	**Animals affected by Medicine**	**Animals not affected by Medicine**
Rabbits	7	3
Mice	5	4
Total	12	7

42. Three female employees and two male employees are working in an office. One employee is selected from the employees of this office for training. The event that the employee selected for the training is a

female is denoted by A and the event that this employee is a male Is denoted by B. Find the sets showing the following events and answer the given questions:
(1) U (2)A (3)B
(4) $A \cup B$ (5) $A \cap B$ (6) $A' \cap B$
(7) Can it be said that the events A and B are mutually exclusive? Give reason.
(8) Can it be said that the events A and B are exhaustive? Give reason.

43. State the main difference between explicit weight and implicit weight.
44. The coefficient of rank correlation of the marks obtained by 10 students in two particular subjects was found to be 0.5. Later on, it was found that one of the differences of the ranks of a student was 7 but it was taken as 3. Find the corrected value of the correlation coefficient.
45. The information regarding maximum temperature (X) and sale of ice cream (Y) of six different days in summer for a city is given below:
Maximum temperature = X (in celsius), Sale of ice cream = Y (in lakh)
$\bar{x} = 40, \bar{y} = 1.2, \sum xy = 306, s_x^2 = 20$
Obtain the regression line of sale of ice cream on maximum temperature. Estimate the sale of ice cream if the maximum temperature on a day is 42 celsius.
46. How does seasonal component differ from the cyclical component?
47. If $\sum p_1 q_0 : \sum p_0 q_0 = 3:2$ and $\sum p_1 q_1 : \sum p_0 q_1 = 5:2$,compute the laspeyre's paasche's and Fisher's index numbers.
48. Fit a linear equation from the following data for variable (y) of a time series:
$n = 4, \sum y = 270, \sum ty = 734$
49. The following information is obtained for monthly advertisement cost and the sales of the last year for a company providing online shopping:

Particulars	**Advertisement cost (ten thousand Rs)**	**Sales (lakh Rs)**
Mean	10	90
Standard Deviation	3	12
r = 0.8		

50. An entrance test required to study abroad is conducted online. The marks obtained inReasoning Ability and English Speaking In this online test (having negative marking system for wrong answer) by 5 students selected in a sample are given below:

Student	**A**	**B**	**C**	**D**	**E**
Marks In Reasoning Ability	5	5	5	5	5
Marks in English Speaking	2	-2	-2	0	2

Calculate the rank correlation coefficient.

51. Find the chain base index numbers from the following data regarding the price of an Item:

Year	2009	2010	2011	2012	2013	2014
Price(Rs.)	40	45	48	55	60	70

52. Find the fixed base Index numbers from the chain base index numbers given below:

Year	2011	2012	2013	2014
Index number	120	90	140	125

Section - E

▸**Answer any 3 (three) questions out of 4 questions from 52 to 55 given below as required. (4 marks each)** (12)

53. 200 students are selected from all the students of a school and the marks obtained by them in an examination of 100 marks follows normal distribution. The mean marks of the distribution is 60 and its standard deviation is 8.
    (1) If 70 or more marks are required for the special scholarship then obtain the number of students getting special scholarship.
    (2) Obtain the minimum marks of 10% of the students getting maximum marks.
54. If Z is standard normal variable and z_1 is Z-score then obtain the values ofZ1 satisfying the following conditions
    (1) $P(-1 \le Z \le z_1) = 0.5255$
    (2) $P(z_1 \le Z \le 2) = 0.7585$
55. The number of students in classes of higher secondary schools of a city follows normal distribution. Average number of students in the classes is 50 and standard deviation is 15. If a class is selected at random then find the following probabilities (i) a class consists of more than 68 students (ii) a class consists of less than 32 students.
56. An Intelligence test is conducted for 500 children and it is found that the average marks are 68 and standard deviations is 22. If the marks obtained by the children is normally distributed, then (1) Find the number of children getting marks more than 68. (2) Find the

percentage of children getting marks between 70 and 90.

Section - F

▸Write the answers to any 4 (four) questions out of the 6 questions from question number 56 to 61 given below. (5 marks each) (20)

57. Compute the Laspeyre's, Paasche's and Fisher's index numbers for the year 2015 from the data given below:

Item	Quantity of Year 2014	Quantity of Year 2015	Price of Year 2014	Price of Year 2015
A	25 Kg	32Kg	42	45
B	15 liter	20 liter	28	30
C	10 pieces	20 pieces	30	36
D	8 meter	15 meter	20	25
E	30 liter	36 liter	60	65

58. Find Karl Pearson's correlation coefficient between density of population (per square km) and death rate (per thousand) from the following data:

City	**A**	**B**	**C**	**D**	**E**	**F**	**G**
Density (per sq.km)	750	600	350	500	200	700	850
Death rate (per thousand)	30	20	15	20	10	25	50

59. In order to study the relationship between the density of population and the number of persons suffering from skin diseases, the following information is obtained for six cities regarding their density of population (per sq. km) and persons suffering from skin diseases(per thousand).

Density (per sq. km) x	12000	14500	19000	17500	13500	16000
Number of patients (per thousand) y	80	60	90	80	40	30

Obtain the regression line of Y on X. Estimate the number of patients suffering from skin diseases if density of population of a city is 15000 (per sq.km). Examine the reliability of this regression model.

60. To know the relation between the heights and weights of the students of a school, a sample of six students is taken and the following information

is obtained. Find the correlation coefficient between the heights and weights of the students.

Height (cm) x	155	165	158	162	153	160
Weight (kg) y	53	63	56	60	52	60

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

62. The data about monthly sales (in thousand ₹) of a company are given in the following table. Fit a linear trend and show it grapically. Estimate the sale for the month of August using the equation obtained.

Month	January	February	March	April	May	June
Sale (thousand ₹)	80	85	90	76	82	88