



Seat No. \_\_\_\_\_

**HR-18**  
**B. Sc. (Sem. II) (W.E.F. 2019) Examination**  
**April - 2023**  
**Statistics : Paper - 201**  
*(Statistical Methods - 2)*

Time :  $2\frac{1}{2}$  Hours / Total Marks : 70

- Instructions :**
- (1) All the five questions are compulsory.
  - (2) Each question carries 14 marks.
  - (3) Students can carry their own scientific calculator.
  - (4) Graphs and Log table should be provided to students on demand.

- 1 (a) Give the answer of following question : 4
- (1) Sum of the absolute deviations about median is \_\_\_\_\_.
  - (2) The correct relation between A.M., G.M., and H.M. is \_\_\_\_\_.
  - (3) If for a discrete series, the assumed mean  $A = 50$ ,  $\sum fd = 45$  for  $d = x - A$ ,  $\sum f = 12$  then the mean series is \_\_\_\_\_.
  - (4) Show the relation between  $D_5$ ,  $Q_2$  and  $M$ .
- (b) Write any **one** : 2
- (1) The mean of 10 observations is 16.5. If the mean of 4 of these 10 observations is 15, find the mean of the remaining observation.
  - (2) If the arithmetic mean of two numbers is 10 and their geometric mean is 8, find their Harmonic mean also find the number.
- (c) Write any **one** : 3
- (1) 3 Students from a group of 18 students failed in the examination for the subject of physics. The marks obtained by 15 students who passed are as follows. 42, 65, 53, 75, 43, 50, 68, 57, 79, 48, 51, 61, 55, 70, 64. Find the median marks of all 18 students.
  - (2) Prove that  $AM \geq GM \geq HM$ .
- (d) Write any **one** : 5
- (1) In class of 40 students Mr. X has 3<sup>rd</sup> rank and in other class of 60 students Mr. Y has 5<sup>th</sup> rank. Compare the result of both the students and who is better student?
  - (2) Write and prove the Properties of Arithmetic Mean.

- 2 (a) Give the answer of following questions : 4
- (1) \_\_\_\_\_ is unit less measure of dispersion.
  - (2) Write the formula of coefficient of skewness, when mode is undefined.
  - (3) What is semi-inter-quartile range?
  - (4) If a constant value 5 is subtracted from each observation of a set, the variance is \_\_\_\_\_.
- (b) Write any **one** : 2
- (1) The mean of variable is 120 and the c.v. is 60%. What is the variance the variable?
  - (2) Write methods of finding skewness.
- (c) Write any **one** : 3
- (1) If three quartiles of frequency distributions are 22, 18 and 25 find skewness and its types.
  - (2) Explain the types of skewness.
- (d) Write any **one** : 5
- (1) For the sequence of 100 observations the mean and the s.d. are 40 and 10 respectively. In calculation these measures two observations were taken as 30 and 70 instead of 3 and 27 by mistake. Find the corrected mean and s.d.
  - (2) Write comparison the methods of Karl Pearsons and Bowley for determining the coefficient of skewness.
- 3 (a) Give the answer of following questions : 4
- (1) The weights used in Pasche's price index are denoted as \_\_\_\_\_.
  - (2) Symbolically  $P_{01} \times P_{10} = 1$  stands for \_\_\_\_\_.
  - (3) If  $\sum p_0q_1 : \sum p_1q_0 := 3 : 4$  then the Paache's index will be \_\_\_\_\_.
  - (4) Method the cost of living index number is constructed by \_\_\_\_\_.
- (b) Write any **one** : 2
- (1) Convert the following chain base index numbers into fixed base index number.
- |              |      |      |      |      |      |
|--------------|------|------|------|------|------|
| Year         | 2001 | 2002 | 2003 | 2004 | 2005 |
| Index Number | 80   | 110  | 120  | 105  | 95   |
- (2) State the characteristics of index numbers.
- (c) Write any one : 3
- (1) Explain the construction of cost of living Index Number.

- (2) Calculate Laspeyre's and Paasche's index number for the following data :

Commodity	$q_0$	$p_0$	$q_1$	$p_1$
A	12	10	15	12
B	15	7	20	5
C	24	5	20	9
D	5	15	5	14

- (d) Write any **one** :

5

- (1) A textile worker in the city of X earns Rs. 4,000 per month. The cost of living index for January, 2010 is given as 2,500. Using the following data find out the amount he spends on (i) Clothing and (ii) Rent.

Group	Expenditure (Rs.)	Group Index
Food	1600	225
Clothing	?	256
Rent	?	275
Fuel and Lighting	400	300

- (2) Show that Fisher's Index Number satisfies both test time reversal test and Factor Reversal Test.

- 4 (a) Give the answer of following questions :

4

- (1) A series of observations recorded over time is known as a \_\_\_\_\_.
- (2) What is trend?
- (3) Moving average method of fitting trend in a time series data removes the effect of \_\_\_\_\_
- (4) Write the additive model of time series.

- (b) Write any **one** :

2

- (1) Find 3-yearly moving average for the following data.

Year	2009	2010	2011	2012	2013
Production	12	15	18	15	16

- (2) Write any two merits and demerits of method of moving average.

- (c) Write any **one** :

3

- (1) Find seasonal indices for the following time series data.

Year	$Q_1$	$Q_2$	$Q_3$	$Q_4$
2010	65	58	72	71
2012	70	60	74	61
2014	75	68	68	59
2016	80	72	60	60

- (2) Explain method of least square to determine the trend.

(d) Write any **one** : 5

(1) Fit a straight line trend by the least squares method and tabulate the trend for the given data :

Year	1999	2001	2003	2005	2007
Production	83	92	71	90	169

(2) Fit second degree parabola to the given data :

Year	1999	2001	2003	2005	2007
Production	11	12	14	18	16

5 (a) Give the answer of following questions : 4

(1) If  $\Delta y_0 = 5$  and  $\Delta y_1 = 3$ , find the value of  $\Delta^2 y_0$ .

(2) \_\_\_\_\_ method of interpolation can be used when the distance between the consecutive values of the independent variable  $x$  not equal.

(3) Write the coefficient for  $n = 5$  in Pascale's triangle.

(4) \_\_\_\_\_ function is used to calculated total in excel.

(B) Write any **one** : 2

(1) Write the meaning of Interpolation and Extrapolation.

(2) Prepare difference table and write four leading differences from the difference table.

(C) Write any **one** : 3

(1) Find the estimated value of  $y$  when  $x = 12.5$  by appropriate method. From the data given in the following table.

$x$	11	12	13	14
$y$	20	23	27	32

(2) If  $U_1 = 5, U_2 = -1, U_3 = 6, U_4 = 17, U_5 = 33$  and 4th order differences are constant then find  $U_6$ .

(D) Write any **one** : 5

(1) If  $f(0) = 2, f(2) = 6, f(3) = 10$ , derive the form of  $f(x)$  by Lagrange's method.

(2) Obtain the number of workers earning wages between Rs. 60 and 70, by using appropriate method of interpolation for the following data :

Weekly wages (in Rs.)	20 – 40	40 – 60	60 – 80	80 – 100	100 – 120
Number of workers (in '000)	250	120	100	70	50