2021

STATISTICS

PAPER-II

Time Allowed — 3 Hours   *Full Marks — 200*

If the questions attempted are in excess of the prescribed number, only the questions attempted first up to the prescribed number shall be valued and the remaining ones ignored.

*Answers may be given either in **English** or in **Bengali** but all answers must be in one and same language.*

Group-A

1. Answer *any ten* questions: 10×10=100

   (a) What do you mean by rational sub-groups in a statistical process control? Explain the theoretical basis of control charts.

   (b) Distinguish between:

       (i) Defect and Defective   (ii) Process Control and Product Control

   (c) Describe control charts for number of defects.

   (d) What are the errors that we often come across while constructing a price index number? —Discuss in brief.

   (e) Define Laspeyres' price index. It has an upward bias. — Justify. Does the formula satisfy the tests for index numbers?

   (f) Distinguish between Edgeworth-Marshall formula and Fisher's ideal formula for price index.

   (g) Indicate the types of error that are usually found to occur in census data on age.—Discuss.

   (h) Distinguish between Neonatal and Perinatal mortality rates.

   (i) What do you mean by a Life table? Write down the uses of such a table.

   (j) Simple moving average method over estimates the trend values when the true trend is a convex function.—Justify. How do you choose the period of moving average?

   (k) Write a note on exponential smoothing method of forecasting.

   (l) Describe the ratio to trend method in estimating the seasonal component.

   (m) What is Pareto's law? Formulate Pareto probability density using the law. Find Gini's mean difference in this case.

   (n) Citing an example describe the method of graphical solution in a simple linear programming problem.

   (o) What are the functions of West Bengal Bureau of Applied Economics and Statistics?

Group-B

2. Answer *any five* questions: 20×5=100

    (a) Distinguish between natural tolerance limits and specification limits. What do you mean by process capability?

    (b) How do you modify the control limits when the process is at desired state of control and the control limits for mean are well within the specification limits?   (6+4)+10=20

3. (a) Discuss the following concepts in connection with sampling inspection plans for attributes :

        AOQ, AOQL, ATI and ASN.

    (b) What is OC curve? Draw an ideal OC curve. What is indifference quality level?

    (c) Distinguish between incoming quality and outgoing quality.   (3+3+3+3)+(2+2+2)+2=20

4. (a) Describe control charts for fraction defectives based on variable sample size.

    (b) Show that 2 × Lorenz area = Gini coefficient of concentration.   10+10=20

5. (a) What are the implications of TFR, GRR and NRR?

    (b) The assumption of relative growth rate of population being constant is unrealistic. — Explain.

    (c) What do you mean by indirect method of standardization in determining STDR?

                                            (3+3+3)+5+6=20

6. (a) Derive, by starting from a suitable functional form for l_x, the following:

      (i) $L_x = \dfrac{l_x + l_{x+1}}{2}$ (ii) $L_x = \dfrac{-dx}{\ln p_x}$

    (b) Show that :

      (i) $\dfrac{e_x \, e_{x+1} \cdots e_{x+n-1}}{(1+e_{x+1})(1+e_{x+2}) \cdots (1+e_{x+n})} = {}_n p_x$

      (ii) $L_x = l_{x+1} + \displaystyle\int_0^1 t\left(-\dfrac{d}{dt} l_{x+t}\right) dt$ (5+5)+(5+5)=20

7. (a) Define serial correlation and correlogram. What are the uses of correlogram?

    (b) Obtain the correlogram of Yule's process. Discuss all the cases.   (2+2+6)+10=20

8. (a) What do you mean by a stationary time series? Define weak stationarity.

   (b) What are the effects of moving average on irregular component?

   (c) Moving averages can adopt themselves to changing circumstances.— Explain.

   $$(3+3)+8+6 = 20$$

9. (a) Distinguish between NDP and NNP.

   (b) Write a note on the role of NSSO.

   (c) Discuss in brief the production approach in computing National income. $4+6+10 = 20$

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