

I.F.S. EXAM-2016

STATISTICS

Paper II

0000001

Time Allowed : Three Hours

Maximum Marks : 200

QUESTION PAPER SPECIFIC INSTRUCTIONS

Please read each of the following instructions carefully before attempting questions.

There are **EIGHT** questions in all, out of which **FIVE** are to be attempted.

Question Nos. **1** and **5** are compulsory. Out of the remaining **SIX** questions, **THREE** are to be attempted selecting at least **ONE** question from each of the two **Sections A** and **B**.

Attempts of questions shall be counted in sequential order. Unless struck off, attempt of a question shall be counted even if attempted partly. Any page or portion of the page left blank in the Question-cum-Answer Booklet must be clearly struck off.

All questions carry equal marks. The number of marks carried by a question / part is indicated against it.

Answers must be written in **ENGLISH** only.

Unless otherwise mentioned, symbols and notations have their usual standard meanings.

Assume suitable data, if necessary and indicate the same clearly.

SECTION 'A'

1. Answer all of the following : 8×5=40
- 1.(a) Explain Single and Double Sampling Plans for attributes. 8
- 1.(b) Give any three definitions of Operations Research. What are the advantages and disadvantages of Operations Research Models ? 8
- 1.(c) Describe the problem of replacement of items whose maintenance cost increases with time. (Assume the value of money is constant over time and time is discrete). 8
- 1.(d) Define (i) LTPD (ii) Consumer's risk (iii) Producer's risk and (iv) OC curve. 8
- 1.(e) What is SPSS ? Briefly explain its salient features. 8
- 2.(a) Explain Shewhart's control chart for mean and range ($\bar{X} - R$) and give its construction. Also give the criterion for detecting lack of control in this chart. 20
- 2.(b) Explain the procedure for drawing the 5-points A S N curve for the sequential sampling plan. 20
- 3.(a) Obtain system of differential difference equations in (M/M/1) : (∞ /FCFS) queuing model mentioning the underlying assumptions. 20
- 3.(b) What do you mean by sensitivity analysis ? What are the problems which can be resolved with it ? With the generalized linear programming problem :
- Maximize $Z = C'X$
 Subject to $AX \leq b$, $X \geq O$
 where $X = \text{col. } (x_1, x_2, \dots, x_n)$, $b = \text{col. } (b_1, b_2, \dots, b_m)$,
 $C = \text{col. } (c_1, c_2, \dots, c_n)$, $O = \text{col. } (o, o, \dots, o)$ and $A = \left((a_{ij}) \right)_{m \times n}$,
- discuss how the changes in the resource vector b can be observed. 20
- 4.(a) Consider a modified form of "Matching biased coins" game problem. The matching player is paid Rs. 18-00 if the two coins turn both heads and Rs. 11-00 if the coins turn both tail. The non-matching player is paid Rs. 13-00 when the two coins do not match. Determine the Payoff matrix, best strategies for each player and the value of the game. 20

4.(b) Solve the following LPP by simplex method :

$$\begin{aligned} \text{Minimize } Z &= x_1 - 3x_2 + 2x_3 \\ \text{Subject to } & 3x_1 - x_2 + 2x_3 \leq 7 \\ & 2x_1 + 4x_2 \geq -12 \\ & -4x_1 + 3x_2 + 8x_3 \leq 10 \\ & x_1, x_2, x_3 \geq 0. \end{aligned}$$

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SECTION 'B'

5. Answer all of the following : 8×5=40

5.(a) Explain the concept of Base Shifting and Splicing in Index Numbers. Give one example of each. 8

5.(b) What are Box-Jenkins models ? Explain how they are useful in forecasting the time series. 8

5.(c) Explain Standard Scores and T Scores and give a comparison of these two scores. 8

5.(d) Write brief note on Sample Registration System. 8

5.(e) Distinguish between Stationary and Stable populations. Also mention the main assumptions of Stable Population Model. 8

6.(a) Explain the Logistic Growth Curve for the Population Growth. Give any two methods of fitting the Logistic Growth Curve. 20

6.(b) Complete the following life Table :

Age in Years	l_x	d_x	q_x	p_x	L_x	T_x	e_x^0
11	12000	?	?	?	?	?	?
12	8000	?	?	?	?	?	?
13	6000	?	?	?	?	?	?
14	4000				3000	?	?

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7.(a) Prove that Fisher's Index Number lies between Laspeyre's and Paasche's Index Numbers. 20

- 7.(b) Construct the cost of living Index for the year 2012 (Base 1990=100) using the following data :

<i>Item</i>	<i>Unit</i>	<i>Price (2010)</i>	<i>Price (2012)</i>	<i>Weight</i>
A	Kg	50	75	10%
B	Litre	60	75	25%
C	Dozen	200	240	20%
D	Kg	80	100	40%
E	One Pair	800	1000	5%

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- 8.(a) Describe briefly the Official Statistical System in India relating to Population.

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- 8.(b) Explain the following: (i) Auto Correlation function (ii) Portmanteau Tests (iii) Partial Auto Correlation Coefficient (iv) Heteroscedasticity and (v) Rank and Order conditions of identifiability.

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