

IC-104

Fellowship

**EXAMINATION  
QUESTION  
PAPERS  
NOV. 2006**



भारतीय बीमा संस्थान

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## FELLOWSHIP EXAMINATION

### STATISTICS

Time: 3 Hours]

[Total Marks : 100

Answer any **FIVE** questions only.  
All questions carry 20 marks each.

**(An extract from the table of areas of the standard normal curve between 0 and x is given at the end)**

1. The Principal of a school wanted to study relationship between the marks obtained by students in school preliminary examination and that in S.S.C Board examination. For this purpose 10 students were selected randomly from amongst the students who had appeared in S.S.C. Board examination. Their percentage marks in the two examinations are given below: Marks

% Marks in Preliminary Examination	84	76	38	69	54	75	45	89	50	60
% Marks in S.S.C. Board Examination	80	64	38	48	55	68	43	86	48	50

- i) Find a linear relationship connecting the percentage marks in 'school preliminary examination' and percentage marks in 'S.S.C. Board examination' and the co-efficient of correlation between them. 10
- ii) Estimate the percentage marks secured by a student in S.S.C. examination, who had secured 62% marks in his preliminary examination. 2
- iii) Find the standard error of estimate. 8
2. a) The marks of 7 students in English and Mathematics are given below. The marks are out of 100 in each subject. Determine in which subject the variation is more. 14



- b) Find the combined mean and standard deviation of the percentage marks obtained in English & Mathematics from the Table given below.

Student	1	2	3	4	5	6	7
Marks obtained in English	30	40	60	70	20	60	90
Marks obtained in Mathematics	60	76	80	70	65	72	74

3. a) Briefly explain the 'Latin Square' design used in the Analysis of variance. 7
- b) The data given below represent average marks secured by insurance agents in a test on 'insurance knowledge'. The 'treatment' under consideration is the agent's qualification:- 13
- A : Professionally qualified diploma holder in insurance education.
- B : Not professionally qualified, but a graduate,
- C : Not professionally qualified and non-graduate.
- The blocking factors are Area of operation and age.

AREA	AGE\		
	35 & below	Above 35 but 50 or below	Above 50
Metropolitan	A 76	B 76	C 67
Urban	B 70	C 64	A 73
Rural	C 70	A 85	B 70

- i) Construct ANOVA table for the above latin square design.
- ii) At 1% and 5% levels, test the null hypothesis that the marks do not depend upon the 'Area of operation'.  
Given :  $F_{0.01} = 99.01$  &  $F_{0.05} = 19.00$  for degrees of freedom 2 and 2.
4. Write short notes on the following:-
- a) Stratified Sampling
- b) Sampling Errors
- c) Non - Sampling Errors

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5. a) Calculate the seasonal Index from the following data using the method of moving averages.

Quarter Year ↓ →	I	II	III	IV	Total
2001	35	86	67	124	312
2002	38	109	91	176	414
2003	47	158	104	226	535
2004	61	177	134	240	612
2005	72	206	141	307	726
<b>Total:</b>	<b>253</b>	<b>736</b>	<b>537</b>	<b>1,073</b>	<b>2,599</b>

- b) i) Derive the equation of the trend line using the method of least squares for the data given below:

Year X	1998	1999	2000	2001	2002	2003	2004	2005
Values Y	160	180	184	166	188	198	184	208

- ii) Calculate the estimated values of Y using the equation of the trend line.

6. A box contains 50 uniform balls of which 35 are white and 15 are red in colour. Three balls are drawn in succession (without replacements) from the box.

What is the probability in getting

- at least two white balls,
- white ball in the first and third draws,
- Red balls in the last two draws, and
- What is the probability of not getting the same colour ball in successive draws ?

7. Ten students are selected at random from college A and another ten students are selected at random from college B. They are given I. Q. test. The marks obtained by the 20 students are given below:

College A:	80	72	36	66	51	71	43	86	48	57
College B:	75	61	36	46	52	64	41	81	46	48



- a) Can it be said that students of college A are more intelligent than those of college B. 12

Given that  $t_{0.05} = 1.734$  for degrees of freedom 18.

- b) Can it be said that variability in intelligence of the students of college A is not larger than that of the students of college B. 8

Given that  $F_{0.05} = 3.18$  for degrees of freedom 9 & 9.

8. a) Using the data given below, calculate the following indices for the year 2004 taking 2000 as base year. 11

- i) Laspeyres' Price Index
- ii) Paasche's Price Index
- iii) Fisher's Price Index
- iv) Laspeyres' Quantity Index
- v) Paasche's Quantity Index
- vi) Fisher's Quantity Index
- vii) Value Index

Year	Commodity A		Commodity B		Commodity C	
	Price	Quantity	Price	Quantity	Price	Quantity
2000	12	24	20	48	8	64
2004	16	20	16	64	12	56

- b) Verify using the above data that Laspeyres' price Index and Paasche's price Index do not satisfy 'Time Reversal' test, whereas Fisher's Index satisfies this Test. 9

**TABLE SHOWING AREAS OF THE STANDARD NORMAL CURVE FOR VALUE OF 'X' BETWEEN '0' AND 'x'**

<b>X</b>	<b>AREA</b>	<b>X</b>	<b>AREA</b>
0.1	0.0398	1.1	0.3643
0.2	0.0793	1.2	0.3849
0.3	0.1179	1.3	0.4032
0.4	0.1554	1.4	0.4192
0.5	0.1915	1.5	0.4332
0.6	0.2257	1.6	0.4452
		1.645	0.4500
0.7	0.2580	1.7	0.4554
0.8	0.2881	1.8	0.4641
		1.9	0.4713
0.9	0.3159	1.96	0.4750
		2.0	0.4772
1.0	0.3413	2.58	0.4951
		3.0	0.4987

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