

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)**

- | | Marks |
|--|--------|
| 1. The scores of candidates who appeared for certain test are normally distributed with mean 55 marks and standard deviation 15 marks. Minimum score for passing is 34 marks and second class is awarded to students with scores between 46 and 61 marks. Minimum marks required for distinction is 70. If 10000 students appeared, find : | 5 each |
| a) Probability that a candidate selected at random scores at most 40 marks. | |
| b) Percentage of candidates who passed | |
| c) Number of candidates passing in Second Class. | |
| d) Number of Candidates scoring distinction. | |
| 2. Write short notes on : | 5 each |
| a) Negative Correlation | |
| b) Spurious Correlation | |
| c) Cluster Sampling | |
| d) Judgment Sampling | |
| 3. a) Fifteen Agency Managers are selected at random from 2 regions. Northern and Western, of a Life Assurance Company. The Agents recruited by the 15 Agency Managers are as shown below : | 10 |

Agency Manager	Northern Region	Western Region
1.	98	39
2.	34	33
3.	94	54
4.	43	23
5.	77	31
6.	40	55

Agency Manager	Northern Region	Western Region
7.	36	31
8.	54	22
9.	57	89
10.	32	72
11.	49	65
12.	34	57
13.	98	24
14.	24	69
15.	59	36

Can it be concluded that the difference in Agency recruitment capacity of the Agency Managers of the two regions is significant ?

- b) There are two underwriters X and Y, working in a New Business section of a Branch Office of a Life Assurance Company. Underwriter X underwrites, on an average, 12 new business proposals per hour, whereas, underwriter Y underwrites, on an average, 8 new business proposals per hour. Moreover, it has also been experienced that, on an average 8% of the new business proposals underwritten by underwriter X results into early claims, and 12% of the new business proposals underwritten by underwriter Y results into early claims. 10
- i) What is the overall probability of a new business proposal being resulted into early claim ?
 - ii) If a new business proposal, selected at random, is found to be resulted into early claim, what is the probability that it was underwritten by underwriter Y ?

4. a) A Company is interested in knowing if there is significant difference in the average salary received by foremen in two divisions. It is believed that the salaries of the foremen are approximately normally distributed with Standard deviations approximately same. Based on the sample data from the two divisions, following observations were made. 10

	First division	Second division
Sample size	12 foremen	10 foremen
Average monthly Salary (Rs)	1050	980
Standard Deviation of Sample Salaries	68	74

If you are a Statistician in this company what will be your conclusion, at 5% level of significance ?

Write clearly the Hypothesis you are testing.

(Given :- $t_{.05} = 2.086$ at 20 d. f.)

- b) A sample of 50 typical round trips of a truck in a transport company showed mean time of a trip 52 hours with a standard deviation 4 hours. Find the limits within which population mean of round trip lies almost certainly.

5. A Life Assurance Company opens five satellite offices (Extension counters) in the developing residential areas of a city. It also deploys specially trained Agency Managers to perform in these offices. The Annualised premium (Rupees, crores) procured by these satellite offices, through these Agency Managers, in a Financial Year, is given below :

20

AGENCY MANAGERS

Satellite Offices	A	B	C	D	E	Total
1	29	1	56	16	16	118
2	97	60	57	67	96	377
3	75	36	66	38	14	229
4	24	63	50	71	34	242
5	12	20	88	7	65	192
Total	237	180	317	199	225	1,158

Determine the effect of the areas of satellite office and the effectiveness of Agency Managers on the procured annualized premium.

6. Twenty life assurance policies are chosen at random from among the policies issued by a Branch Office of a Life Assurance Company. The 'Age at Entry' under these policies are found to be :

20

35	30	43	46	43	29	36	37	40	34
48	30	28	45	25	39	41	24	33	25.

Calculate average age at entry and variance in age at entry.

Also, determine the 90%, 95% and 99% confidence limits for the variance in age at entry of all the policies issued by the Branch Office.

7. Calculate 5 yearly and 7 yearly moving average for the data given below . Also calculate respective seasonal indices. 20

Year	1	2	3	4	5	6	7	8	9	10
Observed Value	220	208	156	210	218	240	230	220	228	244
Year	11	12	13	14	15	16	17	18	19	20
Observed Value	260	254	244	236	260	280	270	260	254	270
Year	21	22	23	24	25	26	27	28	29	30
Observed Value	292	284	276	270	290	310	300	296	286	312

8. i) Prices paid and quantities consumed for groceries, vegetables, milk, cloth and cosmetics for the years - 2005 and 2010 are given below. Calculate :- 15
- Price Index using base year (2005) quantities as weights.
 - Price Index using current year (2010) quantities as weights.
 - Quantity Index using Base year (2005) prices as weights.
 - Quantity Index using current year (2010) prices as weights.
 - Value Index.

Commodity	Year - 2005		Year - 2010	
	Price	Quantity	Price	Quantity.
Groceries	30	4	90	5
Vegetables	25	3	75	4
Milk	20	2	35	3
Cloth	100	5	75	6
Cosmetics	50	2	75	1

- ii) Write a short note on 'Problems in the Construction of Index Numbers ?

TABLE SHOWING AREAS OF THE STANDARD NORMAL CURVE FOR VALUE OF 'X' BETWEEN '0' AND 'X'			
X	Area	X	Area
0.05	0.0199		
0.10	0.0398	1.1	0.3643
0.20	0.0793	1.2	0.3849
0.30	0.1179	1.3	0.4032
0.40	0.1554	1.4	0.4192
0.50	0.1915	1.5	0.4332
0.60	0.2257	1.6	0.4452
		1.645	0.4500
0.70	0.2580	1.7	0.4554
0.80	0.2881	1.8	0.4641
		1.9	0.4713
0.90	0.3159	1.96	0.4750
		2.00	0.4772
1.00	0.3413	2.58	0.4951
		3.0	0.4987

-----END-----