IC-104

Fellowship

EXAMINATION QUESTION PAPERS MAY 2007

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FL-82

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 o and x is given at the end)

1. Six policies were selected at random from each of the four branches of a Life Insurance company and the age at entry of the policy-holders were noted. Determine whether there is significant difference between the ages at entry of the policy-holders of the four branches, using the method of 'Analysis of Variance' Marks 20

Age at entry of policy holders			
Branch 'A'	**Branch 'B'**	**Branch 'C'**	**Branch 'D'**
25	31	42	40
27	29	40	38
30	40	30	39
26	42	24	27
35	34	21	31
33	30	34	21

Given that $F_{0.05} = 3.10$ for degrees of freedom 3 & 20.

2. a) 100 students of a class are divided into three groups on the basis of the marks obtained by them in the mathematics test. The groupings are, less than 50, 50 to 70 & above 70. Each group is further divided into three groups on the basis of their performance in English viz. marks less than 40, 40 to 60 & above 60. The table below gives the number of students in each group. 10

Mathematics → / **English ↓**	**(A_1) Below 50**	**(A_2) 50 to 70**	**(A_3) Above 70**	**Total**
Below 40 **(B1)**	15	10	5	30
40 to 60 **(B2)**	5	30	25	60
Above 60 **(B3)**	0	5	5	10
Total :	**20**	**45**	**35**	**100**

If a student is selected at random, find :

i) Probability (A3),
ii) Probability (B3),
iii) Probability (A3/B3),
iv) Probability (B3/A3),
v) Probability of B1 or B2,
vi) Probability of B2 and A2.

b) Of 2 drawers, the first contains 4 different pairs of gloves and the second contains three different pairs of gloves. One of the drawers is chosen and 2 gloves are taken out of it at random and are found to form a pair. What is the probability that they came from the : 10

i) First drawer ?
ii) Second Drawer ?

3. Quareterly output of coal for four years (in '000 tons) are tabulated below:-

Year	Quater I	Quarter II	Quarter III	Quarter IV	Total
2003	75	60	54	59	248
2004	86	65	63	80	294
2005	90	72	66	85	313
2006	100	78	72	93	343
Total :	**351**	**275**	**255**	**317**	**1198**

a) Obtain trend value for each quarter. 10
b) Isolate the random variations taking the following as quaterly index. 6
c) Ignoring the random variations, forecast the quarterly output of coal for the year 2007. 4

Quarter :	I	II	III	IV
Index :	119.9	91.5	84.8	103.8

4. a) In a petrol filling station, 30 cars arrive during one hour. Find the probability that: 10

i) The next car will arrive within 5 minutes.
ii) No car will arrive during next three minutes.

Assume that the random variable x representing the time interval for arrival of successive cars follows exponential distribution.

Given that $\bar{e}^1 = 0.36788$

b) From an urn, containing 3 red balls and 2 white, a man is to draw two balls at random without replacement. He is promised Rs.20 for each red ball he draws and Rs. 10 for each white one. Find his expectation. 10

5. For the data given below :

X :	57	58	59	59	60	61	62	64
Y:	77	78	75	78	82	82	79	81

a) Calculate co-efficient of co-relation between variables X & Y. 12
b) Derive equations of Regression lines. 6
c) Estimate values of Y when the value of X is 65. 2

6. a) Write short notes on 'Central Limit Theorem'. 14
b) From the policies underwritten by a life office during a month 100 policies were chosen at random and the weights of the proposers as given in the proposal forms were noted. The sum and sum of the squares of the weights were respectively found to be 6,000 kgs. and 366, 400 $(kg)^2$. 6
Determine the 90% confidence limits of the mean of the population. Ignore finite population correction.

7. The following are the marks obtained in mathematics by 20 students in an examination.

85,	30,	80,	75,	55,	50,	20,	75,	95,	40,
25,	20,	90,	15,	40,	95,	50,	70,	15,	75.

Calculate:
a) Mean, mode, median 6
b) Standard deviation, mean deviation (from mean) 6
c) Pearson's co-efficient of skewness & measure of skewness 'α_3' 8

P. T. O.

8. a) For testing the quality of 2 types of seeds, an agronomist prepared 12 plots of land and sowed variety A in one half of each of the 12 plots & variety B in the other half. The yields from the 12 plots were as shown below: 12

Plot→ Type↓	1	2	3	4	5	6	7	8	9	10	11	12
A	7	6	10	8	8	9	12	7	11	6	9	7
B	6	7	8	7	5	8	10	8	9	6	7	8

Can it be said that variety A gives more yield than varity B?
Given that $t_{0.05}$=1.717 for d.f. 22.

b) In connection with the constructon of index numbers, write notes on 'Selection of items to be included in the index'. 8

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

X	Area	X	Area
0.05	0.0119		
0.10	0.0398	1.10	0.3643
0.20	0.0793	1.20	0.3849
0.30	0.1179	1.30	0.4032
0.40	0.1554	1.40	0.4192
0.50	0.1915	1.50	0.4332
0.60	0.2257	1.60	0.4452
		1.645	0.4500
0.70	0.2580	1.70	0.4554
0.80	0.2881	1.80	0.4641
		1.90	0.4713
0.90	0.3159	1.96	0.4750
		2.00	0.4772
1.00	0.3413	2.58	0.4951
		3.00	0.4987

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