IC-104

Fellowship

EXAMINATION QUESTION PAPERS NOV. 2005

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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)

Marks

1. i) A client is to visit us by appointment and from the past experience we know that the probabilities that he will come by bus,taxi or train are respectively $^1/_5$, $^1/_{10}$, $^3/_{10}$. The probability that he will use his own car is $^2/_5$. If he comes by bus the probability that he will be late is $^1/_3$, if by taxi $^1/_{12}$, if by train $^1/_4$; if he uses his own car he will not be late.
   a) When he arrives he is late.What is the probability that he came by bus? 5
   b) If the information had been to the effect that he is not late, what would be the probability that he came by bus? 5

   ii) In the case of 6 people of different ages, the probabilities of living for 7 years are respectively 0.4, 0.5, 0.6, 0.7, 0.8 & 0.9. Calculate the probability that of these six people exactly 2 will live for 7 years. 10

2. An agricultural experiment gave the following results for the yield of wheat per acre; columns correspond to blocks and rows to treatments. Discuss the variations of yield with each of the two factors: 20

TREATMENT	BLOCKS					
	I	II	III	IV	V	VI
A	13	10	16	9	12	15
B	11	9	13	12	17	11
C	18	8	15	10	19	9
D	14	12	10	13	11	14
E	12	11	12	8	14	17

Given that F 0.05 = 2.87 for degrees of freedom 4 and 20
and F 0.05 = 2.71 for degrees of freedom 5 and 20

3. a) Two unbiased dice are thrown. Find the probability of the sum of numbers appearing on upper faces 10
   i) more than 8
   ii) less than 8
   b) i) An unbiased coin is tossed 900 times. What is the probability that the number of 'heads' lies between 425 and 475? 8
   ii) Explain your result in (b) (i) in layman's language? 2

4. 570 students were examined in Mathematics in the year 2004 by an Educational Insurance Institute. The marks obtained by the students ranged from 0 to 99, all being integers. They are grouped in 20 classes of class interval of 5. They are given below with respective class frequencies.

Interval	Mid-Value (x)	Frequency (f)	Interval	Mid-Value (x)	Frequency (f)
0 to 4	2	12	55 to 59	57	52
5 to 9	7	13	60 to 64	62	61
10 to 14	12	13	65 to 69	67	41
15 to19	17	14	70 to 74	72	32
20 to 24	22	23	75 to 79	77	27
25 to 29	27	23	80 to 84	82	23
30 to 34	32	29	85 to 89	87	17
35 to 39	37	34	90 to 94	92	13
40 to 44	42	44	95 to 99	97	5
45 to 49	47	44			
50 to 54	52	50	**Totals**		**570**

Calculate in respect of variable x

i) a) Mean b) Mode c) Median d) Lower Quartile 15
   e) Upper Quartile
ii) Standard Deviation 5

5. A random sample of 36 proposals out of 10,000 received by a life office gave the weights (in kgs) of proposers as:

74,	50,	68,	67,	67,	64,	68,	84,	60,	45,	49,	59,
50,	52,	77,	56,	69,	54,	75,	51,	66,	62,	56,	48,
45,	62,	70,	52,	78,	47,	64,	72,	46,	61,	60,	49.

a) Estimate the average weight of 10,000 proposers and the standard error of mean. 12
b) Determine 95% confidence interval for the population mean. 4

c) Determine the size of the sample required, if it is desired that the difference between sample mean and population mean should not differ by more than 2.5 kgs at 95% confidence level. 4

6. The Table below gives the observed values of y corresponding to seven given values of X.

Variable $X \rightarrow$	12	13	14	15	16	17	18
Variable y $\rightarrow$	2	5	8	20	24	40	55

a) Find the coefficient of correlation between x & y. 10
b) Find the equation of regression line of y on x. 5
c) Find the estimated values of y and the standard Error of the Estimate. 5

7. i) a) A random sample of 9 students from college 'A' of a city gave mean height of 68" and variance 4(inch)^2. Find 90% confidence interval for mean height of students of that college. Given that t0.05 = 1.86 for 8 degrees of freedom. 2

b) A random sample of 10 students from college B of the same city gave a mean height of 69" and variance 4.2 (inch)^2. Can it be said that students of college B are taller than those of college A given in (a) above? Given that t0.05 = 1.74 for 17 degrees of freedom. 8

ii) Write short notes on student's t - distribution. 10

8. a) Briefly describe the **three different methods** of determining the linear trend values 8

b) Calculate Seasonal Indices by the method of Moving Averages for the data given below : 12

Wheat prices in Rupees per Kg.

Year → / ↓	Ouarter I	Ouarter II	Ouarter III	Ouarter IV	Total
1999	10	13	14	12	49
2000	12	14	15	13	54
2001	13	15	18	14	60
2002	15	19	21	18	73
2003	15	22	23	20	80
Total :	**65**	**83**	**91**	**77**	**316**

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	1.10	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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