00916

ADIT / BIT PROGRAMME

Term-End Examination

December, 2010

CSI-99 : STATISTICAL TECHNIQUES

Time : 3 hours *Maximum Marks : 75*

Note : *Question No. 1 is **compulsory**. Answer **any three** questions from Question No. 2 to Question No. 5. Use of calculator is allowed.*

1. (a) (i) From a bag containing 3 red and 2 blue balls, 2 balls are drawn at random. Write down the sample space and then find the set representing the event, "1 ball is red and the other is blue." **3x2=6**

(ii) A fair die is thrown. What is the probability that either an odd number or a number greater than 4 will turn up ?

(iii) If P (A) = 3/7, P (B) = $\frac{1}{3}$ and

P (A or B) = 2/3; Find P (A/B).

(b) Fill in the blanks : 3x2=6

(i) In the standard normal curve, the area between $z = -1$ and $z = 1$ is nearly.....

(ii) The marks obtained were found normally distributed with mean 75 and variance 100. The percentage of students who scored more than 75 marks is .....

(iii) In a random variable x follows Poisson distribution such that $P(x=1) = P(x=2)$, then the mean of the distribution is .....

(c) The probabilities of A, B, C solving a problem are 1/3, 2/7 and 3/8 respectively. If all the three try to solve the problem simultaneously, find the probability that exactly one of them will solve it. 3

(d) A random variate x has the following distribution : 3

x	0	1	2	3
$p(x)$	1/8	3/8	3/8	1/8

Find the variance and hence determine the standard deviation of the distribution.

(e) Fill in the blanks 4

(i) The measure of central item is called as ____ .

(ii) The correlation co-efficient is the ____ mean between the regression coefficients.

(iii) The value of coefficient of correlation lies between ____ and ____ .

(iv) The probability of getting a ticket of number of multiple of 5 in a random draw from a bag containing tickets of even numbers from 1 to 100, is ____ .

(f) One bag contains four white and two black beads and another contains three of each colour. A beads is drawn from each bag. What is the probability that one is white and one is black ? 3

(g) Compute the mean of the probability density function (p d f), given by 2

$f(x) = 12\,x^2\,(1 - x)$ for $0 \leq x \leq 1$ and

$f(x) = 0$

otherwise

(h) Wireless sets are manufactured with 25 soldered joints each. On the average, 1 in 500 is defective. How many sets can be expected to be free from defective joints in a consignment of 10000 sets ? 3

2. (a) A business firm receives on an average 2.5 telephone calls per day during the time period 10.00 - 10.05 AM. Find the probability that on a certain day, the firm receives

(i) no call **3x5=15**

(ii) exactly 4 calls, during the same period.

(Assume Poisson Distribution)

(b) The life of army shoes is "normally" distributed with mean 8 months and standard deviation 2 months. If 5000 pairs are issued how many pairs would be expected to need replacement after 12 months ?

$\left[\text{Given that } P(z \geq 2) = 0.0228, \text{ and } z = \frac{x-\mu}{\sigma}\right]$.

(c) Find the regression line of y on x for the date :

x	1	4	2	3	5
y	3	1	2	5	4

3. (a) The mean of a normal distribution is 50 and 5% of the values are greater than 60. Find the standard deviation of the distribution (Given that the area under standard normal curve between z=0, and z = 1.64 is 0.45).

(b) The life time of radio tubes manufactured in a factory is known to have an average value of 10 years. Find the probability that the life time of a tube taken randomly.

(i) exceeds 15 years,

(ii) is less than 5 years, assuming that the exponential probability law is followed.

(c) In a Normal distribution, 31% of the items are under 45 and 8% are over 64. Find the mean and standard deviation of the distribution. **3x5=15**

4. (a) From the data given below about the treatment of 500 patients suffering from a disease, state whether the new treatment is superior to the conventional treatment. **3x5=15**

	No of Patients		
	Favourable	Not Favourable	Total
New	280	60	340
Conventional	120	40	160
	400	100	500

(b) A random sample of 100 recorded deaths in India during the past year showed an average life span of 71.8 years. Assuming a population standard deviation of 8.9 years, does this seem to indicate that the mean life span today is greater than 70 years ? Use a 0.05 level of significance.

(c) A manufacturer intends that his electric bulbs have a life of 1000 hours. He tests a sample of 20 bulbs, drawn at random from a batch and discovers that the mean life of the sample bulbs is 990 hours with a standard deviation of 22 hours. Does this signify that the batch is not up to the standard ?

5. (a) A function f (x) is defined as follows : **3x5=15**

$$f(x) = \begin{cases} 0 & x < 2 \\ \frac{1}{18}(2x+3) & 2 \leq x \leq 4 \\ 0 & x > 4 \end{cases}$$

Show that it is a probability density function.

(b) A machinist is making engine parts with axle diameter of 0.70 inch. A random sample of 10 parts shows mean diameter 0.742 inch with a standard deviation of 0.04 inch. On the basis of this sample, would you say that the work is inferior.

(c) Find the standard deviation for the following data :

x_i	140	145	150	155	160	165	170	175
f_i frequency	4	6	15	30	36	24	8	2