B.TECH. DEGREE EXAMINATIONS: NOV/DEC 2010

Fourth Semester

BIO TECHNOLOGY

U07MA405 Probability and Statistics

Time: Three Hours   **Maximum Marks: 100**

Answer ALL Questions:-

PART A (10 x 1 = 10 Marks)

1. The Median of the numbers 11, 10, 12, 13, 9 is

   A) 12.5   B) 12   C) 10.5   D) 11

2. Coefficient of variation is

   A) $\dfrac{\sigma}{x}$ B) $\dfrac{\sigma}{\bar{x}}$ C) $\dfrac{\sigma^2}{x}$ D) $\dfrac{\sqrt{\sigma}}{x}$

3. The odds in favour of an event A are 5 to 4. The probability of success of A is

   A) $\dfrac{4}{5}$ B) $\dfrac{5}{9}$ C) $\dfrac{4}{9}$ D) $\dfrac{1}{5}$

4. If $f(x) = kx^2, 0 < x < 3$ is to be a density function, then the value of k is

   A) $\dfrac{1}{9}$ B) $\dfrac{1}{3}$ C) 1   D) $\dfrac{1}{27}$

5. If X is a Poisson variable such that $P(X = 0) = 0.5$, then λ is equal to

   A) 1   B) 2   C) log2   D) e^2

6. The area under the whole normal curve is

   A) 0.5   B) 0.1   C) 2   D) 1

7. Standard error of a statistic is

   A) Mean of the sampling distribution   B) Mode of the sampling distribution

   C) S.D of the sampling distribution   D) Median of the sampling distribution

8. For a two tailed test, if $H_0 : \mu_1 = \mu_2$ then H_1 is

   A) $\mu_1 \neq \mu_2$ B) $\mu_1 > \mu_2$ C) $\mu_1 < \mu_2$ D) $\mu_1 = \mu_2 = 0$

9. Latin Square Design is suitable when the number of treatments is in between

   A) 1 and 5   B) 13 and 17   C)17 and 29   D) 5 and 12

10. We grew radishes in solutions with no magnesium, a normal concentration of magnesium, and double concentration of magnesium. This is an example of

    A) Level of treatment   B) Replication   C) Control group   D) Dependent variable

PART B (10 x 2=20 Marks)

11. Find the Mean of the distribution whose Mode is 1 and Median is 3.

12. If $4x - 5y + 33 = 0, 20x - 9y = 107$ are regression lines of a destroyed laboratory record, find the means of x and y.

13. An urn contains 5 red and 10 black balls. Eight of them are placed in another urn. What is the probability of the latter to contain 2 red and 6 black balls?

14. If X represents the outcome, when a fair die is tossed, find the moment generating function.

15. State the memory less property of the exponential distribution.

16. When will be a Markov chain completely specified?

17. Define level of significance.

18. The data of number of aircraft accidents that occurred during the various days of a week are given and it is asked to test whether the accidents are uniformly distributed over the week. Set up null hypothesis (H_0).

19. What are the basic principles of Experimental Design?

20. What is the main advantage of LSD over RBD?

PART C (5x 14=70 Marks)

21. a) (i) The following are the scores of two batsmen A and B in a series of innings:

A	12	115	6	73	7	19	119	36	84	29
B	47	12	16	42	4	51	37	48	13	0

    Who is the better scorer and who is more consistent?
  (ii) Ten participants on a contest are ranked by two judges as follows:

x	1	6	5	10	3	2	4	9	7	8
y	6	4	9	8	1	2	3	10	5	7

Calculate the rank correlation coefficient.

(OR)

b) (i) Calculate the mode of the following frequency distribution.

Class interval	20-25	25-30	30-35	35-40	40-45	45-50	50-55	55-60
Number of workers	35	43	70	105	90	71	51	30

(ii) In the following table are recoded data showing the test scores made by sales men on an intelligence test and their weekly sales:

Salesmen	1	2	3	4	5	6	7	8	9	10
Test scores	40	70	50	60	80	50	90	40	60	60
Sales(000)	2.5	6.0	4.5	5.0	4.5	2.0	5.5	3.0	4.5	3.0

Calculate the regression line of sales on test scores and estimate the most probable weekly sales volume if a sales man makes a score of 70.

22. a) (i) There are 3 true coins and 1 false coin with head on both sides. A coin is chosen at random and tossed 4 times. If 'head' occurs all the 4 times, what is the probability that the false coin has been chosen and used?

(ii) A continuous random variable X has probability density function $f(x) = kx^2 e^{-x}, x \geq 0$. Find k, mean and variance.

(OR)

b) (i) A random variable X has the following probability distribution.

x	0	1	2	3	4	5	6	7
P(x)	0	k	2k	2k	3k	k^2	$2k^2$	$7k^2 + k$

Find the value of k, $P(1.5 < X < 4.5 / X > 2)$ and the smallest value of λ for which $P(X \leq \lambda) > \dfrac{1}{2}$

(ii) If a random variable has moment generating function $M(t) = \dfrac{3}{3-t}$, obtain the standard deviation of X.

23. a) (i) If A and B shoot independently until each hit his own target. The probabilities of their hitting the target at each shot are $\dfrac{3}{5}$ and $\dfrac{5}{7}$ respectively. Find the probability that B will require more shots than A.

(ii) The number of monthly breakdowns of a computer is a random variable having Poisson distribution with mean equal to 1.8. Find the probabilities that this computer will function for a month without breakdown and with only one breakdown.

(OR)

b) The transition probability matrix of a Markov chain $\{x_n\}, n = 1,2,3,...$ having 3 states 1,2

and 3 is $P = \begin{pmatrix} 0.1 & 0.5 & 0.4 \\ 0.6 & 0.2 & 0.2 \\ 0.3 & 0.4 & 0.3 \end{pmatrix}$ and initial distribution is $p^{(0)} = (0.7, 0.2, 0.1)$

Find (i) $P(X_2 = 3)$ and (ii) $P(X_3 = 2, X_2 = 3, X_1 = 3, X_0 = 2)$

24. a) (i) The fatality rate of typhoid patients is believed to be 17.26%. In a certain year 640 patients suffering from typhoid were treated in a metropolitan hospital and only 63 patients died. Can you consider the hospital efficient?

   (ii) The average marks scored by 32 boys is 72 with Standard Deviation of 8, while that for 36 girls is 70 with a Standard Deviation of 6. Test at 1% Level of Significance whether the boys perform better than girls.

(OR)

b) The nicotine contents in two random samples of tobacco are given below:

Sample1:	21	24	25	26	27	
Sample2:	22	27	28	30	31	36

   Can you say the two samples came from the same population?

25. a) The following table shows the lives in hours of four brands of electric lamps:

A:	1610	1610	1650	1680	1700	1720	1800	
B:	1580	1640	1640	1700	1750			
C:	1460	1550	1600	1620	1640	1660	1740	1820
D:	1510	1520	1570	1600	1680			

   Perform an analysis of variance and test the homogeneity of the mean lives of four brands of lamps.

(OR)

b) Analyse the variance in LSD of yields in kilograms of paddy, P,Q,R,S denote different methods of cultivation

S122	P121	R123	Q122
Q124	R123	P122	S125
P120	Q119	S120	R121
R122	S123	Q121	P122

   Analyse whether the different method of cultivation have given significantly different yields.

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