Register No: ……..

B. TECH DEGREE EXAMINATIONS: APRIL/MAY 2011

Fourth Semester

BIOTECHNOLOGY

U07MA405: Probability and Statistics

Normal Tables may be permitted.

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

Answer All Questions:-

PART A (10 x 1 = 10 Marks)

1. Standard deviation is the measure of

A) absolute variation B) dispersion C) average D) central tendency

2. The value of the coefficient of correlation is always

A) r = 0 B) r > 0 C) $|r| \le 1$ D) $r \to \infty$

3. If A and B are two mutually exclusive events, then $P(A \cup B)$ is

A) $P(A)+P(B)$ B) $P(A).P(B)$ C) $P(A) - P(B)$ D) $\frac{P(A)}{P(B)}$

4. r^{th} moment about the origin is

A) $\frac{\sum x}{n}$ B) $\frac{\sum x^r}{n}$ C) $\frac{\sum (x-A)^r}{n}$ D) $\sum x^r$

5. If X has a uniform distribution in (-3 , 3), then its pdf is

A) 1/3 B) 1/6 C) 3 D) 6

6. If in a Markov chain, every state can be reached from every other state, then the chain is known as

A) irreducible B) reducible C) persistent D) ergodic

7. The interval with in which the parameter is expected to lie is called as the

A) confidence interval B) finite C) infinite D) closed

8. As n tends to ∞, the χ^2 distribution becomes a

A) normal distribution B) 0 C) straight line D) Poisson distribution

9. The basic principle of experimental design is

A) randomization B) replication C) local control D) all the above

10. For which of the Latin square design has the degree of freedom for the residual variation zero

A) 3 X 3 B) 2 X 2 C) 4 X 4 D) n X n.

PART B (10 x 2 = 20 Marks)

11. Find the Arithmetic mean of the following data

X:	52	58	60	65	68	70	75
F:	7	5	4	6	3	3	2

12. Give the demerits of Median..
13. If the probability that a communication system will have a high fidelity is 0.81 and the probability that it will have high fidelity and selectivity is 0.18. What is the probability that a system will have high fidelity will also have selectivity.
14. Write any two properties of Moment Generating function.
15. If X and Y are independent Poisson variates with parameters λ_1 *and* λ_2 Show that X + Y is also a Poisson variate with parameter $\lambda_1 + \lambda_2$.
16. State the properties of Normal distribution.
17. What are the different types of error in testing of hypothesis?
18. Write two uses of t-distribution?
19. What are the basic assumptions in designs of experiment?
20. Write the ANOVA table for two-way classification.

PART C (5 x 14 = 70 Marks)

21. a) (i) Find the Mode for the following data

Marks:	1 – 5	6 – 10	11 – 15	16 – 20	21 – 25
No. of Student:	7	10	16	32	24

(ii) Find the rank correlation for the following data.

X:	80	91	99	71	61	81	70	59
Y:	123	135	154	110	105	134	121	106

(OR)

b) (i) Two lines of regression are 2 X + 3 Y = 7 and 5 X + 4 Y = 9. Find

(i) Mean of X and Y.

(ii) Regression coefficient of X and Y.

(iii) Correlation coefficient of X and Y.

(ii) Calculate the mean deviation of the following data.

X:	44-46	46-48	48-50	50-52	52-54
f:	3	24	27	21	

22. a) (i) If A and B are two independent events, then show that

(i) $\overline{A}$ and $\overline{B}$ are independent

(ii) $\overline{A}$ and B are also independent.

(ii) An Urn contains 5 balls. Two balls are drawn and are found to be white. What is the probability of all the balls being white.

(OR)

b) (i) The diameter of an electric cable, say x, is assumed to be a continuous random variable with pdf $f(x) = 6x(1-x)\ ;\ 0 \le x \le 1$

(a) Check that the above is a pdf.

(b) Determine b such that $P(x<b) = P(x>b)$

(c) Find the distribution function of x.

(ii) A random variable X has the following distribution

X:	0	1	2	3	4	5	6	7	8
f(X):	a	3a	5a	7a	9a	11a	13a	15a	17a

(a) Determine 'a'.

(b) Find P (x<3) and P(x≥3)

(c) What is the smallest value of x such that $P(X \le x)>0.5$

23. a) (i) Six dice are thrown 729 times. How many times do you expect at least three dice to show a 5 or a 6.

(ii) A raining process is considered as a two state Markov chain. If it rains, it is considered to be in the state 0 and if it does not rain, the chain is in the state 1. The tpm is $P = \begin{bmatrix} 0.6 & 0.4 \\ 0.2 & 0.8 \end{bmatrix}$

(a) Find the probability that it will rain after three days from today.

(b) Find also the conditional probability that it will rain after three days with the initial probability of state 0 and 1 as 0.4 and 0.6 respectively.

(OR)

b) (i) The time required to repair a machine is exponentially distributed with parameter $\lambda = 1/2$. What is the probability that the repair time exceeds 2 hours. What is the probability that the repair time takes at least 10 hours given that its duration exceeds 9 hours.

(ii) In a normal distribution 31% of the items are under 45 and 8% are over 64. Find the mean and the standard deviation.

24. a) (i) A sample of 100 students is taken from a large population. The mean height of the students in this sample is 160 cms. Can it be reasonably regarded that, in the population, the mean height is 165 cms and the SD is 10 cms.

(ii) Tests made on the breaking strength of 10 pieces of a metal wire gave the results 578, 572, 570, 568, 572, 570, 570, 572, 596 and 584 kgs. Test if the mean breaking Strength of the wire can be assumed as 577 kg.

(OR)

b) (i) In one sample of 8 observations, the sum of squares of deviations of the sample values from the sample mean was 84.4 and in the other sample of 10 observations, it was 102.6. Test whether this difference is significant at 5% level.

(ii) The following data represents the monthly sales (in Rs) of a certain retail stores in a leap year. Examine if there is any seasonality in the sales

6100, 5600, 6350, 6050, 6250, 6200, 6300, 6250, 5800, 6000, 6150 and 6150.

25. a) A completely randomized design experiment with 10 plots and 3 treatments gave the following results.

Plot No.:	1	2	3	4	5	6	7	8	9	10
Treatment:	A	B	C	A	C	C	A	B	A	B
Yield:	5	4	3	7	5	1	3	4	1	7

Analyze the results for treatment effects.

(OR)

b) Analyze the variance in the following Latin Square yields (in Kgs) of Paddy where A, B, C and D denote the different methods of cultivation.

*D*122	*A*121	*C*123	*B*122
*B*124	*C*123	*A*122	*D*125
*A*120	*B*119	*D*120	*C*121
*C*122	*D*123	*B*121	*A*122

Examine whether the different methods of cultivation have given significantly different yields.

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