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B.TECH. DEGREE EXAMINATIONS: NOVEMBER 2009

Fourth Semester

BIOTECHNOLOGY

U07MA405: Probability and Statistics

Time: Three hours **Maximum Marks: 100**

Answer ALL the Questions:-

PART A (10 x 1 = 10 Marks)

(7) 1. The Mode of the numbers 7, 7, 7, 9, 10, 11, 11, 11, 12 is

(7)

A. 11 B. 12 C. 7 D. 7 & 11

2. Average scores of three batsmen X, Y, Z are respectively 40, 45, and 55 and their standard deviations are respectively 9, 11, and 16. Which batsman is more consistent?

(7)

A. X B.Y C. Z D. X & Z

(7)

3. The probability that A passes a test is $\frac{2}{3}$ and the probability that B passes the same test is $\frac{3}{5}$. The

(7) probability that only one of them passes is

(7)

A. $\frac{2}{5}$ B. $\frac{4}{15}$ C. $\frac{2}{15}$ D. $\frac{7}{15}$

4. If $f(x) = kx, 0 < x < 1$ is to be a density function, then the value of k is

(7)

(7)

A. 2 B. $\frac{1}{3}$ C. 1 D. $\frac{1}{27}$

5. The variance of Poisson distribution with parameter $\lambda = 2$ is

A. 1 B. 4 C. 2 D. e^2

6. The distribution in which mean, median mode are equal is

(7) A. asymmetrical B. Poisson C. binomial D. symmetrical

(7) 7. A hypothesis is true, but is rejected; this is an error of

A. Critical type B. Significance C. Type I D. Type II

(10) 8. The t-test is applicable to samples for which n is

(4) A. less than 30 B. greater than 100 C. very large D. between 50 and 100

9. Which can not be a controlled variable?

A. light exposure B. temperature C. humidity D. dependent variable

10. A factor of an experiment is a

gati A. controlled independent variable B. replication C. treatment D. dependent variable

PART B (10 x 2 = 20 Marks)

(11. The Pearson's coefficient of skewness of a distribution is 0.32. Its variance is 42.25 and mean 29.6.

(Find median.

12. If $x + 6y - 4 = 0, 2x + 3y + 1 = 0$ are regression lines, find the means of x and y.

2 of

13. A four digit number is formed from 1, 2, 3, 5 with no repetition. Find the probability that the number is divisible by 5.

14. If the probability density function of a random variable is given by

$$f(x)=\begin{cases}\frac{1}{4}, & -2<x<2,\\ 0, elsewhere\end{cases}$$ Find $P\{|x|>1\}$.

15. In 256 sets of 8 tosses of a coin, in how many sets one may expect heads and tails equal in numbers?

16. If the initial state probability distribution of a Markov chain is $p^{(0)}=\left(\frac{5}{6},\frac{1}{6}\right)$ and transition probability matrix is $p=\begin{pmatrix}0 & 1\\ \frac{1}{2} & \frac{1}{2}\end{pmatrix}$, find $p^{(2)}$.

17. Define Critical region.

18. What is the relationship between the critical values for a single tailed and a two tailed test?

19. What is the degrees of freedom for residual Q_3 in a two factor analysis of an experiment with h blocks and k treatments?

20. Compare RBD and LSD in terms of number of replications.

PART C (5 x 14 = 70 Marks)

21 (a) (i) Find the standard deviation and mean deviation from the mean for the distribution given below.

x	2	4	6	8	10
f	1	4	6	4	1

(ii) Obtain the lines of regression and find the coefficient of correlation from the following:

x	1	2	3	4	5	6	7
y	9	8	10	12	11	13	14

(OR)

(b) (i) Compute the Pearson's coefficient of skewness for the following distribution:

Class interval	3–7	8–12	13–17	18–22	23–27	28–32	33–37	38–42
Frequency	2	108	580	175	80	32	18	5

(ii) In the following incomplete distribution, find the missing frequencies, given that the total frequency is 170 and median value is 35.

x	0–10	10–20	20–30	30–40	40–50	50–60	60–70
f	10	20	–	40	–	25	15

22 (a) (i) The odds in favour of A solving a mathematical problem are 3 to 4 and the odds against B solving the problem are 5 to 7. Find the probability that the problem will be solved by atleast one of them.

(ii) A continuous random variable X has probability density function

$f(x) = k(1+x), 2 < x < 5$. Find k and $P(x < 4)$.

(OR)

(b) (i) If a continuous random variable X has probability density f unction \

$$f(x) = \begin{cases} \frac{1}{4}, -2 < x < 2 \\ 0, elsewhere \end{cases}$$

Obtain $p(|X| > 1)$ *and* $p(2X + 3 > 5)$.

(ii) A coin is tossed until a tail appears. What is the expectation of the number of tosses?

23 (a) (i) Fit a Poisson distribution for the following frequency distribution and hence find the expected frequencies:

x	0	1	2	3	4	5	6
f	314	335	204	86	29	9	3

(ii) The daily consumption of milk in excess of 20,000 litres in a town is approximately exponentially distributed with parameter $\frac{1}{3000}$. The town has a daily stock of 35,000 litres. What is the probability that 2 days selected at random the stock is insufficient for both days?

(OR)

(b) X is a normal variate with mean 30 and Standard Deviation 5. Find

(i) $P(26 \le X \le 40)$, $(ii) P(X \ge 45)$, $(iii) P(|X - 30| > 5)$

24 (a) (i) A manufacturing company claims that atleast 95% of its product supplied confirms to the specifications. Out of a sample of 200 numbers 18 are defective. Test the claim at 5% level of significance.

(ii) The means of two large samples of sizes 2000 and 1000 are 68.0 and 67.5 gm. respectively. Can the sample be regarded as drawn from the same population of standard deviation 2.25gm.?

(OR)

(b) In a study of the effect of chemicals on the labourers in a chemical unit, the following results were obtained on their systolic blood pressures. Examine whether differences in the blood pressures are significant.

	Male exposed	Male controlled	Female exposed	Female controlled
No	250	55	103	50
Mean	117.5	121.6	111.7	112.5
SD	10.58	10.82	9.33	9.38

25 (a) A bank branch has four sales representative, each of them was sent for a week in to three types of area: Central government office(C), private companies(P) and Multinational companies (M). Their takings in rupees/ week are given below:

Sales Rep.

Area	A	B	C	D
C	30	70	30	30
P	80	50	40	70
M	100	40	80	80

Discuss the difference between

(i) Sales representative (ii) Areas

Time:

(OR)

(b) An agricultural experiment was conducted on a Latin square to investigate the yield per acre of five different varieties of wheat, when subjected to treatment of two types of fertilizers X and Y, each of five different strengths. The results are setout in a Latin square given below in which letters correspond to varieties; columns are treated with different strengths of fertilizer X and rows with different strengths of fertilizer Y.

A16	B10	C11	D9	E9
E10	C9	A14	B12	D11
B15	D8	E8	C10	A18
D12	E6	B13	A13	C12
C13	A11	D10	E7	B14

Discuss the yield variations with respect to each factor.

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1 Whic
(a) ad

2 Whicl
(a) ten
(b) pH
(c) the
(d) the
(e) all c

3 Prosthe
(a) requ
(b) loos
(c) sites
(d) linke
(e) tightl

4 The initi
(a) the co
(b) the co
(c) the afl
(d) all of t
(e) none o