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(FOR THE CANDIDATES ADMITTED DURING THE ACADEMIC YEAR 20 ONLY) 24UDA2A1 REG.NO. :

N.G.M.COLLEGE (AUTONOMOUS) : POLLACHI

END-OF-SEMESTER EXAMINATIONS : MAY 2025

BSC CS WITH DA(SF) **MAXIMUM MARKS: 75**

SEMESTER-II **TIME : 3 HOURS**

PART – III

24UDA2A1- STATISTICS AND PROBABILITY

SECTION-A (10*1=10 MARKS)

ANSWER THE FOLLOWING QUESTIONS. (K1)

MULTIPLE CHOICE QUESTIONS.

1. Two events E_1 and E_2 are independent if and only if $P(E_1 \cup E_2) =$…….
   (a) $P(E_1) + P(E_2)$ (b) $P(E_1)P(E_2)$
   (c) $P(E_1) + P(E_2) - P(E_1 \cap E_2)$ (d) $P(E_1) + P(E_2) + P(E_1 \cap E_2)$
2. The first raw moment about the origin is the …….. of the distribution.
   (a) mean (b) median (c) mode (d) variance
3. The number of independent observations in a set is called as……
   (a) degree of freedom (b) critical region (c) level of hypothesis (d) one-tailed test
4. Accept null hypothesis when it is false is…… error
   (a) Type I (b) Type II (c) Type 0 (d) not a
5. Linear relationship between two variables is represented by a straight line is……..
   (a) Correlaton cofficient (b) Correlation analysis
   (c) regression line (d) scatter diagram

ANSWER THE FOLLOWING IN ONE (OR) TWO SENTENCES. (K2)

6. Define Sample Space
7. Explain Two types of Errors
8. Write any two properties of t-test
9. What is the primary purpose of the F-test in small samples?
10. Write a note on Negative Correlation

SECTION-B (5*5=25 MARKS)

ANSWER EITHER (a) OR (b) IN EACH OF THE FOLLOWING QUESTIONS. (K3)

11. a) A perfect dice is tossed twice. Find the probability of getting a total of 9.

(OR)

b) Three coins are tossed. Find the probability of getting

(i) at least one head (ii) exactly 2 heads

12.a) The first four moments of a distribution about the value 5 of a random variable are 2, 29 40 and 50. Show that the mean is 7 and variance is 16.

(OR)

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(CONT…2)

b) A sample of 900 items has mean 3.4 and standard deviation 2.61. Can the sample be regarded as drawn from a population with mean 3.25 at 5% level of significance? (The table value of z at 5% level is 1.96)

13. a) Certain refined edible oil is packed in tins holding 16 kg each. The filling machine can maintain this but with a standard deviation of 0.5 kg. Samples of 25 are taken from the production line. If a sample mean is 16.35 kg can we be 95% sure that the sample has come from a population of 16kg tins? (Table value of t at 5% level & 24 d.f is 2.064)

(OR)

b) Explain the uses of Chi-square test.

14. a) Two random samples gave the following results. $n_1 = 10, \sum(x_i - \bar{x})^2 = 90$ and $n_2 = 12$, $\sum(y_i - \bar{y})^2 = 108$ Test whether the samples came from the populations with the same variance. (Table value of F for (9, 11) d.f at 5% level is 2.90.)

(OR)

b) From the following data test if the difference between the variances is significant at 5% level

Sum of squares of deviations from the mean	84.4	102.6
Size	8	10
Sample	A	B

(Table value of F for (7, 9) at 5% level is 3.29)

15. a) Explain the Types of Correlation using Scatter Diagram

(OR)

b) The following are the ranks obtained by 10 students in Statistics and Mathematics:

Statistics	1	2	3	4	5	6	7	8	9	10
Mathematics	1	4	2	5	3	9	7	10	6	8

Using Rank correlation to what extent is the knowledge of students in the two subjects related?

SECTION-C (5*8=40 MARKS)

ANSWER EITHER (a) OR (b) IN EACH OF THE FOLLOWING QUESTIONS. (K4 OR K5)

16. a) The probabilities of 3 students A,B and C solving a problem in Statistics and are $\frac{1}{2}, \frac{1}{3}$ and $\frac{1}{4}$. A problem is given to all the three students. What is the probability that,

(i) No one will solve the problem (ii) Only one will solve the problem

(iii) At least one will solve the problem **(OR)**

b) A random variable X has the following probability function.

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

(i) Find k (ii) Evaluate (a) $P(X < 6)$ (b) $P(X \geq 6)$

(CONT…3)

17. a) Find the rth moment about the origin, the mean and the standard deviation of the distribution whose p.d.f is given by $f(x) = 2(1-x)$ for $0 < x < 1$ and 0 elsewhere. **(OR)**

b) Random samples drawn from two places gave the following data relating to the heights of adult males.

	Place A	**Place B**
Mean height (inches)	68.50	68.58
Standard Deviation of heights	2.5	3.0
Sample Size	1200	1500

Test at 5% level that the mean height is the same for adults in the two places. (Table value of z at 5% level for two tailed test is 1.96)

18. a) In 120 throws of a single die, the following distribution of faces was observed.

Face	1	2	3	4	5	6
Frequency	30	25	18	10	22	15

Can you say that the die is biased? (Table value of chi-square for 5 d.f is 11.07) **(OR)**

b) A filling machine is expected to fill 5kg of powder into bags. A sample of 10 bags gave the weights 4.7, 4.9, 5.0, 5.1, 5.4, 5.2, 4.6, 5.1, 4.6 and 4.7. Test whether the machine is working properly. (Table value of t at 5% level for 9 d.f is 2.262)

19. a) Time taken by workers in performing a job are given below

Method I	20	16	26	27	23	22	
Method II	27	33	42	35	32	34	38

Test whether there is any significant difference between the variances of time distribution. (Table value of F at 5% level for (6, 5) d.f is 4.28). **(OR)**

b) The following table gives the yields of 15 samples of plot under three varieties of seed.

A	B	C
20	18	25
21	20	28
23	17	22
16	15	28
20	25	32

Test using analysis of variance whether there is a significant difference in the average yield of seeds

20. a) The following table gives age (X) in years of cars and annual maintenance cost (Y) (in hundred rupees)

X	1	3	5	7	9
Y	15	18	21	23	22

Estimate the maintenance cost for a 4-year old car after finding the regression equations. **(OR)**

b) Find the coefficient of correlation between x and y from the following data.

X	5	10	5	11	12	4	3	2	7	1
y	1	6	2	8	5	1	4	6	5	2

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