

CA2803 STATISTICAL METHODS FOR COMPUTER APPLICATIONS Set 2

Note : Statistical Tables will be provided.

PART A

Answer ALL Questions

(10 X 2 =20)

1. What is standard deviation?
2. Define correlation
3. What is mathematical expectation?
4. Probability lies between _____ and _____
5. Define Poisson distribution
6. State true or false the following:
For a binomial distribution, mean is 24 and variance is 12.
7. Define the terms: i. Parameter ii. Statistic
8. What are null hypothesis and alternative hypothesis.
9. What is moving average?
10. What methods are used to find cyclic variations?

PART B

Answer ALL Questions

(5 X 8 = 40)

11a. Runs scored by two batsmen, batsman A and batsman B in an innings of 10 matches is given below. Who is more efficient and who is more consistent?

Batsman A	10	115	5	73	7	120	36	84	29	19
Batsman B	45	12	76	42	4	50	37	48	13	0

(or)

11b. In order to find the correlation coefficient between two attributes X and Y from 20 pairs of observations, the following calculations were made: $\sum X = 120$, $\sum Y = 80$, $\sum X^2 = 1440$, $\sum Y^2 = 650$, $\sum XY = 886$.

It was found later that the pair (X = 10, Y = 5) was copied wrongly, instead of the correct value (X = 11, Y = 4). Find the corrected value of correlation coefficient.

12a.i. What is probability mass function. (2marks)

ii A random variable X has the following probability distribution: (6marks)

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

- (a) Determine the value of a.
- (b) Find $P(2 < X < 7)$
- (c) What is the smallest value of x for which $P(X \leq x) > 0.5$

(or)

- 12b. i. Prove that $P(A \cup B) = P(A) + P(B) - P(A \cap B)$. (3marks)
 ii A continuous random variable X follows the probability law $f(x) = Ax^2$ $0 \leq x \leq 1$
 Determine A, $P(0.2 \leq x \leq 0.5)$ and $P(x > 0.75)$ (5 marks)

- 13a. i. Define Normal distribution and state its properties.(3marks)
 ii The mean weight of 600 students in a school is 50kg., and standard deviation is 6kg.
 Assuming that the weights are normally distributed, find how many students weigh
 (a) between 44.5kg. and 54.4k. (b) less than 42.5kg. (5 marks)

(or)

- 13b. i. Define Binomial distribution.
 ii. The incident of certain disease is such that on an average 20% workers suffer from it. If 10 workers are selected at random, find the probability that exactly 2 workers suffer from the disease and not more than 2 workers suffer from the disease.

14a. In the past, a chemical blending process has produced 15kgs. or less of waste material for every 40kgs. batch with a corresponding standard deviation of 5kgs. From a sample of 25 batches, the accounting department now finds an average of 16kgs. of waste/batch. At 5% level of significance, does the accounting department has reasons to believe that the average quantity of waste/batch has increased. ($Z @ 5\% \text{ level} = 1.64$).

(or)

14b. Write the procedure for testing 400 times, which turns up head 219 times. Do the data justify the hypothesis of an unbiased coin? ($Z_{0.025} = 1.96$). (8marks)

- 15a. i. Define time series. (3marks)
 ii the table below shows the production (metric ton) for a state for the year period 2000 – 2010
 Construct (a) a 5-year moving average and (b) a 4-year moving average. (5marks)

Year	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Production	68	62	61	63	65	68	63	67	66	64

(or)

- 15bi. Explain semiaverages method. (3marks)
 ii. Using the method of semiaverages, obtain the trend values for the purchase data (in thousands) given in the following table: (5marks)

Year	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Purchase	17.6	18.4	18.2	19.3	20.5	19.9	22.1	23.8	22.1	22.7

PART C

Answer any TWO Questions

(2 x 20 = 40)

16a. Find the Quartile deviation and Quotient of Quartile deviation for the following frequency distribution

Wages/day(Rs.)	150-159	160-169	170-179	180-189	190-199	200-209	210-219
No. of workers	15	40	50	60	45	40	15

16b. A doctor has to visit a patient. From past experience it is known that probability with which he will come by train, bus, bike and by other means of transport are respectively $\frac{3}{10}$, $\frac{2}{10}$, $\frac{1}{10}$ and $\frac{4}{10}$. If he comes by train the probability that he will be late is $\frac{1}{4}$, by bus it is $\frac{1}{3}$, by bike it is $\frac{1}{12}$ and by other means of transport it is $\frac{1}{3}$. When he arrived, he was late. What is the probability that he came by train and by bike?

17a.i. Define the following: (a) random experiment (b) conditional probability. (5marks)
 ii A group consisting of 15 men and 5 women from which a committee of 5 members is formed. What is the probability that the committee has

(a) 3 men, 2 women (b) at least 2 men. (5marks)

17b. i. Four coins are tossed simultaneously. What is the probability of getting

(a) no head (b) two heads only. (5marks)

ii The mean weight of 600 students in a school is 50kg., and standard deviation is 6kg. Assuming that the weights are normally distributed, find how many students weigh less than 42.5kg. (5 marks)

18a. Two sample poles of votes for two candidates A and B for a Public Office are taken, by choosing one from among residents of rural and urban areas. The results are given below. Examine whether the nature of the area is related to voting preference in this election.

Vote for→ Area↓	A	B	Total
Rural	620	380	1000
Urban	550	450	1000
Total	1170	830	2000

18b. . The lifetimes in hours of samples from three different types of T.V. picture tubes produced by a company is given below. Determine whether there is a difference between the three types at 5% level of significance. $F(2,9) = 4.26$.

Sample-1	407	411	409	-	-
Sample-2	404	406	408	405	402
Sample-3	410	408	406	408	-

Carry out the analysis of variance. (10marks)