



Time: Three Hours

Max. Marks: 100

KEEPING MOBILE PHONE/SMART WATCH, EVEN IN 'OFF' POSITION, IS TREATED AS EXAM MALPRACTICE
General Instructions: Statistical Table is allowed

Answer any TEN Questions

(10 X 10 = 100 Marks)

1. A company owned by PRN, produces chips using three machines, Alpha, Beta and Citrus. Of the total output, machine Alpha is responsible for 27%, machine Beta for 33% and machine Citrus for the rest. It is known from previous experience with the machines that 2% of the output from machine Alpha is defective, 5% from machine Beta and 4% from machine Citrus. A chip is chosen at random from the production line and found to be defective. Use the Baye's Rule to find the probability that the defective chip came from (i) machine Beta and (ii) from machine Citrus.
2. A discrete random variable X follows the output of the experiment, throw of two dice at a time. Write the distribution function. Find the value of (i) $P(3 < X < 7)$ (ii) $P(X > 9)$ (iii) the mean- $E(X)$ and (iv) the variance.
3. The probability density function of a continuous random variable X is given by
$$f(x) = \begin{cases} ax & 0 \leq x \leq 1 \\ a & 1 \leq x \leq 2 \\ 3a - ax & 2 \leq x \leq 3 \\ 0 & \text{elsewhere} \end{cases}$$
Find the (i) value of ' a ' (ii) cumulative distribution function of X and (iii) $P(X > 1.5)$.
4. a) Out of 800 families with 5 children each, how many would you expect to have (i) 5 girls (ii) children of both category? Assume equal probabilities for boys and girls and use Binomial distribution.
b) Suppose a given website receives an average of 20 visitors per hour. Use the Poisson distribution to find the probability that the website receives.
(i) 25 visitors in a given hour and (ii) 35 visitors in a given hour.
5. Commonly, car cooling systems are controlled by electrically driven fans. Assuming that the lifetime T in hours of a particular make of fan can be modelled by an exponential distribution with $\lambda = 0.0003$, find the proportion of fans which will give at least 10000 hours service. If the fan is redesigned so that its lifetime may be modelled by an exponential distribution with $\lambda = 0.00035$, would you expect more fans or fewer to give at least 10000 hours service?
6. A sales tax officer has reported that the average sales of 500 businesses he has to deal with during a year are 36000 with a standard deviation of 10000. Sales data follows a normal distribution. (i) Find the number of businesses as the sales of which are above 40000. (ii) Find the percentage of businesses that are likely between 30000 and 40000.
7. Write in detail about the properties, differences and uses of the Internal and external data.

8. Write in detail about the properties, differences and uses of the primary and secondary data.
9. Mention the points to be taken in the construction of graphs? Discuss in detail various types of graphs.
10. Calculate the mean and the mode for the following data:

Weight (Kg)	20-30	30-40	40-50	50-60	60-70	70-80	80-90
Frequency	5	62	133	159	144	53	5

11. Evaluate $\iint xy(x+y) dx dy$ over the area enclosed by the curves $y = x^2$ and $y = x$.
12. Determine the volume of the solid enclosed by the planes $4x + 2y + z = 10$, $y = 3x$, $z = 0$, and $x = 0$ using the Triple integral.

