TIME : 2 Hrs.   MARKS : 50

N.B :
    1) All questions are compulsory.
    2) Figures to the right indicate marks.

Q.1 a) An urn contains 6 white and 4 black balls and another urn contains 3 white
       and 1 black ball. A ball is drawn at random from the first urn and is placed
       into the second urn without noting its colour. Then a ball is drawn from the
       second urn. If this ball drawn is white, what is the probability that the first
       ball was also white ?   **(05)**

    b) Calculate Cov (x, y) between x and y from the following. Give the
       joint probability distribution function.

       $$p(x, y) = \frac{(x + y)}{36} \; ; \; x = 1, 2, 3 \quad y = 1, 2, 3$$

                    = 0 otherwise   **(05)**

    c) A uniform die is thrown. Let X : number on the uppermost face of the die,
       Find the probability distribution of X. Also find E (X)   **(04)**

                        OR

    p) One card is drawn from a full pack of well - shuffled 52 cards. Find the
       probability that it is either.
       i) a diamond or a king card
       ii) red or ace card   **(05)**

    q) A sample paragraph selected from the writings of B Alexnder revealed
       the following :

No of letters	1	2	3	4	5	6	7	8	9
No of words	1	13	8	5	8	7	4	1	3

       Find the probability mass function p (x) of X hence find E (x) and V (x)   **(05)**

    r) For a binomial distribution mean is 5 and standard deviation is 2
       Find the value of 'n' and 'p'   **(04)**

Q.2 a) The probability that three drivers will be able to drive home safely afer
       drinking are ½, , 1/4 and 1/5 respectively. If they set out to drive home
       after a drinks party, what is the probability that all three drivers will have
       accident ? What is the probability that at least one driver home safely.
       What is the probability that one of them will drive home safely.

Q.2 b) State and prove multiplication Theorem on probability. Also state theorem
       if A and B are independent events.   **(6)**

                                                            P.T.O.

OR

(6)

Q. 2 p) State and Explain Bayes Theorem.

q) The probability that a person stopping at a petrol pump will ask for petrol is 0.80, the probability that he will ask for water is 0.70 and the probability that he will ask for both 0.65. Find the probability that a person stopping at this petrol pump will ask for

i)   either petrol or water.

ii) neither petrol nor water   **(06)**

iii) Only petrol

Q. 3 a) State and prove the properties of expectation and veriance of a discrete random variable X.   **(06)**

Q. 3 b) Following is joint probability mass function of X and Y

X \ Y	1	2	3
5	–	0.05	0.10
10	0.15	0.20	0.20
15	0.10	0.05	0.05
20	–	–	0.10

(06)

Obtain (i) Marginal probability distribution of X and Y

(ii) Expected Value of X and Y

(iii) Conditional probability distribution of X when $Y \leq 2$

OR

Q. 3 p) Define :

i) Probability distribution function of a discrete random variate.

ii) Cumulative probability distribution function of a discrete random variate.

(06)

Also their important properties.

Q. 3 q) A discrete random variable X has probability mass function given by

X :	-1	0	1	2
P (X) :	0.1	0.2	0.3	0.4

Write probability function of (i) $Y = X^2$

ii) $Z = 2x + 3$ **(06)**

Also state find E (y) and E (Z)

ability mass function of a Binomial distribution. Obtain its

b) In a factory factory bolts are packed in boxes of 500 each. It is known that on an average 0.1% of the bolts are defective. What is the chance that one such box consists of

i) no defective

ii) one defective   (06)

iii) two or more defectives ?

OR

Q. 4 p) If X is a Poisson variate with parameter m, prove that $E(X) = Var(X) = m$ (06)

q) For a binomial variate if mean = 3 and $15p[X=0] = 2\ P[X=1]$ (06)
Find the $P[X=5]$

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