b) Let the random variable x assume the value 'r' with the probability law.

$$P(x = r) = q^{r-1}P \; ; \; r = 1, 2, 3, ...$$

Find the m.g.f. of x and hence it's mean and variance. (8)

Unit - II

3. a) Define the Binomial distribution and prove the following recurrence formula:

$$\mu_{r+1} = pq \left(nr\mu_{r-1} + \frac{d\mu_r}{dp} \right).$$

where μ_r is the rth order central moment. Hence also obtain μ_2, μ_3 and μ_4. (8)

b) If skulls are classified as A, B, C according as the length, breadth index is under 75, between 75 and 80, over 80, find approximately (assuming that the distribution is normal) the mean and standard deviation of a series in which A are 58%, B are 38% and C are 4% being given that if

$$f(t) = \frac{1}{\sqrt{2\pi}} \int_0^t e^{-t^2/2} \, dt$$

then f(0.20) = 0.80 and f(1.75) = 0.46. (8)

OR

4. a) A car hire firm has two cars which it hires out day by day. The number of demands for a car on each day is distributed as Poisson variate with mean 1.5. Calculate the proportion of days on which

   i) neither car is used

   ii) some demand is refused. (8)

b) Subway trains on a certain line run every half hour between mid night and six in the morning. What is the probability that a man entering the station at a random time during this period will have to wait at least twenty minutes? (8)

Unit - III

5. a) Calculate the correlation coefficient for the following height (in inches) of fathers (X) and their son(Y):

X :	65	66	67	67	68	69	70	72
Y :	67	68	65	68	72	72	69	71

(8)