Q10

$$P(D) = 0.05$$
$$n = 500$$

(a) using Binomial distribution :-

$$^{500}C_{20} (0.05)^{20} (1-0.05)^{480}$$

$$= 0.051 \qquad \text{—} \textcircled{a}$$

(b)

$$P(x \geq 10) = 1 - P(x < 10)$$

$$= 1 - \left[P(x=1) + P(x=2) + P(x=3) \cdots \cdots P(x=9) \right]$$

$$= 1 - \left[^{500}C_1 (0.05)(0.95)^{499} + ^{500}C_2 (0.05)^2 (0.95)^{498} + \right.$$

$$^{500}C_3 (0.05)^3 (0.95)^{497} + ^{500}C_4 (0.05)^4 (0.95)^{496} +$$

$$^{500}C_5 (0.05)^5 (0.95)^{495} + \cdots \cdots$$

$$\left. ^{500}C_9 (0.05)^9 * (0.95)^{491} \right]$$

$$= 1 - 0.00017$$
$$= 0.99983 \qquad \text{—} \textcircled{b}$$

(c) $\quad P(x \leq 15) \quad = \quad P(x=0) + \cdots \cdots + P(x=15)$

$$^{500}C_0 (0.05)^0 (0.95)^{500} + ^{500}C_1 (0.05)^1 (0.95)^{499} + \cdots$$

$$\cdots \cdots ^{500}C_{15} (0.05)^{15} (0.95)^{485}$$

$$= 0.01986 \qquad \text{—} \textcircled{c}$$

(d) $\quad$ Expected no. of defective bulbs $= 500 * 0.05 = \underline{\underline{25 \text{ bulbs}}}$