Q.1. The number cars sold on Saturday at a particular store has following probability distribution

Number of cars x	0	1	2	3	4	5	6
P(x)	0.05	0.2	0.25	0.2	k	0.1	0.05

a. Determine the value of k.
b. Find the probability that there will be even number of cars sold
c. Find the probability that at least 2 cars sold on Saturday

[3 Marks]

Q.2. Let X be a continuous random variable with probability density function

$$f_X(x) = \begin{cases} \frac{3}{x^4}, x \geq 1 \\ 0, \quad x < 1 \end{cases}$$

Find the mean and variance of X [3 Marks]

Q.3. Annual sales in millions of rupees for 21 Automobile companies is as follows
8408, 1374, 1872, 8879, 2459, 11413, 608, 14138, 6452, 1850, 2818, 1356, 10498, 7478, 4019, 4341, 739, 2127, 3653, 5794, 8305.
a. Calculate the five-point summery.
b. Find the mean and standard deviation.
c. List the outliers if any. [3 Marks]

Q.4. Consider the promotion status of male and female officers in police force. The police force consists of 1200 officers, 960 men, and 240 women. Over past 10 years 324 officers received promotion out of which 288 are men and 36 are women. If a police officer is selected at random then
a. Find the probability that he is not promoted.
b. If the officer is a female, then what is the probability that she is not promoted?
c. Find the probability that the officer is a male and not promoted.

[3 Marks]

Q.5. The participation of three chess players A, B, C in overall tournaments worldwide is 50%, 25%, 25% respectively. Anyone's chance to beat A, B, C is 0.3, 0.4, 0.5 respectively. If you play a match in this tournament what is the probability that –
a. You win the match
b. Suppose that you have won the match then what is the probability that you played against A? [3 Marks]

Q.6. A study at checkout lines at a supermarket reveal that between 4 p.m. to 7 p.m. on weekdays the average of 4 customers waiting in the line. What is the probability that you visit the supermarket in the same time and find–
a. There is no customer in the line.
b. Four customers are waiting.
c. Four or fewer customers are waiting
d. More than four customers are waiting.
e. Exactly 2 customers are waiting. [5 Marks]

Q.7. According to a study, in metro cities average visiting cost to a doctor is Rs. 850/- with a standard deviation of Rs. 100/-. If the cost to visit a doctor follows a normal distribution, then answer the following questions
a. What is the probability that the cost will be more than Rs. 1000/-?
b. What is the probability that the cost will be less than Rs. 650/-?
c. What is the probability that the cost will be between Rs. 600/-to Rs. 900/-?
d. What is the probability that the cost will be more than Rs. 1000/-?
e. If the cost to the patient is in lower 8%, then what maximum amount he has to pay?

[5 Marks]

Q.8. In a survey of students, it is observed that 27% of students appeared for HSC examination have not enrolled for coaching classes.
a. Suppose the survey was made with 500 students. Construct a 95% confidence interval estimate for the population proportion of students who have not enrolled for coaching classes.
b. Suppose the survey was made with 1000 students. Construct a 95% confidence interval to estimate the proportion of students who have not enrolled for coaching classes.
c. Note your comment on change of sample size on the interval estimation.

[5 Marks]