Question 1 (Sample Variant 3)[25 marks]

(a) ***Descriptive Statistics (5 Marks)***
Consider the following data set of seven numbers:

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4, 18, 2, 7, 18, 9, 3, 11, 17, 19, 4
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For this sample, compute the following descriptive statistics (specifying the approach you have used):

(i) (1 Mark) the Mean,

(ii) (1 Mark) the Median,

(iii) (2 Marks) the First and Third Quartiles,

(iv) (1 Mark) the Interquartile Range .

(b) ***Independent Events (6 Marks)***
Suppose A and B are two events, with P(A), the probability that A occurs, equal to 0.4 and P(B), the probability that B occurs, equal to 0.5. .

(i) (2 Marks) Assume that A and B are independent events. Calculate $P(A \cap B)$, the probability of both A and B occuring.

(ii) (2 Marks) Assume that A and B are independent events. Calculate $P(A \cup B)$, the probability of either A or B (or both) occuring.

(iii) (1 Mark) Assume that A and B are mutually exclusive events. Calculate $P(A \cap B)$, the probability of both A and B occuring.

(iv) (1 Mark) Assume that A and B are mutually exclusive events. Calculate $P(A \cup B)$, the probability of either A or B (or both) occuring.

(c) ***Probability (4 Marks)***
An IT consultant is responsible for three software engineering projects X, Y and Z. He knows that the probability of completing project X in time is 0.99, for project Y this probability is 0.95 and for project Z it is 0.80.

(i) (1 Mark) What assumption do you need to make in order to calculate the probability of completing all three projects in time, from the information given?

(ii) (3 Marks) Calculate the probability of completing all three projects in time.

(d) ***Probability (5 Marks)***
The following contingency table illustrates the number of 400 students in different departments according to gender.

	Computer Science	Statistics	Equine Science
Males	140	100	20
Females	30	80	30

(i) (2 Marks) What is the probability that a randomly chosen person from the sample is a computer science student?

(ii) (2 Marks) What is the probability that a randomly chosen person from the sample is both female and studying statistics?

(iii) (1 Marks) Given that the student is female, what is the probability that she is an equine science student?

(e) ***Discrete Random Variables (3 Marks)***
The probability distribution of discrete random variable X is tabulated below. There are 6 possible outcome of X, i.e. 1, 2, 3, 4 ,5 and 6.

x_i	1	2	3	4	5	6
$P(x_i)$	0.16	0.13	k	0.19	0.21	0.12

(i) (1 Marks) Compute the value for k.

(ii) (2 Marks) Determine the expected value $E(X)$.

(f) ***Binomial Coefficients (2 Marks)***
Evaluate the following binomial coefficients

$$\binom{6}{4} \text{ and } \binom{6}{0}$$