

Question 1 (Sample Variant 1)[25 marks]

(a) **Probability (6 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 marks) 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.
- (iii) (2 marks) Calculate the probability that only projects X and Y will be completed on time.

(b) **Probability (8 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) (2 marks) What is the probability that a randomly chosen person from the sample is male?
- (iv) (2 marks) Given that a student studies statistics, what is the probability that the student is female?

(c) **Discrete Random Variables (6 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	0.14	k	0.17	0.21	0.19

- i (1 marks) Compute the value for k .
- ii (2 marks) Determine the expected value $E(X)$.
- iii (2 marks) Evaluate $E(X^2)$.
- iv (1 marks) Compute the variance of random variable X .

(d) ***Descriptive Statistics (5 Marks)***

Consider the following data set of seven numbers:

4, 18, 2, 7, 18, 3, 4

For this sample, compute the following descriptive statistics:

- (i) (1 Mark) The mean,
- (ii) (1 Mark) The median,
- (iii) (2 Marks) The variance,
- (iv) (1 Mark) The standard deviation.