

2020

STATISTICS — HONOURS — PRACTICAL

Paper : CC-2P

Full Marks : 30

The figures in the margin indicate full marks.

*Candidates are required to give their answers in their own words
as far as practicable.*

1. There are two roads from Town A to Town B and two roads from Town B to Town C. Each of the four roads is blocked on a day with probability 0.1, independently of the others. Find the probability that there is an open road from Town A to Town B given that there is no open route from Town A to Town C.

If, in addition, there is a direct road from Town A to Town C which is blocked on a day with probability 0.1 independently of the others, find the required conditional probability. 5+4

2. Team A plays against team B in a best of seven series. In each game team A has 70% chance of winning, and assume that the games are independent. Find the probability that
- (a) A wins;
 - (b) A wins within five games;
 - (c) the series ends within five games. 4+3+3

3. Suppose IQ scores have a mean 100 and standard deviation 10.
- (a) Without making any further assumptions about the distribution of the scores, find an upper bound to the probability that a randomly chosen individual will have a score of 130 or more.
 - (b) Find a smaller upper bound to the probability that a randomly chosen individual will have a score of at least 130, assuming the distribution of scores is symmetric about 100. 3+3

4. Suppose n is 1 added to the last digit of your roll number (i.e. if your roll number ends with 1, then $n = 2$, if it ends with 9, then $n = 10$, and if it ends with 0, then $n = 1$).

A test for a disease gives a positive result for $(100 - n)\%$ of those who are actually infected, but also for $n\%$ of those who are not. If the population contains $2n\%$ of people who are infected, what is the probability that a randomly chosen person testing positive is actually infected? 5
