

**Question 13****(13 marks)**

A cable in a bridge is required to support a weight of 10 000 Newtons. Tina tests a random sample of 100 cables from a supplier. The sample mean is found to be 10 300 Newtons and the sample standard deviation 400 Newtons.

- (a) Based on Tina's sample, obtain a 95% confidence interval for  $\mu$ , the population mean cable strength. (4 marks)
- (b) State whether each of the following statements is true or false. Provide reasons for your answer and state any assumptions.
- (i) If another sample of 100 cables is taken, then the sample mean will fall within the confidence interval found at part (a). (2 marks)
- (ii) If a single cable is selected at random, then the strength of the cable will fall within the confidence interval found at part (a). (2 marks)

Jon, a colleague of Tina, said, 'The cable strengths are not normally distributed, so the calculation for the confidence interval is incorrect'.

- (c) How should Tina respond to Jon's comment? (2 marks)

A different sample of 36 cables is taken and it is found that the standard deviation is 500 Newtons. A confidence interval for the population mean cable strength is determined to be  $9900 \leq \mu \leq 10\,200$ .

- (d) Determine the confidence level, to the nearest 0.1%, used to calculate this interval. (3 marks)