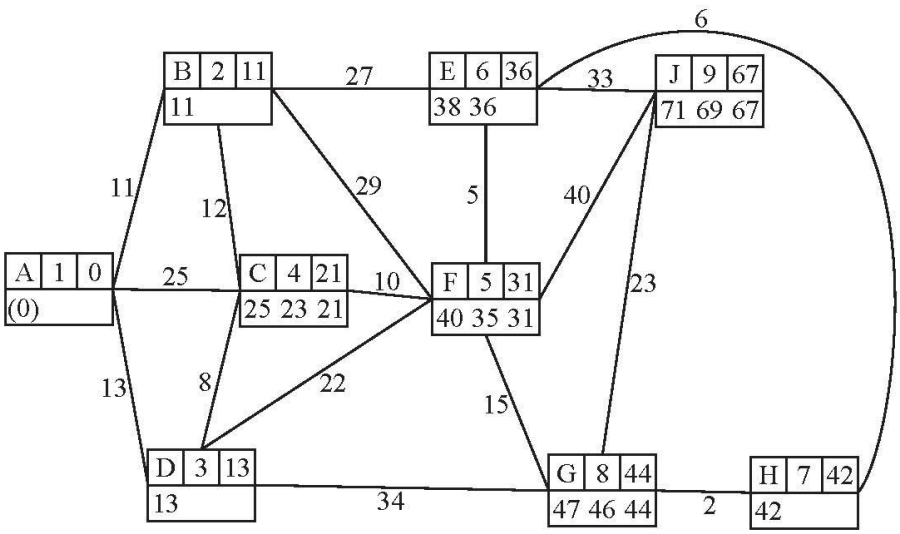
Question Number	Scheme	Marks
6.(a)(i)	 Shortest path from A to J: ADCFEHGJ	M1 A1 (ABDC) A1 (FE) A1ft (HGJ) A1
(a)(ii)	Length of shortest path from A to J: 67 (miles)	A1ft **(6)**
(b)	AC + EJ = A(D)C + E(HG)J = 21 + 31 = 52	M1 A1
	AE + CJ = A(DCF)E + C(FEHG)J = 36 + 46 = 82	
	AJ + CE = A(DCFEHG)J + C(F)E = 67 + 15 = 82	A1
	Route length is 315 + 52 = 367 (miles)	A1ft **(4)**
(c)	Pass through G a total of 3 times	B1 **(1)**
(d)	Difference in inspection routes is 67 – 52 = 15 (miles)	B1ft **(1)**
(e)	Arcs CF and EF do not need to be repeated	B1 **(1)**
		13 marks
	Notes for Question 6	
In (a) it is important that all values at each node are checked very carefully – the order of the working values must be correct for the corresponding A mark to be awarded e.g. at F the working values must be 40 35 31 in that order (so 40 31 35 is incorrect) **It is also important that the order of labelling is checked carefully. The order of labelling must be a strictly increasing sequence – so 1, 2, 3, 3, 4, … will be penalised once (see notes below) but 1, 2, 3, 5, 6, … is fine. Errors in the final values and working values are penalised before errors in the order of labelling**		

a1M1: A larger value replaced by a smaller value at least twice in the working values at either C, E, F, G or J
a1A1: All values at A, B, D and C correct and the working values in the correct order
a2A1: All values at F and E correct and the working values in the correct order
a3A1ft: All values in H, G and J correct on the follow through and the working values in the correct order.
To follow through G say check that the working value(s) at G follow from the candidate's final values for the nodes that are directly attached to G (which are D, F, H and J). For example, **if** correct then the order of labelling of nodes D, F and H are 3, 5 and 7 respectively so the working values at G should come from D, F and H in that order. The first working value at G should be their 23 (the Final value at D) + 34 (the weight of the arc DG), the second working value at G should be their 31 (the Final value at F) + 15 (the weight of the arc FG) and the third working value at G should be their 42 (the Final value at H) + 2 (the weight of arc GH). Repeat this exact process for H and J for the follow through for this mark
a4A1: Correct shortest path from A to J (ADCFEHGJ) **only** – not from J to A
a5A1: Follow through their final value at J **only** (condone lack of units) – if their answer is 67 but this is not their Final Value at J then **A0**

Condone for the final two marks in (a) the 'shortest path' and 'length of shortest path' written on the wrong lines

b1M1: Three distinct pairings of nodes A, C, E and J
b1A1: Any one row correct including pairing **and** total
b2A1: All three rows correct including pairings **and** totals
b3A1ft: Correct route length (367) from the correct pairing or follow through 315 + their least total from a choice of three

c1B1: CAO (3)

d1B1ft: Correct answer of 15 either from correct or no incorrect working **or** follow through (their Final value at J from (a) – their least repeat from (b)) – **this mark is dependent on having scored both M marks in (a) and (b)**

e1B1: CAO (CF, EF only)