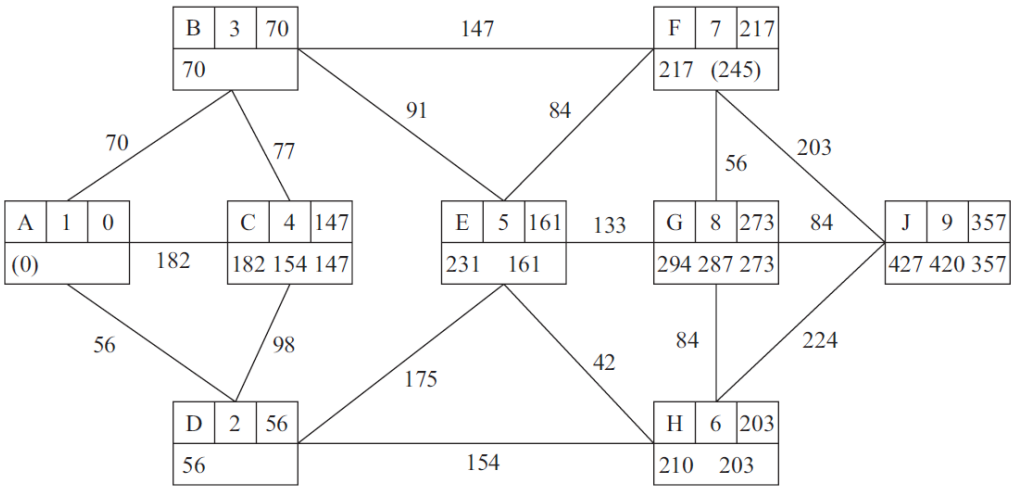
Question Number	Scheme	Marks
2.(a) (i)		M1 A1 (ADBCE) A1 (HF) A1ft (GJ)
	Shortest path from A to J is ABFGJ	A1
(a) (ii)	Shortest length is 357 (metres)	A1ft **(6)**
(b)	Consider all pairings of A, C, E and J	M1
	AC + EJ 147 + 210 = 357 AE + CJ 161 + 364 = 525 AJ + CE 357 + 168 = 525	A1ft A1ft
	Length of route = 1 960 + 357 = 2 317 (metres)	A1 ft **(4)**
(c)(i)	Consider arcs between odd nodes not using A – shortest CE so repeat. Finish at J	M1 A1
(c)(ii)	Difference in length their "357" – 168 = 189 metres or their "2317" – 2128 = 189 (metres)	A1ft **(3)**
		13 Marks

Notes for Question 2	
	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 C the working values must be 182 154 147 in that order (so 182 147 154 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**
ai1M1	A larger value replaced by a smaller value at least twice in the working values at either C, E, G, H, J
ai1A1	All values at A, D, B, C and E correct and the working values in the correct order
ai2A1	All values at H and F correct and the working values in the correct order
ai3A1ft	All values in G and J correct on the follow through and the working values in the correct order. To follow through G check that the working values at G follow from the candidate's final values for the nodes that are directly attached to G (which are E, F and H (and J)). For example, **if** correct then the order of labelling of nodes E, F and H are 5, 7 and 6 respectively so the working values at H should come from E, H and F in that order. The first working value at G should be their 161 (the Final value at E) + 133 (the weight of the arc EG), the second working value at G should be their 203 (the Final value at H) + 84 (the weight of the arc HG) and the third working value should be their 217 (the Final value at F) + 56 (the weight of the arc FG) . Repeat the process for J (which will have working values from F, G and H with the order of these nodes determined by the candidate's order of labelling at F, G and H)
ai4A1	CAO (accept route written in arcs)
aii1A1ft	Follow through their final value at J **only** – if answer is 357 but the final value at J is not 357 then A0
b1M1	The correct three pairings of the correct four nodes (A, C, E and J)
b1A1ft	Two rows correct including pairings **and** totals. Ft for AC, AE and AJ only using their values from (a) but allow recovery if correct totals seen here
b2A1ft	All three rows correct including pairings **and** totals. Ft for AC, AE and AJ only using their values from (a) but allow recovery if correct totals seen here
b3A1ft	1960 + their smallest from a choice of three totals
ci1M1	Considers arcs between odd nodes not including A (e.g. listing possible arcs to be repeated CE CJ and EJ) (A statement that CE is the shortest implies this mark)

ci1A1	Clear indication that CE is shortest (e.g. a statement or tick or starring of CE, not just using 168) (we do not need to see all values explicitly listed here) and therefore finish at J
cii1A1ft	**Dependent on M mark in (b)** 189 or their "357" – 168