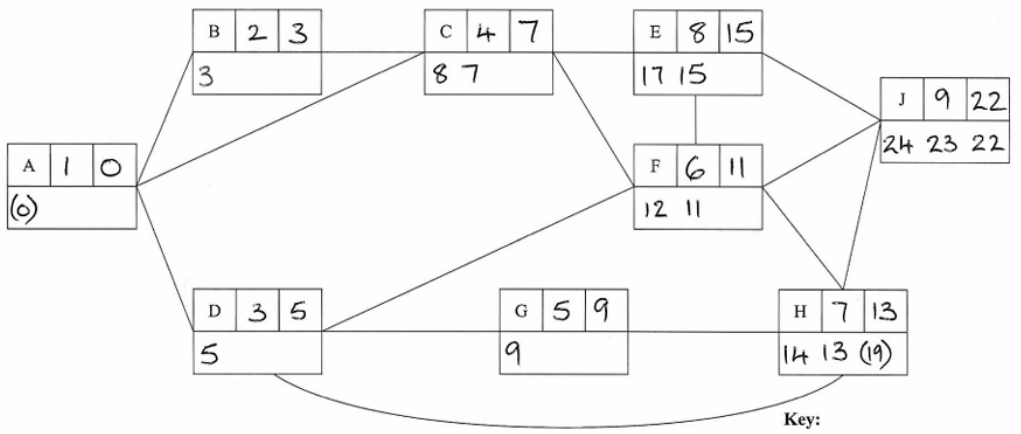
Question Number	Scheme	Marks
3.		
(a)		
		M1 A1 (ABDC) A1(GFH) A1ft (EJ)
	Shortest route: A – B – C – F – E – J	A1
	Length: 22 (metres)	A1ft
		(6)
(b)		
	A(BCF)E + F(E)J = 15 + 11 = 26 A(BC)F + EJ = 11 + 7 = 18* A(BCFE)J + EF = 22 + 4 = 26	M1 A1ft A1
	Arcs AB, BC, CF, EJ will be traversed twice	A1
		(4)
(c)		
	Route: e.g. **ABA**DGHDFH**JEJ**FE**CFCBC**A	B1
	Length: 100 + 18 = 118	B1ft
		(2)
(d)		
	(Start/finish at) E/J, **or** (start/finish at) C/J (one pair stated) (Start/finish at) E/J, **and** (start/finish at) C/J (both pairs stated)	M1 A1
	Length: 100 – 3 – 4 + 4 = 97 (metres)	A1
		(3)
		[15]

Notes for Question 3

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 J the working values must be 24 23 22 in that order (so 24 22 23 is incorrect)

It is also important that the order of labelling is checked carefully – some candidates start with a label of 0 at A (rather than 1) – which is fine. Also 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 in at least two of the working value boxes at either C or E or F or H or J

a1A1: All values at A, B, D and C correct and working values in the correct order. Condone lack of 0 in As working value

a2A1: All values at G, F and H correct and the working values in the correct order. Penalise order of labelling only once per question (G, F and H must be labelled in that order and G must be labelled after A, B, D and C)

a3A1ft: All values at E and J correct on the follow through and the working values in the correct order. Penalise order of labelling only once per question. To follow through E check that the working values at E follow from the candidate's final values from the feeds into E (which will come from nodes C and F (in the order in which the candidate has labelled them)) and that the final value, and order of labelling, follows through correctly. Repeat this process for J (which will possibly have working values from F, H and E with the order of labelling determined by the candidate's order of labelled at F, H and E)

a4A1: CAO (accept in terms of arcs) (do accept route from J to A)

a5A1ft: ft their final value at J (if 22 stated and 22 is not the final value at J then A0)

If route and length are written on the wrong lines this can still score both marks

b1M1: The correct three pairings of the correct four nodes (A, E, F and J)

b1A1ft: Two rows correct including pairings and totals follow through their final values at E, F and J

b2A1: All three rows correct including pairings and totals

b3A1: Correct repeats (AB, BC, CF, EJ) must be arcs so do not accept ABCF and EJ

c1B1: CAO – must be 20 vertices starting and finishing at A with correct repeats (shown in bold) and visiting every vertex (may be in terms of arcs)

c2B1ft: Length of route correct on the follow through (100 + smallest repeat) but must be from a choice of 3 totals from the correct 3 pairs of vertices

d1M1: One correct pair (E and J or C and J)

d1A1: Both pairs correct – accept as a minimum EJ and CJ without any comment on start/finish

d2A1: CAO (97)