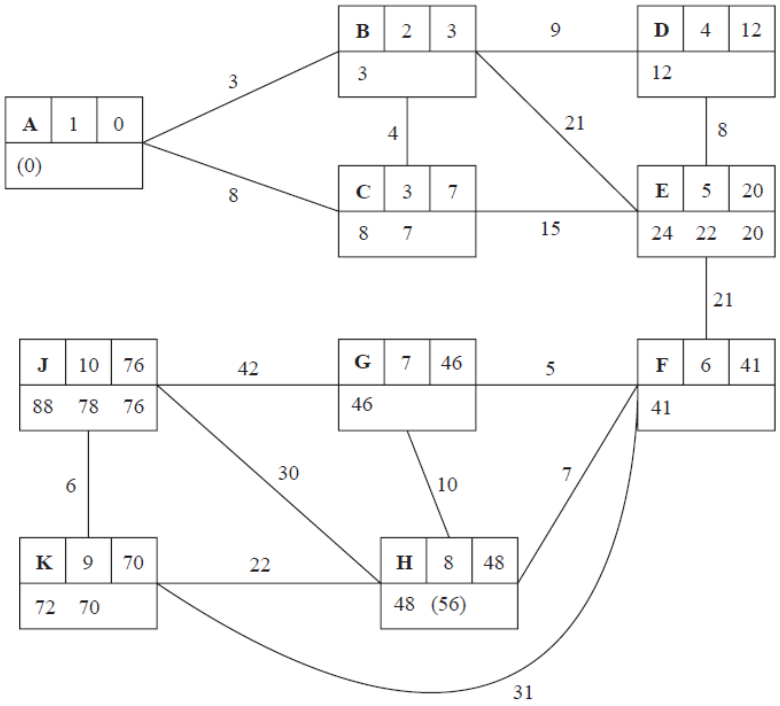
Question Number	Scheme	Marks
2. (a)	 Route: ABDEFHKJ Length: 76 (km)	M1 A1 (ABCDE) A1 (FGH) A1ft (KJ) A1 A1ft **(6)**
(b)	Prim: AB, BC; BD, DE	M1; A1 **(2)**
(c)	Kruskal: FG, JK, FH, not GH, HK, (not HJ), (not FK), (not GJ)	M1; A1 **(2)**
(d)	Total length: 85 (km)	B1 **(1)**
		11 marks

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 E the working values must be 24 22 20 in that order (so 24 20 22 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 J or K
a1A1: All values in A, B, C, D and E correct and the working values in the correct order at C and E (including order of labelling). Condone lack of 0 in A's working value
a2A1: All values in F, G and H correct and the working values in the correct order. Penalise order of labelling only once per question (F, G and H must be labelled in that order and F must be labelled after A, B, C, D and E). Note that an additional working value of 56 at H after the 48 is not an error so 48 56 is fine, however, any other number or 56 48 in this order is incorrect and scores A0 in this part
a3A1ft: All values in K 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 K check that the working value at K follows from the candidate's final values from their feeds into K (which will come from nodes F, H and possibly even J (in the order in which the candidate has labelled them)) and that the final value, and order of

Question Number	Scheme	Marks
	labelling, follows through correctly. Repeat this process for J (which will possibly have working values from G, H and K with the order of these values determined by the candidate's order of labelling at G, H and K) **a4A1:** CAO - correct route (ABDEFHKJ) not from J to A **a5A1ft:** Follow through on their final value at J only (so if 76 given as the answer and the final value at J is not 76 then A0) **b1M1:** First two arcs (AB, BC) chosen correctly in order, or first three nodes (ABC) chosen correctly in order. If any rejections seen at any point, or just a list of **all** the arcs in order, or only a list of weights then M0 (condone for M1only those who find the MST for the entire network) **b1A1:** CSO (must be considering arcs so must be AB, BC, BD, DE or BA, BC, etc.) – do not isw if candidates continue and find the MST for the entire network **c1M1:** First two arcs (FG, JK) chosen correctly in order **and at least one rejection seen at some point** – no marks in this part if candidates apply Kruskal to the entire network or if only a list of weights given **c1A1:** CSO – all selections and rejections correct in the correct order and at the correct time. Note that stating all the arcs in order (e.g. GF, JK, FH, GH, KH, JH, FK, GJ) and then stating only those in the tree in the corret order is fine for both marks in this part **d1B1:** CAO (85)	