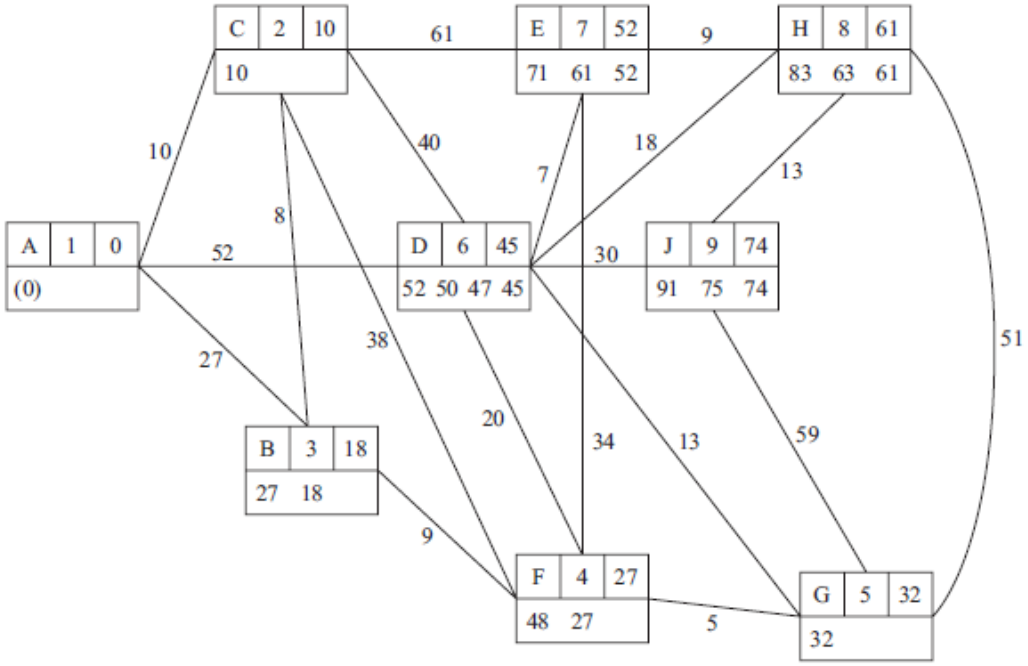
Question Number	Scheme	Marks
3.(a)		M1 A1 (ACBFG) A1 (DE) A1ft (HJ)
	Shortest time to travel from A to J is 74 (mins)	A1ft
	Quickest route is ACBFGDEHJ	A1 **(6)**
(b)	As the quickest route found in (a) is a path through **all** vertices in the network the weight of this path is equal to the weight of the MST for the network	M1
	Weight of MST is 74 (mins)	A1ft **(2)**
		8 marks

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 E the working values must be 71 61 52 in that order (so 71 52 61 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 B, D, E, F, H, J
a1A1	All values at A, C, B, F and G correct and the working values in the correct order
a2A1	All values at D and E correct and the working values in the correct order
a3A1ft	All values in H and J correct on the follow through and the working values in the correct order. To follow through H check that the working values at H follow from the candidate's final values for the nodes that are directly attached to H (which are D, E and G (and J)). For example, **if** correct then the order of labelling of nodes D, E and G are 6, 7 and 5 respectively so the working values at H should come from G, D and E in that order. The first working value at H should be their 32 (the Final value at G) + 51 (the weight of the arc GH), the second working value at H should be their 45 (the Final value at D) + 18 (the weight of the arc DH) and the third working value should be their 52 (the Final value at E) + 9 (the weight of the arc EH) . Repeat the process for J (which will have working values from D, G and H with the order of these nodes determined by the candidate's order of labelling at D, G and H)
a4A1ft	Follow through their final value at J **only** – if answer is 74 but this is not the Final Value at J then A0
a5A1	CAO (ACBFGDEHJ)
b1M1	A statement that the route found in (a) is the MST, either stated directly, or an indication that the route has visited all 9 nodes.
b1A1ft	Follow through their answer to (a) provided that the route from (a) passed through all nine nodes in the network (a weight of 74 with no reason scores M0)