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ANSWER BOOK

Float, Gantt charts and scheduling

Decision Mathematics 1 · Year FM

6 questions · 20 marks

NAVY EDITION

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SECTION A · Warm-up

A1 Total float = latest finish - earliest start - duration = 13 - 6 - 4 = 3 days. Equivalently, the latest start is 9 and the earliest is 6. [2]

A2 A, C, E and G are critical, so each has float 0. B: 2 - 0 = 2. D: 8 - 3 = 5. F: 10 - 5 = 5. [3]

SECTION B · Standard

B1 They lie on the same chain: F cannot start until D has finished. The five days is the slack available to the chain as a whole, not to each activity separately, which is what the word total in total float signals. Delaying D by five leaves F no room at all, and delaying both would push G, and so the whole project, five days late. [4]

B2 Total work = 25 worker-days over 15 days, so the lower bound is 25/15 = 1.67, rounded up to 2 workers. At earliest start times B, C and D all run between days 3 and 5, so the histogram peaks at 3, above the bound. [5]

B3 D has 5 days of float, so it can be delayed. Moving D to start at day 5 rather than 3 removes it from the crowded stretch, leaving B and C alone there. F then follows D and still finishes within its own float. The demand never exceeds 2, which matches the lower bound, so the schedule is optimal. [3]

SECTION C · Stretch

C1 62/20 = 3.1, so at least 4 workers are needed: three could supply only 60 worker-days in 20 days. But the bound assumes every worker is busy the whole time, which the precedence relations may forbid. If a long activity must run alone at the start, some workers are idle and more than four may be required. The bound is a floor, not a promise. [4]