Model solution

Based on the above figures and the scenario, please, answer the following questions. Include references (not lengthy quotations) to sections of the textbook to support your argument where appropriate.

1. Classify the different cost items as either fixed or variable costs (matching row number to Fixed or Variable as appropriate) AND as capital or recurrent costs.
   Answer:
   All cost items under A: fixed recurrent; under B and C: fixed capital; under C variable (non-recurrent).
2. Calculate the Recurrent Fixed Costs of course overheads (management and secretarial support).
   Answer:
   $20650
3. Calculate the aggregate *Fixed Costs of Development* (FD) and the aggregate *Fixed Costs of Maintenance* (FM).
   Answer:
   FD=$ 156150
   FM= $ 7200
   F=FD+FM=$ 163350
4. Calculate the variable cost per student (V)
   Answer:
   V=$ 677,10
5. Calculate the depreciation rate on a basis of the lifetime of the presentation of the project (compare Rumble Table 6.1) and charge it to each year of presentation. (You may use the format of the attached spreadsheet.) Take account of the recurrent overhead costs.
   Answer:
   Depreciation rate FD: $ 26025
   Depreciation rate FM: $ 2400
   Following the template of Rumble Table 6.4, annualize the *Fixed Costs of Development* (FD) over the six years of presentation at 7.5% interest and the *Fixed Costs of Maintenance* (FM) over three years at the same rate. Take account of the recurrent overhead costs.
   Answer:
   Annualization rate FD: $ 33267
   Annualization rate FM: $ 2769
   Total annualized fixed costs: $ 331808
6. Summarize in a short paragraph the reasons for and against annualization.
   Answer:
   Should include that in planning decisions costs of forgone interest should be taken into account. But only if there is a real alternative to invest the money in such a way that this interest can be earned. If it is public money ring-fenced for a specific purpose this does not apply.
7. Calculate the equation of *total costs* (TC=F+VxN) using the annualized figure of fixed costs and N=900

Answer:
TC(N) = $331808+ $ 677.10*N
For N = 900
TC(900) = $ $331808+ $ 677,10= $941198

8. Draw the graph of the total cost function using, as above, the annualized figure of fixed costs while N varies over the accumulated number of students (i.e. N= 150, 300, 450 etc.)
   Answer: Cf. spreadsheet attached.
9. Calculate the equation of *average costs* (AC=F/N+V) using the annualized figure for fixed costs and N=900
   Answer:
   AC(N) = ($331808/N) + $677.10
   For N = 900
   AC(900) = ($331808/900) + $677.10= $1046
10. Draw the graph of the average cost function, using, as above, the annualized figure of fixed costs while N varies over the accumulated number of students (i.e. N= 150, 300, 450 etc.)
    Answer: Cf. spreadsheet attached.
11. If the student is charged the per student fee specified calculate the *break-even point*. (Use the equation TC=F+VxN and the income equation: I=SFxN (Income =Student fee x No of students). The break-even point is BP=F/(SF-V)
    Answer:
    BP= $331808/($1185- $677.10) = 653
12. Represent the break-even point graphically (overlaying the graphs of TC and I).
    Answer: Cf. spreadsheet attached.
13. Summarize in a short paragraph why it is believed that the TC and AC equations and the specific cost structure of DE suggests that DE may be more cost-efficient than conventional modes of educational provision.
    Answer:
    This paragraph should explain the conditions under which DE can be expected to be more cost-efficient than conventional education (measured in terms of average cost per student). One condition is that that DE has smaller aggregate unit costs (V) than conventional education. This is indeed often the case and is achieved by doing two things: (i) use less expensive teaching personnel (e.g. tutors instead of teachers, adjunct faculty instead of tenured staff in HE) and (ii) to reduce contact time. One tries to compensate this reduction in f2f teaching time by producing higher quality course material. This may mean higher fixed costs of development. Hence the typical difference between DE and conventional education is that aggregate unit costs in DE are smaller than those in conventional education (i.e. $V_{DE} < V_{CE}$). In this case for large numbers of student the total costs of DE will necessarily fall below the total costs of CE even if the development costs for DE much higher than for CE. The mathematical reason for this is that total costs eventually approach unit costs. If unit costs of DE are smaller, then total costs will be also for sufficiently large N. Note the trap: there is no guarantee that we can increase N ad libitum.