CH0401 Process Engineering Economics

Lecture 1b

Balasubramanian S

Department of Chemical Engineering
SRM University

Process Engineering Economics

1 **Introduction – Time Value of Money**

2 Equivalence

3 Equations for economic studies

4 Amortization

5 Depreciation and Depletion

Process Engineering Economics

1   **Introduction – Time Value of Money**

2   Equivalence

3   Equations for economic studies
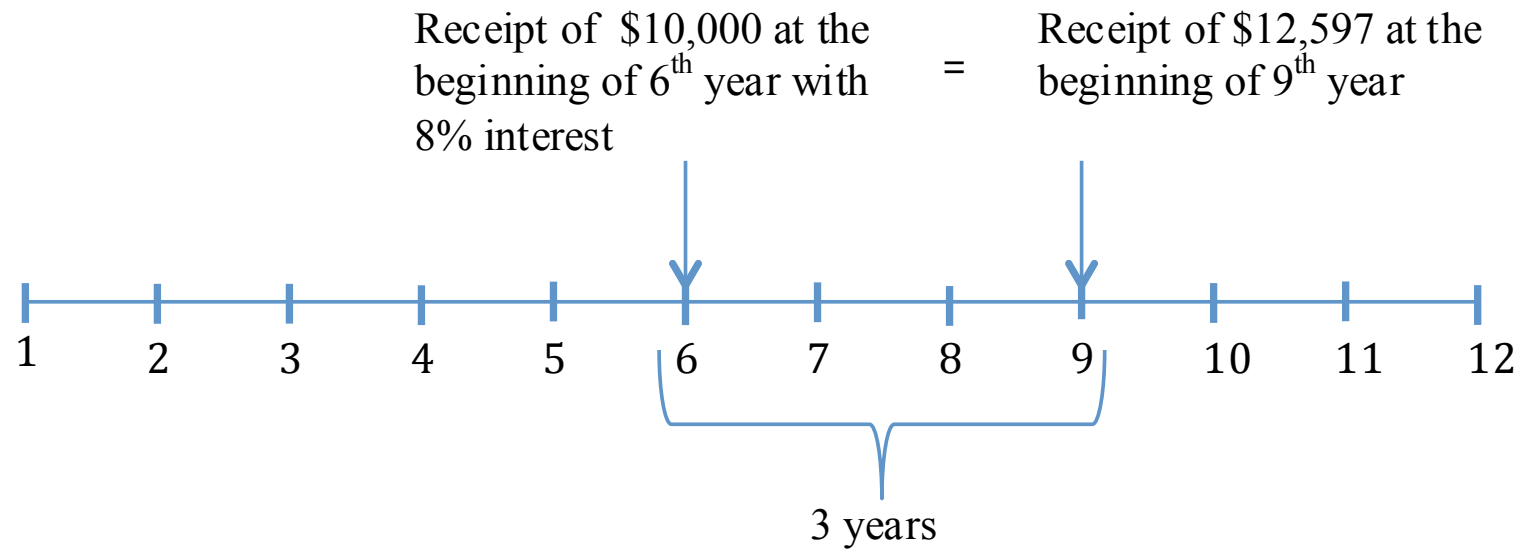
4   Amortization

5   Depreciation and Depletion

Process Engineering Economics

Meaning of Equivalence:

The concept of equivalent payments is crucial in the study of finance, and we shall now develop this concept.

Consider that a firm received the sum of $10,000 at the beginning of year six and immediately invested this at 8%. By the beginning of year nine the sum of money expanded to $(F/P, 3, 8\%)$ = $12,597 (i.e. $F = P (1+i)^n$ = 10,000 $(1+0.08)^3$ = $12,597). Therefore, if the firm had received the sum of $12,597 at the beginning of the year nine rather than the sum of $10,000 at the beginning of the year six, its monetary worth at the beginning of the year nine at every instant thereafter would have been the same. Thus these two alternative events – receipt (the money that enters the firm) of $10,000 at the beginning of year six and receipt (the money that enters the firm) of $12,597 at the beginning of year nine yield an identical monetary worth if money worth 8%. We may therefore say that these two events are equivalent to one another.

Receipt of $10,000 at the beginning of 6th year with 8% interest

=

Receipt of $12,597 at the beginning of 9th year

1   2   3   4   5   6   7   8   9   10   11   12

3 years

Now consider that this firm made a disbursement of $10,000 at the beginning of year 6. If this money had remained in its possession and earned 8% interest it would have expanded to $12,597 by the beginning of year 9. Therefore, if this firm had made a disbursement of $10,000 at the beginning of year 6, its monetary worth at the beginning of year 9 and at every instant thereafter would have been the same. Thus, these two alternative events – a disbursement of $10,000 at the beginning of year 6 and a disbursement of $12,597 at the beginning of year 9 are equivalent to one another if money worth 8 percent.

3 years

1 2 3 4 5 6 7 8 9 10 11 12

Disbursement of $10,000 at the beginning of 6th year = Disbursement of $12,597 at the beginning of 9th year
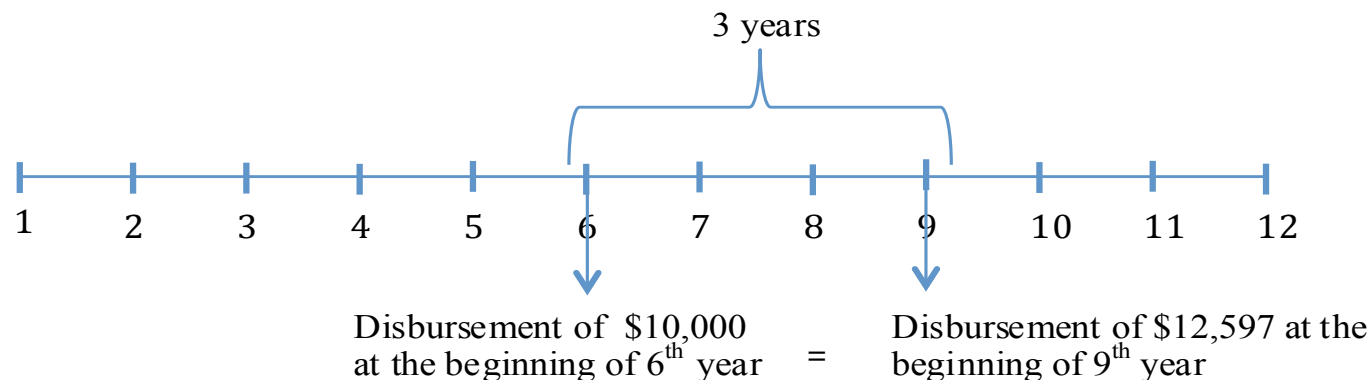
Process Engineering Economics – Equivalence

The purpose of most calculation in engineering economics is to determine the minimum cost incurred to obtain a return on the invested capital either by

a) Studying the capital required to do a given job.

(or)

b) Studying the costs of the operations including recovery of capital in a depreciating investment.

Thus, if a piece of equipment costs $10,000 when installed, the return that this equipment must make to pay for itself and how operating costs and repair costs affect this return are the questions that must be answered. They can be answered by means of the economic equations.

Process Engineering Economics – *References*

- Herbert E. Schweyer. (1955) *Process Engineering Economics*, Mc Graw Hill
- Max S. Peters, Kaus D. Timmerhaus, Ronald E. West. (2004) *Plant Design and Economics for Chemical Engineers*, 5th Ed., Mc Graw Hill
- Max Kurtz. (1920) *Engineering Economics for Professional Engineers' Examinations*, 3rd Ed., Mc Graw Hill
- Frederic C. Jelen, James H. Black. (1985) *Cost and Optimization Engineering*, International Student edition, Mc Graw Hill