V 4246


Eighth Semester
(Regulation 2004)

Mechanical Engineering

MG 1452 — ENGINEERING ECONOMICS AND COST ANALYSIS
(Common to Production Engineering/Automobile Engineering)
(Common to B.E. (Part Time) Seventh Semester—Regulation 2005)

Time: Three hours

Maximum: 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. What is elasticity of demand?

2. What is opportunity cost?

3. How much will a piece of property have to increase in value over the next 5 years, if it is to earn 10% per year on the purchase price?

4. Calculate the present worth of the following payments – Rs. 5,000 in year 3, in 10,000 in year 5.

5. What is annual equivalent method of comparing alternatives?

6. What is revenue dominated cash flow?

7. Name the types of maintenance.

8. What are the types of replacement problem?
9. What is service output method of depreciation?

10. Define inflation.

PART B — (5 × 16 = 80 marks)

11. (a) (i) Bring out the scope of engineering economics with appropriate examples.

(ii) A concern manufacturing a domestic appliance proposes to put up an improved model in the market and the selling price for the same to be decided. The selling price will cover the overheads and ensure the proportion of profit on sales as before. The material in the new model will cost Rs. 4,000 and the direct wages would be Rs. 2,000. Following figures relate to the previous year:

Stock of material on 1st April 2006 Rs. 2,00,000
Stock of material on 31st March 2007 Rs. 2,20,000
Purchase of raw material in this period Rs. 5,20,000
Manufacturing wages Rs. 1,60,000
Works overhead Rs. 80,000
Administrative and sales overhead Rs. 80,000
Sales during the year Rs. 9,02,000.
Suggest a selling price. Overhead absorption based on % of direct labour.

Or

(b) (i) Explain the process of material selection in new product development.

(ii) From the following details, calculate the break even point. What will be the selling price per unit if break even point to be brought to 9,000 units:

Variable cost per unit Rs. 750
Fixed expenses Rs. 27,00,000
Selling price per unit Rs. 1,000.

12. (a) (i) What is uniform gradient conversion? Illustrate with an example.

(ii) What is value engineering? With a suitable example, explain the various phases of value engineering job plan.

Or
(b) A manufacturing company has extra capacity which can be used to produce gears that the company has been buying for Rs. 300 each. If the company makes the gears, it will incur material cost of Rs. 90 per unit, labour cost of Rs. 120 per unit and variable overhead cost of Rs. 30 per unit. The annual fixed cost associated with the unused capacity is Rs. 2,40,000. Demand over the next year is estimated at 4,000 units.

(i) Should the company make the gears or continue to buy?

(ii) Suppose the capacity could be used by another department for the production of some pump components that would cover its fixed and variable cost and contribute Rs. 90,000 to profit. Which would be more advantageous, gear production or pump components production?

13. (a) An engineer is considering two types of pressure sensors for a low pressure steam line. The costs are shown below. Which should be selected based on a present worth comparison at an interest rate of 16% per year? (16)

<table>
<thead>
<tr>
<th>Type</th>
<th>Type X</th>
<th>Type Y</th>
</tr>
</thead>
<tbody>
<tr>
<td>First cost</td>
<td>Rs. 76,500</td>
<td>Rs. 1,29,000</td>
</tr>
<tr>
<td>Maintenance cost/year</td>
<td>12,000</td>
<td>9,000</td>
</tr>
<tr>
<td>Salvage value</td>
<td>0</td>
<td>20,000</td>
</tr>
<tr>
<td>Life, years</td>
<td>2</td>
<td>4</td>
</tr>
</tbody>
</table>

Or

(b) A company that manufactures amplified transducers is trying to divide between the machines shown below. Compare them on the basis of annual worth using an interest rate of 15% per year. (16)

<table>
<thead>
<tr>
<th>Variable speed</th>
<th>Dual speed</th>
</tr>
</thead>
<tbody>
<tr>
<td>First cost, Rs.</td>
<td>4,50,000</td>
</tr>
<tr>
<td>Annual operating cost, Rs.</td>
<td>3,10,000</td>
</tr>
<tr>
<td>Overhaul in years 2 and 4, Rs.</td>
<td>—</td>
</tr>
<tr>
<td>Overhaul in year 5, Rs.</td>
<td>1,20,000</td>
</tr>
<tr>
<td>Salvage value, Rs.</td>
<td>1,00,000</td>
</tr>
<tr>
<td>Life, years</td>
<td>8</td>
</tr>
</tbody>
</table>

14. (a) (i) What is defender challenger concept in replacement? Illustrate with an example. (8)

(ii) Explain the causes for replacement of assets, in detail with examples. (8)

Or
(b) Initial cost of a machine is Rs. 6,00,000, with other details as below:

<table>
<thead>
<tr>
<th>Year</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Resale value (Rs.)</td>
<td>4,20,000</td>
<td>3,00,000</td>
<td>2,04,000</td>
<td>1,44,000</td>
<td>96,500</td>
</tr>
<tr>
<td>Cost of spares (Rs.)</td>
<td>40,000</td>
<td>42,700</td>
<td>48,800</td>
<td>57,000</td>
<td>68,000</td>
</tr>
<tr>
<td>Cost of labour (Rs.)</td>
<td>1,40,000</td>
<td>1,60,000</td>
<td>1,80,000</td>
<td>2,10,000</td>
<td>2,50,000</td>
</tr>
</tbody>
</table>

Determine the optimum period for replacement of the machine.

15. (a) (i) How to adjust inflation in evaluating public alternatives? Explain the procedure.

(ii) Find the depreciation annuity by annuity method after three years, when the initial cost of the machine is Rs. 8,00,000 and salvage value at the end of three years is Rs. 4,00,000. Rate of interest 10%.

Or

(b) (i) What is economic life of an asset? How to determine it? Explain.

(ii) The cost of a machine is Rs. 1,60,000 and its scrap value is Rs. 40,000. Estimated life 5 years. Using sum of year’s digits method, determine depreciation charges for each year.