B. Tech.
(SEM. VIII) EXAMINATION, 2006-07
MECHANICAL SYSTEMS DESIGN

Time : 3 Hours] 
[Total Marks : 100

Note : Attempt all questions.

1 Attempt any four of the following : 5×4=20
   (a) Discuss various approaches and techniques used in concurrent engineering.
   (b) Mention the approach used in engineering problem solving.
   (c) Describe details of an engineering design process. How problem definition helps in it ?
   (d) Give a list of optimization techniques used for the analysis of the system.
   (e) How input-output system helps in illustrating a problem ?
   (f) Give a check list for need analysis of the design of a product.

2 Attempt any four parts : 5×4=20
   (a) Why modelling is needed for a system ? How it helps in solving a problem ?

VB–4058] 1 [Contd...
(b) Describe the steps involved in modelling a mechanical system.

(c) What is system analysis? List various types of models used in mfg. system design.

(d) Explain various steps used in linear graph modelling.

(e) Discuss how a automobile instrument panel is designed.

(f) Discuss system themes from the view point of system analysis.

3 Attempt any two: 10 x 2 = 20

(a) Draw the network from the following activity and find critical path and total duration of project:

<table>
<thead>
<tr>
<th>Activity</th>
<th>Duration (Days)</th>
</tr>
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<tbody>
<tr>
<td>1-2</td>
<td>9</td>
</tr>
<tr>
<td>1-3</td>
<td>8</td>
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<tr>
<td>1-4</td>
<td>15</td>
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<td>2-4</td>
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<td>3-4</td>
<td>10</td>
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<td>4-5</td>
<td>2</td>
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</tbody>
</table>

(b) Why Network is studied in system design? How is it useful in design of a project or system?

(c) Discuss following methods of optimisation:
   (i) Analytical
   (ii) Subjective.
4 Attempt any two parts: 10×2=20
   (a) Mention suitable optimization method for a problem with one decision variable. Which calculus method is appropriate in this case?
   (b) A person deposits a sum of Rs. 20,000 at the interest rate of 18% compounded annually for 10 years. Find the maturity value after 10 years.
   (c) Why financial analysis is made for evaluation of a system? How is it useful in design?

5 Attempt any two parts: 10×2=20
   (a) Define "maximin" criterion. Illustrate with an example the "savage minimax regret criterion".
   (b) What do you understand by decision tree analysis? How is it useful in making decisions?
   (c) What is simulation? Explain four reasons for using simulation. Give two examples of it.

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VB–4058] 3 [ 50 ]