Task 1 Bitmap-Index

(a) Explain the functionality and applicability of a Bitmap-Index based on the following example.

<table>
<thead>
<tr>
<th>Name</th>
<th>MatrNr</th>
<th>Sex</th>
<th>Start of Study</th>
<th>Study Course</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tom</td>
<td>15874</td>
<td>M</td>
<td>2002</td>
<td>INF</td>
</tr>
<tr>
<td>Claudia</td>
<td>18091</td>
<td>W</td>
<td>2006</td>
<td>CV</td>
</tr>
<tr>
<td>Klaus</td>
<td>14342</td>
<td>M</td>
<td>2003</td>
<td>INF</td>
</tr>
<tr>
<td>Susanne</td>
<td>11012</td>
<td>W</td>
<td>2001</td>
<td>INF</td>
</tr>
</tbody>
</table>

(b) How can a multi-component bitmap index reduce the storage consumption compared to a standard Bitmap-Index?

Task 2 Digital & Prefix Trees

Why are specialized trees for indexing text needed, if there are already B-Trees?

Dataset: MENSCHENWUERDE, MENSCHENAFFE, MENSCHWERDUNG, MENTHOL, MENTAL, AAL

Insert the words from the dataset in the following index structures:

(a) Trie
(b) Patricia-Tree
(c) Prefix-Tree

Task 3 KdB/kd-Baum

(a) Insert the following data series into a kd-tree (2 entries per page):

(10 Z), (30 A), (20 Z), (20 A), (30 Z), (10 A), (99 H)

(b) Draw the corresponding brickwall.

(c) What is a KdB-Tree?
Task 4 R-Tree

(a) How is a R-Tree structured?

(b) Insert the following data series into a R-Tree (3 entries per page):

   (10 Z), (20 K), (30 A), (40 L), (50 M), (60 N), (70 D), (80 X)

(c) Which problems occur in R-Trees?

Good Luck!