List of figures

1.1 Flowchart for GA algorithm ........................................ 7
1.2 A graphical representation of roulette wheel selection ........ 10
1.3 Single point crossover ............................................. 12
1.4 Two point crossover .............................................. 12
1.5 Uniform crossover ................................................ 13
1.6 Flowchart for SA algorithm ................................. 27

2.1 Flowchart for CEA .............................................. 38
2.2 Flowchart for CGA ............................................... 41
2.3 Convergence Graph for the function $g_1$ using CGA, CEA and GA algorithms. .................................................. 50
2.4 Convergence Graph for the function $g_2$ using CGA, CEA and GA algorithms. .................................................. 51
2.5 Convergence Graph for the function $g_3$ using CGA, CEA and GA algorithms. .................................................. 51
2.6 Convergence Graph for the function $g_4$ using CGA, CEA and GA algorithms. .................................................. 52
2.7 Convergence Graph for the function $g_5$ using CGA, CEA and GA algorithms. .................................................. 52
2.8 Convergence Graph for the function $g_6$ using CGA, CEA and GA algorithms. .................................................. 53
<table>
<thead>
<tr>
<th>Figure</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.9</td>
<td>Convergence Graph for the function $g_7$ using CGA, CEA and GA algorithms.</td>
<td>53</td>
</tr>
<tr>
<td>2.10</td>
<td>Convergence Graph for the function $g_8$ using CGA, CEA and GA algorithms.</td>
<td>54</td>
</tr>
<tr>
<td>2.11</td>
<td>Convergence Graph for the function $g_9$ using CGA, CEA and GA algorithms.</td>
<td>54</td>
</tr>
<tr>
<td>2.12</td>
<td>Convergence Graph for the function $g_{10}$ using CGA, CEA and GA algorithms.</td>
<td>55</td>
</tr>
<tr>
<td>2.13</td>
<td>Convergence Graph for the function $g_{11}$ using CGA, CEA and GA algorithms.</td>
<td>55</td>
</tr>
<tr>
<td>2.14</td>
<td>Convergence Graph for the function $g_{12}$ using CGA, CEA and GA algorithms.</td>
<td>56</td>
</tr>
<tr>
<td>2.15</td>
<td>Convergence Graph for the function $g_{13}$ using CGA, CEA and GA algorithms.</td>
<td>56</td>
</tr>
<tr>
<td>2.16</td>
<td>Convergence Graph for the function $g_{14}$ using CGA, CEA and GA algorithms.</td>
<td>57</td>
</tr>
<tr>
<td>2.17</td>
<td>Convergence Graph for the function $g_{15}$ using CGA, CEA and GA algorithms.</td>
<td>57</td>
</tr>
<tr>
<td>2.18</td>
<td>Convergence Graph for the function $f_1$ using CGA, CEA and GA algorithms.</td>
<td>58</td>
</tr>
<tr>
<td>2.19</td>
<td>Convergence Graph for the function $f_2$ using CGA, CEA and GA algorithms.</td>
<td>58</td>
</tr>
<tr>
<td>2.20</td>
<td>Convergence Graph for the function $f_3$ using CGA, CEA and GA algorithms.</td>
<td>59</td>
</tr>
<tr>
<td>2.21</td>
<td>Convergence Graph for the function $f_4$ using CGA, CEA and GA algorithms.</td>
<td>59</td>
</tr>
<tr>
<td>2.22</td>
<td>Convergence Graph for the function $f_5$ using CGA, CEA and GA algorithms.</td>
<td>60</td>
</tr>
</tbody>
</table>
List of figures

2.23 Convergence Graph for the function $f_6$ using CGA, CEA and GA algorithms. ................................................................. 60
2.24 Convergence Graph for the function $f_7$ using CGA, CEA and GA algorithms. ................................................................. 61
2.25 Convergence Graph for the function $f_8$ using CGA, CEA and GA algorithms. ................................................................. 61
2.26 Convergence Graph for the function $f_9$ using CGA, CEA and GA algorithms. ................................................................. 62
2.27 Convergence Graph for the function $f_{10}$ using CGA, CEA and GA algorithms. ............................................................... 62
2.28 Convergence Graph for the function $f_{11}$ using CGA, CEA and GA algorithms. ............................................................... 63
2.29 Convergence Graph for the function $f_{12}$ using CGA, CEA and GA algorithms. ............................................................... 63
2.30 Convergence Graph for the function $f_{13}$ using CGA, CEA and GA algorithms. ............................................................... 64
2.31 Convergence Graph for the function $f_{14}$ using CGA, CEA and GA algorithms. ............................................................... 64
2.32 Convergence Graph for the function $f_{15}$ using CGA, CEA and GA algorithms. ............................................................... 65
3.1 Flowchart for SACGA ................................................................. 69
4.1 Convergence Graph for Cassini2 problem using CGA and GA algorithms. ................................................................. 83
4.2 Convergence Graph for Messenger problem using CGA and GA algorithms. ................................................................. 83
5.1 Flowchart for SABGA ................................................................. 87
5.2 Convergence Graph for the function $g_1$ using SABGA, GA and SA algorithms. Upper plot is for SABGA algorithm, middle plot is for GA algorithm and lower plot is for SA algorithm. . . . . . . . . . . . . . . 91
5.3 Convergence Graph for the function $g_2$ using SABGA, GA and SA algorithms. Upper plot is for SABGA algorithm, middle plot is for GA algorithm and lower plot is for SA algorithm. . . . . . . . . . . . . . . 92
5.4 Convergence Graph for the function $g_3$ using SABGA, GA and SA algorithms. Upper plot is for SABGA algorithm, middle plot is for GA algorithm and lower plot is for SA algorithm. . . . . . . . . . . . . . . 93
5.5 Convergence Graph for the function $g_4$ using SABGA, GA and SA algorithms. Upper plot is for SABGA algorithm, middle plot is for GA algorithm and lower plot is for SA algorithm. . . . . . . . . . . . . . . 94
5.6 Convergence Graph for the function $g_5$ using SABGA, GA and SA algorithms. Upper plot is for SABGA algorithm, middle plot is for GA algorithm and lower plot is for SA algorithm. . . . . . . . . . . . . . . 95
5.7 Convergence Graph for the function $g_6$ using SABGA, GA and SA algorithms. Upper plot is for SABGA algorithm, middle plot is for GA algorithm and lower plot is for SA algorithm. . . . . . . . . . . . . . . 96
5.8 Convergence Graph for the function $g_7$ using SABGA, GA and SA algorithms. Upper plot is for SABGA algorithm, middle plot is for GA algorithm and lower plot is for SA algorithm. . . . . . . . . . . . . . . 97
5.9 Convergence Graph for the function $g_8$ using SABGA, GA and SA algorithms. Upper plot is for SABGA algorithm, middle plot is for GA algorithm and lower plot is for SA algorithm. . . . . . . . . . . . . . . 98
5.10 Convergence Graph for the function $g_9$ using SABGA, GA and SA algorithms. Upper plot is for SABGA algorithm, middle plot is for GA algorithm and lower plot is for SA algorithm. . . . . . . . . . . . . . . 99
5.11 Convergence Graph for the function $g_{10}$ using SABGA, GA and SA algorithms. Upper plot is for SABGA algorithm, middle plot is for GA algorithm and lower plot is for SA algorithm. 

5.12 Convergence Graph for the function $g_{11}$ using SABGA, GA and SA algorithms. Upper plot is for SABGA algorithm, middle plot is for GA algorithm and lower plot is for SA algorithm.

5.13 Convergence Graph for the function $g_{12}$ using SABGA, GA and SA algorithms. Upper plot is for SABGA algorithm, middle plot is for GA algorithm and lower plot is for SA algorithm.

5.14 Convergence Graph for the function $g_{13}$ using SABGA, GA and SA algorithms. Upper plot is for SABGA algorithm, middle plot is for GA algorithm and lower plot is for SA algorithm.

5.15 Convergence Graph for the function $g_{14}$ using SABGA, GA and SA algorithms. Upper plot is for SABGA algorithm, middle plot is for GA algorithm and lower plot is for SA algorithm.

5.16 Convergence Graph for the function $g_{15}$ using SABGA, GA and SA algorithms. Upper plot is for SABGA algorithm, middle plot is for GA algorithm and lower plot is for SA algorithm.