<table>
<thead>
<tr>
<th>Table No.</th>
<th>Title of Table</th>
<th>Page No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.1</td>
<td>Representation of various methods involved in nanoparticles synthesis their advantages and disadvantages</td>
<td>24</td>
</tr>
<tr>
<td>1.2</td>
<td>list of drugs and their replacement factor</td>
<td>41</td>
</tr>
<tr>
<td>2.1</td>
<td>Literature reviews of suppositories</td>
<td>87</td>
</tr>
<tr>
<td>4.1</td>
<td>Details of equipments used</td>
<td>114</td>
</tr>
<tr>
<td>4.2</td>
<td>List of Chemicals used</td>
<td>115</td>
</tr>
<tr>
<td>5.1</td>
<td>Characteristic peaks of Aspirin (ASA)</td>
<td>125</td>
</tr>
<tr>
<td>5.2</td>
<td>Characteristic peaks of Chitosan</td>
<td>126</td>
</tr>
<tr>
<td>5.3</td>
<td>Characteristic peaks of Chitosan nanoparticles</td>
<td>127</td>
</tr>
<tr>
<td>5.4</td>
<td>Characteristic peaks of Aspirin + Gelatin</td>
<td>128</td>
</tr>
<tr>
<td>5.5</td>
<td>Characteristic peaks of Glycerinated Gelatin</td>
<td>129</td>
</tr>
<tr>
<td>5.6</td>
<td>Characteristic peaks of Chitosan + Glycerinated gelatin</td>
<td>130</td>
</tr>
<tr>
<td>5.7</td>
<td>Characteristic peaks of ASA-chitosan nanoparticles + Glycerinated gelatin</td>
<td>130</td>
</tr>
<tr>
<td>5.8</td>
<td>DSC characteristics of pure drug and excipients</td>
<td>132</td>
</tr>
<tr>
<td>5.9</td>
<td>Table representing concentration (µgm/ml) and absorbance</td>
<td>134</td>
</tr>
<tr>
<td>6.1</td>
<td>Composition of chitosan-aspirin Nanoparticles chitosan concentration as process variable</td>
<td>137</td>
</tr>
<tr>
<td>6.2</td>
<td>Composition of chitosan-aspirin nanoparticles STPP concentration as process variable</td>
<td>138</td>
</tr>
<tr>
<td>6.3</td>
<td>Lyophilizing conditions</td>
<td>140</td>
</tr>
<tr>
<td>6.4</td>
<td>Physicochemical evaluation results of ASA-nanoparticles (Fa1-Fa9)</td>
<td>143</td>
</tr>
<tr>
<td>6.5</td>
<td><em>In-vitro</em> study results of ASA-nanoparticles (Fa1-Fa9)</td>
<td>145</td>
</tr>
<tr>
<td>6.6</td>
<td><em>In-vitro</em> kinetic study results of ASA-nanoparticles (Fa1-Fa9)</td>
<td>146</td>
</tr>
<tr>
<td>6.7</td>
<td>Physicochemical evaluation of ASA-nanoparticles</td>
<td>147</td>
</tr>
<tr>
<td>6.8</td>
<td><em>In-vitro</em> dissolution study results of ASA-nanoparticles of Fb1-Fb9 formulations</td>
<td>149</td>
</tr>
</tbody>
</table>
6.9 *In-vitro* Drug release kinetics of ASA-Chitosan nanoparticles (Fb1-Fb9)

7.1 Composition of ASA-suppositories (FS1-FS24)

7.2 Composition of aspirin nanoparticles loaded suppositories

7.3 Physiochemical evaluation results of ASA-suppositories (Fs1-Fs24)

7.4 Physiochemical evaluation results of ASA-nanoparticles loaded suppositories

7.5 *In-vitro* characterization of ASA-nanoparticles loaded suppositories

7.6 *In-vitro* drug release of aspirin suppositories (Fs1-Fs12)

7.7 *In-vitro* drug release kinetics of ASA-suppositories (Fs1-Fs12)

7.8 *In-vitro* drug release study of ASA-nanoparticles loaded suppositories (Fas2, Fas4, Fas9, Fas11)

7.9 *In-vitro* drug release kinetics of ASA-nanoparticles loaded formulation (Fas2, Fas4, Fas9, Fas11)

7.10 *In-vitro* drug release of ASA-suppositories (Fs13-Fs24)

7.11 *In-vitro* kinetics of ASA-suppositories (Fs13-Fs24)

7.12 *In-vitro* dissolution of ASA-nanoparticles loaded suppositories (Fas1, Fas3, Fas4, Fas8, Fas11, Fas12)

7.13 *In-vitro* kinetics of ASA-nanoparticles loaded suppositories (Fas1, Fas3, Fas4, Fas8, Fas11, Fas12)

8.1 Concentration of drug and peak area for ASA in In rabbit plasma

8.2 Calibrated values of ASA in rabbit plasma

8.3 Pharmacokinetic parameters of ASA-suppositories and ASA-nanoparticles loaded suppositories.

8.4 Pharmacokinetic parameters of formulation Fs13, Fs15, Fs16, Fs20, Fs23, Fs24, Fbs 23.
<table>
<thead>
<tr>
<th>Figure No.</th>
<th>Title of figure</th>
<th>Page No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.1</td>
<td>The rectal insertion of suppository</td>
<td>25</td>
</tr>
<tr>
<td>3.1</td>
<td>Schematic representation mechanism involved in nanoparticles loaded suppositories.</td>
<td>109</td>
</tr>
<tr>
<td>3.1.1</td>
<td>Steps involved in preparation of suppositories loaded ASA-nanoparticulates</td>
<td>113</td>
</tr>
<tr>
<td>4.1</td>
<td>Structure of Aspirin</td>
<td>116</td>
</tr>
<tr>
<td>4.2</td>
<td>Molecular structure of chitosan</td>
<td>119</td>
</tr>
<tr>
<td>4.2.1</td>
<td>(a) Raw chitosan (b) Powder chitosan</td>
<td>120</td>
</tr>
<tr>
<td>4.2.2</td>
<td>Structure of Sodium Tripoly Phosphate (STPP)</td>
<td>121</td>
</tr>
<tr>
<td>4.2.3</td>
<td>STPP powder</td>
<td>121</td>
</tr>
<tr>
<td>5.1</td>
<td>Schematic representation of compatibility studies</td>
<td>124</td>
</tr>
<tr>
<td>5.2</td>
<td>FTIR spectrum of Aspirin</td>
<td>125</td>
</tr>
<tr>
<td>5.3</td>
<td>FTIR of Chitosan</td>
<td>126</td>
</tr>
<tr>
<td>5.4</td>
<td>FTIR of Chitosan nanoparticles</td>
<td>127</td>
</tr>
<tr>
<td>5.5</td>
<td>FTIR of Aspirin + Gelatin</td>
<td>128</td>
</tr>
<tr>
<td>5.6</td>
<td>FTIR of Glycerinated Gelatin</td>
<td>129</td>
</tr>
<tr>
<td>5.7</td>
<td>FTIR OF chitosan + Glycerinated gelatin</td>
<td>129</td>
</tr>
<tr>
<td>5.8</td>
<td>FTIR of ASA-chitosan nanoparticles + Glycerinated gelatin</td>
<td>130</td>
</tr>
<tr>
<td>5.9</td>
<td>DSC of Aspirin</td>
<td>131</td>
</tr>
<tr>
<td>5.10</td>
<td>DSC of chitosan</td>
<td>131</td>
</tr>
<tr>
<td>5.11</td>
<td>DSC of ASA-chitosan nanoparticles</td>
<td>131</td>
</tr>
<tr>
<td>5.12</td>
<td>DSC of ASA-chitosan nanoparticles + Glycerinated gelatin</td>
<td>132</td>
</tr>
<tr>
<td>5.13</td>
<td>Data of concentration and absorbance for ASA in 7.2 pH phosphate buffer at 221 nm</td>
<td>134</td>
</tr>
<tr>
<td>6.1</td>
<td>Malvern zeta size analyzer</td>
<td>141</td>
</tr>
<tr>
<td>6.2</td>
<td>Diagrammatic representation of nanoparticles in-vitro drug release assemblage</td>
<td>142</td>
</tr>
<tr>
<td>6.3</td>
<td>Mean particle size vs. concentration of chitosan (mg/mL)</td>
<td>143</td>
</tr>
</tbody>
</table>
6.4 Poly Dispersability vs. zeta potential vs. concentration of chitosan (mg/mL)  144

6.5 SEM image of ASA-chitosan nanoparticles.  144
6.6 *In-vitro* dissolution study of ASA-chitosan nanoparticles.  145
6.7 *In-vitro* drug release of optimized formulation of ASA-nanoparticles and ASA-nanoparticles loaded suppositories  146
6.8 TEM photographs Chitosan-ASA loaded nanoparticles  147
6.9 TEM photographs Chitosan-ASA loaded nanoparticles  147
6.10 TEM photographs Chitosan-ASA loaded nanoparticles  148
6.11 TEM photographs Chitosan-ASA loaded nanoparticles  148
6.12 The influence of STPP concentration on particle size distribution (nm)  148
6.13 The influence of STPP concentration on particle size distribution (nm) and zeta potential (mv)  148
6.14 *In-vitro* drug release plot of ASA-Chitosan nanoparticles (Fb1-Fb9)  149
6.15 Particle size distribution of Fa1  192
6.16 Zeta potential of Fa1  193
6.17 Particle size distribution of Fa2  194
6.18 Zeta potential of Fa2  195
6.19 Particle size distribution of Fa3  196
6.20 Zeta potential of Fa3  197
6.21 Particle size distribution of Fa4  198
6.22 Zeta potential of Fa4  199
6.23 Particle size distribution of Fa5  200
6.24 Zeta potential of Fa5  201
6.25 Particle size distribution of Fa6  202
6.26 Zeta potential of Fa6  203
6.27 Particle size distribution of Fa7
6.28 Zeta potential of Fa7
6.29 Particle size distribution of Fa8
6.30 Zeta potential of Fa8
6.31 Particle size distribution of Fa9
6.32 Zeta potential of Fa9
6.33 Particle size distribution of Fb1
6.34 Zeta potential of Fb1
6.35 Particle size distribution of Fb2
6.36 Zeta potential of Fb2
6.37 Particle size distribution of Fb3
6.38 Zeta potential of Fb3
6.39 Particle size distribution of Fb4
6.40 Zeta potential of Fb4
6.41 Particle size distribution of Fb5
6.42 Zeta potential of Fb5
6.43 Particle size distribution of Fb6
6.44 Zeta potential of Fb6
6.45 Particle size distribution of Fb7
6.46 Zeta potential of Fb7
6.47 Particle size distribution of Fb8
6.48 Zeta potential of Fb8
6.49 Particle size distribution of Fb9
6.50 Zeta potential of Fb9
6.51 Zero order graph of ASA-chitosan nanoparticles (Fa1, Fa2, Fa3)
6.52 Zero order graph of ASA-chitosan nanoparticles (Fa4, Fa5, Fa6)
6.53 Zero order graph of ASA-chitosan nanoparticles (Fa7, Fa8, Fa9)
6.54 Higuchi plot of ASA-chitosan nanoparticles (Fa1, Fa2, Fa3)
6.55 Higuchi plot of ASA-chitosan nanoparticles (Fa4, Fa5, Fa6)
6.56 Higuchi plot of ASA-chitosan nanoparticles (Fa7, Fa8, Fa9)
6.57 First order release plot of ASA-chitosan nanoparticles (Fa1, Fa2, Fa3) 229
6.58 First order release plot of ASA-chitosan nanoparticles (Fa4, Fa5, Fa6) 229
6.59 First order release plot of ASA-chitosan nanoparticles (Fa7, Fa8, Fa9) 229
6.60 Korsmeyer’s peppas plot of ASA-chitosan nanoparticles (Fa1, Fa2, and Fa3) 229
6.61 Korsmeyer’s peppas plot of ASA-chitosan nanoparticles (Fa4, Fa5, Fa6) 229
6.62 Korsmeyer’s peppas plot of ASA-chitosan nanoparticles (Fa7, Fa8, and Fa9) 229
6.63 Zero order drug release plot of ASA-chitosan nanoparticles (Fb1, Fb2, Fb3) 230
6.64 Zero order drug release plot of ASA-chitosan nanoparticles (Fb4, Fb5, Fb6) 230
6.65 Zero order drug release plot of ASA-chitosan nanoparticles (Fb7, Fb8, Fb9) 230
6.66 Higuchi plot of ASA-chitosan nanoparticles (Fb1, Fb2, Fb3) 230
6.67 Higuchi plot of ASA-chitosan nanoparticles (Fb4, Fb5, Fb6) 230
6.68 Higuchi plot of ASA-chitosan nanoparticles (Fb7, Fb8, Fb9) 230
6.69 First order plot of ASA-chitosan nanoparticles (Fb1, Fb2, Fb3) 231
6.70 First order plot of ASA-chitosan nanoparticles (Fb4, Fb5, Fb6) 231
6.71 First order plot of ASA-chitosan nanoparticles (Fb7, Fb8, Fb9) 231
6.72 Korsmeyer’s peppas plot of ASA-chitosan nanoparticles (Fb1, Fb2, Fb3) 231
6.73 Korsmeyer’s peppas plot of ASA-chitosan nanoparticles (Fb4, Fb5, Fb6) 231
6.74 Korsmeyer’s peppas plot of ASA-chitosan nanoparticles (Fb7, Fb8, Fb9) 231
7.1 Prepared ASA-suppositories 155
7.2 Erweka hardness tester 156
7.3 Liquefaction assembly 158
7.4 Diagrammatic representation of suppositories and nanoparticles loaded suppositories in-vitro drug release assemblage 159
7.5 \textit{In-vitro} drug release of aspirin suppositories (Fs1-Fs12) 163
7.6 \textit{In-vitro} drug release of optimized formulation of ASA-suppositories. 164
7.7 \textit{In-vitro} drug release study of ASA form nanoparticles loaded suppositories (Fas2, Fas4, Fas9 and Fas11) 165
7.8 \textit{In-vitro} drug release of ASA-suppositories (Fs13-Fs24) 166
7.9 \textit{In-vitro} dissolution results of optimized formulation ASA-suppositories and nanoparticles loaded suppositories 167
7.10 \textit{In-vitro} dissolution study of optimized formulation ASA from nanoparticles and nanoparticles loaded suppositories 167
7.11 \textit{In-vitro} drug release study of ASA form suppositories loaded nanoparticles 169
7.12 Higuchi plot of ASA-suppositories (Fs1, Fs2, Fs3) 232
7.13 Higuchi plot of ASA-suppositories (Fs4, Fs5, Fs6) 232
7.14 Higuchi plot of ASA-suppositories (Fs7, Fs8, Fs9) 232
7.15 Higuchi plot of ASA-suppositories (Fs10, Fs11, Fs12) 232
7.16 Korsmeyer’s peppa’s plot of ASA-suppositories (Fs1, Fs2, Fs3) 232
7.17 Korsmeyer’s peppa’s plot of ASA-suppositories (Fs4, Fs5, Fs6) 232
7.18 Korsmeyer’s peppa’s plot of ASA-suppositories (Fs7, Fs8, Fs9) 233
7.19 Korsmeyer’s peppa’s plot of ASA-suppositories (Fs10, Fs11, Fs12) 233
7.20 First order plot of ASA-suppositories (Fs1, Fs2, Fs3) 233
7.21 First order plot of ASA-suppositories (Fs4, Fs5, Fs6) 233
7.22 First order plot of ASA-suppositories (Fs7, Fs8, Fs9) 233
7.23 First order plot of ASA-suppositories (Fs10, Fs11, Fs12) 233
7.24 Zero order plot of ASA form nanoparticles loaded suppositories (Fas2, Fas4, Fas9 and Fas11) 234
7.25 Higuchi plot of ASA form nanoparticles loaded suppositories (Fas2, Fas4, Fas9 and Fas11) 234
7.26 First order plot of ASA form nanoparticles loaded suppositories (Fas2, Fas4, Fas9 and Fas11) 234
7.27 Korsmeyer’s peppa’s plot of ASA form nanoparticles loaded suppositories (Fas2, Fas4, Fas9 and Fas11) 234
7.28 First order plot of ASA-suppositories (Fs13-Fs15) 234
7.29 First order plot of ASA-suppositories (Fs16-Fs18) 234
7.30 First order plot of ASA-suppositories (Fs19-Fs21) 235
7.31 First order plot of ASA-suppositories (Fs22-Fs24) 235
7.32 Higuchi plot of ASA-suppositories (Fs13-Fs15) 235
7.33 Higuchi plot of ASA-suppositories (Fs16-Fs18) 235
7.34 Higuchi plot of ASA-suppositories (Fs19-Fs21) 235
7.35 Higuchi plot of ASA-suppositories (Fs22-Fs24) 235
7.36 Korsmeyer’s peppa’s plot of ASA-suppositories (Fs13, Fs14, Fs15) 236
7.37 Korsmeyer’s peppa’s plot of ASA-suppositories (Fs16, Fs17, Fs18) 236
7.38 Korsmeyer’s peppa’s plot of ASA-suppositories (Fs19, Fs20, Fs21) 236
7.39 Krosnayer’s peppa’s plot of ASA-suppositories (Fs22, Fs23, Fs24) 236
7.40 Zero order plot of ASA-nanoparticles loaded suppositories (Fbs13, Fbs15, Fbs16) 236
7.41 Zero order plot of ASA-nanoparticles loaded suppositories (Fbs20, Fbs23, Fbs24) 236
7.42 Higuchi plot of ASA-nanoparticles loaded suppositories (Fbs13, Fbs15, Fbs16) 237
7.43 Higuchi plot of ASA-nanoparticles loaded suppositories (Fbs20, Fbs23, Fbs24) 237
7.44 First order plot of ASA-nanoparticles loaded suppositories (Fbs13, Fbs15, Fbs16) 237
7.45 First order plot of ASA-nanoparticles loaded suppositories (Fbs20, Fbs23, Fbs24) 237
7.46 Korsmeyer’s peppas plot of ASA-nanoparticles loaded suppositories (Fbs13, Fbs15, Fbs16) 237
7.47 Korsmeyer’s peppas plot of ASA-nanoparticles loaded suppositories (Fbs20, Fbs23, Fbs24) 237
8.1 Calibration curve of ASA in rabbit plasma 173
8.2 Mean plasma concentration of ASA from suppositories and nanoparticles loaded in rabbit plasma 175
8.3 Chromatogram of rabbit plasma (Placebo) 177
8.4 $C_{\text{max}}$ of Fs2 formulation in rabbit plasma Chromatogram 177
8.5 $C_{\text{max}}$ of Fs4 formulation in rabbit plasma Chromatogram 177
8.6 $C_{\text{max}}$ of Fs9 formulation in rabbit plasma Chromatogram 177
8.7 $C_{\text{max}}$ of Fs11 formulation in rabbit plasma Chromatogram 177
8.8 $C_{\text{max}}$ of Fas9 formulation in rabbit plasma Chromatogram 177
8.9 Mean plasma concentration of ASA from suppositories and nanoparticles 178
loaded in rabbit plasma

8.10 $C_{\text{max}}$ of Fs13 formulation in rabbit plasma Chromatogram

8.11 $C_{\text{max}}$ of Fs15 formulation in rabbit plasma Chromatogram

8.12 $C_{\text{max}}$ of Fs16 formulation in rabbit plasma Chromatogram

8.13 $C_{\text{max}}$ of Fs20 formulation in rabbit plasma

8.14 $C_{\text{max}}$ of Fs24 formulation in rabbit plasma Chromatogram

8.15 $C_{\text{max}}$ of Fs23 formulation in rabbit plasma Chromatogram

8.16 Fbs23 formulation in rabbit plasma Chromatogram

Histology of rectal tissues after administration of ASA-suppositories and ASA-nanoparticles loaded suppositories A) Control B) First week C) Second week D) Third week E) Fourth week and F) Rectal tissue after four weeks administration of ASA-nanoparticles loaded suppositories.