These days majority of drugs are preferably administered by oral route because they can be self administered by the patient. However, this route has certain limitations such as first pass metabolism, gastric irritation, enzymatic degradation and fluctuation in drug concentration that may lead to under or over medication. Some of these limitations may be overcome by delivering the drug molecule directly to the site of action (site specific delivery) or to the site of maximum absorption. Colon specific drug delivery system is designed to release the drug molecules specifically in the colon. Moreover, the delivery of drugs to the colon for local action is highly desirable in a variety of conditions like inflammatory bowel diseases, infectious diseases and colon cancer. Colonic drug delivery is also useful for systemic absorption of drugs, especially protein and peptide drugs, because of less hostile environment prevailing in the colon compared with stomach and small intestine.

The different approaches for targeting orally administered drugs to the colon include coating with pH-dependent polymers, design of timed release dosage forms, pressure controlled systems and microflora-activated system. The pH - dependent system has poor site specificity. This is because of large variations in the pH of the gastrointestinal tract. The large variation in gastric emptying time is a cause of poor site specificity of timed-release dosage form. Moreover, the bacterial flora of the colon are predominantly anaerobic and carry out a variety of metabolic reactions like hydrolysis, decarboxylation, dealkylation, reduction, acetylation, nitrosamine formation, heterolytic ring fission and esterification. These microflora- induced breakdowns have been used as a highly specific mechanism for targeting drugs to lower bowel.

Colonic bacterial enzymes are capable of degrading a variety of polysaccharides present in the diet that are not affected either in the stomach or in the small intestine. These non- toxic and biodegradable polysaccharides have the potential of delivering drugs specifically to the colon. These can be easily modified chemically and biochemically. Polysaccharides include naturally occurring polysaccharides obtained from plants (Guar gum, Inulin), animals, (Chitosan, Chondroitin sulphate), algae (Alginates) or microflora (Dextran). These are broken down by colonic micro flora to simple polysaccharides. However, these polymers are water soluble and might not to be able to protect the drug from being released during its transit through the upper GIT/stomach.
The vast microflora fulfils its energy needs by fermenting various types of substrates that have been left undigested in the small intestine e.g. di and tri saccharides, poly saccharides, etc. For this fermentation, microflora produces a vast number of enzymes such as glucuronidase, xylosidase, arabinosidase, galactosidase, nitroreductase, azoreductase and urea dehydroxylase (Scheline, 1973). Because of the presence of these biodegradable enzymes only in the colon, the use of bacterial degradable polymers for colon specific drug delivery seems to be a more specific approach as compared to other approaches. These polymers shield the drug from the environment of the stomach and the small intestine and are able to deliver the drug to the colon. On reaching the colon these undergo assimilation by the microorganism (Potts et al., 1973), degradation by enzymes (Huang et al., 1979) or breakdown of the polymer backbone(Hergenrother et al., 1992) leading to a subsequent reduction in their molecular weight and thereby loss of the mechanical strength. They are then unable to hold the drug entity any longer (Park et al., 1993). The various polymers used for microflora-activated systems are azopolymers (Saffran et al., 1991), natural gums such as pectin (Dupuis et al., 2006), etc.

The development of biodegradable materials for the purpose of targeted drug delivery, sustained release systems, tablet coating materials, packaging material, etc is the main aim of today’s researchers. Among biodegradable materials natural gums are considered useful due to their availability and low cost. However, these materials are soluble and swellable in water. Therefore, suitable chemical modifications and their combination with other biodegradable polysaccharides could be considered appropriate for the pharmaceutical as well as food industry. Moreover, the growing industrial utility of these gums or their modified derivatives in the field of paper, textile, petroleum recovery and pharmaceutical industries has resulted in an impetus in India for intensified research on new sources of gums and their modified products.

_Cassia fistula_ Linn. (Family: Leguminoseae , sub-family: caesalpinioideae) commonly known as Amaltas, is a beautiful deciduous ornamental tree of about 20-25 feet in height. The seeds are dicotyledonous, medium size (weight of ten seeds is 1.83gms) and consist of about 50% endosperm which is responsible for water soluble gum. The structure of the backbone of the seed polysaccharide, \( \beta (1\rightarrow4) \) linked D-mannopyranose with random distribution of \( \alpha-(1\rightarrow6) \) linked D-
galactopyranose units as side chain (M/G:3.0), was established by partial hydrolysis (Srivastava and Kapoor, 2005). *Cassia fistula* seeds have been identified as a potential source of commercial gums (Joshi and Kapoor, 2001) and considered superior in terms of higher endosperm content (50-55%) and its easy mechanical separability due to bigger size as compared to existing Indian commercial sources like guar, dhaincha and cassia gums which contain 25-42% of endosperm. Further, chemical modification of these seed gums like tamarind / Cassia tora / guar via carboxymethylation (Sharma, Kumar, Soni, & Sharma, 2003c), carbamoylethylation (Sharma, Kumar, & Soni, 2003a, 2004), cyanoethylation (Sharma, Kumar, & Soni, 2003b) and grafting (Sharma, Kumar, & Soni, 2002) showed improved cold water solubility and non-Newtonian pseudo-plastic behavior due to relatively high viscosity as compared to unmodified gums. However, the cassia gum was found to have poor film forming as well as mechanical properties. This probably is the reason for its limited application in the pharmaceutical as well as food industry.

Chitosan, a natural linear biopolyaminosaccharide; is obtained by alkaline deacetylation of chitin, which is the second most abundant polysaccharide next to cellulose (Sinha et al., 2004). Chitosan comprises of copolymers of glucosamine and N-acetyl glucosamine (Kato et al., 2003). Chemically, it is a copolymer of 2-amino-2-deoxy-D-glucose and 2-acetamido-2-deoxy-D-glucose units linked with β-(1–4) bonds. This polysaccharide, on reaching the colon, undergoes degradation by enzymes or break down of the polymer backbone (Yamamoto et al., 2000). It is degraded by lysozyme, an enzyme that is highly concentrated in mucosa and by enzymes secreted by intestinal bacteria (Sinha and Kumria, 2003; Lee et al., 2009). Due to easy availability of free amino groups, it carries a positive charge and can be easily crosslinked with other anions, oppositely charged drugs and many polymers (Daly and Knorr, 1998; Dubey et al., 2010; Aguzzi et al., 2011). But the main limitation associated with its rapid dissolution in the gastric fluids does not allow chitosan to be used in its putative form for delivery of drugs to the lower parts of GIT. Therefore, there is a need to crosslink chitosan in order to prevent it from degradation in gastric fluid. This approach shall be helpful for obtaining drug release in lower parts of GIT.

Colorectal cancer (CRC) is projected to be the third most common type of cancer in the US (Jemal et al., 2008; Kahi et al., 2008; Nambiar et al., 2010).
Precursor lesions of CRC and adenomas will develop in the gastrointestinal tract of approximately 50% men and women in the industrialized western world. The yearly conversion rate of these adenomas to carcinomas has been estimated between 0.1 to 0.25% (Jass, 2004). 5-Fluorouracil (5-FU) is one of the most widely used agent in the first-line chemotherapy of colorectal cancer (Lai et al., 2006). In addition, because of the short plasma half-life of 10–20 min, high doses have to be administered repeatedly by IV route to reach therapeutic level (Peters et al., 1993). The oral bioavailability in humans is reported to be only 28% (Gilman, 1996). The reported severe systemic toxic effects and very short plasma half-life make this drug particularly suitable for local delivery at the site by a suitable drug delivery system thus, exposing the diseased tissues in a continuous and sustained manner (Koole et al., 1998). However, its hydrophilic character makes it susceptible to easily get leached from the hydrophilic polymeric system. Hence, a need was felt to nullify the effect of g.i.t. pH on tablets by employing a combination of hydrophilic and lipophilic polymeric systems for preventing the release in upper GIT and deliver 5-FU slowly during transit through the colon. Colon microflora is increasingly being recognized as a preferable triggering component in the design of colonic drug delivery systems since the great increase in bacteria population and corresponding activities in the colon represent an event independent of GI transit time and of fed or fasted state. A large number of polysaccharides such as pectin, chitosan, cyclodextrin, dextrans have been investigated as promising drug carriers in a biomimetic approach for colon-specific drug delivery. As these polymers are usually soluble in water, they must be made water insoluble by cross-linking or hydrophobic derivatization. Physical or chemical cross-linking of the polymers can reduce the water/acid solubility of natural polysaccharides to form swellable hydrogels.

In light of above facts, it can be postulated that the physico-chemical modification of the natural gums (Cassia species) may lead to formation of water insoluble complexes. Further, these ionic or covalent cross-linked polymeric complexes are expected to prevent drug release in the acidic pH of the stomach and target drugs to the colon. Therefore, cross-linking the polysaccharide obtained from Cassia species with other biodegradable polymers can be expected to be helpful in formulating solid dosage forms of drugs being used for treatment of colon cancer.