Course	**Discipline Specific Core**
Semester	IV
Paper Number	MBTCR4081T
Paper Title	MOLECULAR BIOLOGY
No. of Credits	6
Theory/Composite	Theory
No. of periods assigned	5 Theory + 1Tutorial
Course description/objective	1. Students will be introduced to the major biological processes – replication, transcription and translation, in prokaryotic and eukaryotic systems. 2. Students will also be made familiar with DNA damage and repair mechanisms. 3. The course aims to impart knowledge about the mechanisms and regulation of prokaryotic transcription. 4. The course aims to impart knowledge about the mechanisms and regulation of eukaryotic transcription. 5. The course aims to impart knowledge about the mechanisms and regulation of prokaryotic and eukaryotic translation. 6. Students would be made familiar with DNA structure and replication.
Syllabus	**Module A: (25 Marks)** **DNA Replication** **UNIT I:** DNA structure and replication: DNA as genetic material; Structure of DNA - DNA supercoiling – linking number, negative and positive supercoilng, topoisomerases; Replication of DNA in prokaryotes - Semiconservative nature of DNA replication, Bidirectional replication, DNA polymerases, Replication complex - preprimming proteins, primosome, replisome, Rolling circle replication, Fidelity of replication. **UNIT II:** DNA damage repair by homologous recombination: Mechanism of recombination – Holliday intermediate; Recombinational repair of damaged replication forks and of double stranded breaks. **No. of Classes:** 2 /week **Module B: (55 Marks)** **Gene expression and its regulation** **UNIT III: Transcription and translation in prokaryotes:** Prokaryotic RNA polymerase, role of sigma factor, promoter, Initiation, elongation and termination of RNA chains, Regulation of gene expression in prokaryotes: Operon concept (inducible and repressible system) Translation in prokaryotes: RNA structure and types of RNA, Genetic code and its characteristics, Prokaryotic and eukaryotic translation: ribosome structure and assembly, Charging of tRNA, aminoacyl tRNA synthetases, Mechanism of initiation, elongation and termination of polypeptides, Fidelity of translation, Inhibitors of translation.
	UNIT IV: Transcription and translation in eukaryotes: Eukaryotic RNA polymerases, transcription factors, promoters, enhancers and silencers, mechanism of transcription initiation, formation of preinitiation complex, promoter clearance and elongation,

	enhancers and silencers, Activator/Coactivator interaction. Translation in eukaryotes: mechanism of translation initiation, regulation of translation. **No. of Classes: 4 Classes per week including tutorial**
Readings	**1. Lehninger Principles of Biochemistry - Cox & Nelson.** **2. Molecular Biology – Weaver.** **3. Biochemistry - Voet and Voet.** **4. Biochemistry Berg – Tymoczko & Stryer.**
Evaluation	**Continuous Internal Assessment: 20 marks** **End- Semester Theory Examination: 80 marks**
Paper Structure for End Sem Theory	**Module A (25 marks)** **Q.1. Compulsory – 10 marks** **Q.2. – Q.3. – Any one – 15 marks** **Sub-parts will not be less than 1 and not more than 5. Module B (55 Marks)** **Fifteen objective questions – 1 X 15 = 15 marks Subjective four questions 10 marks each i.e., 4 x 10 = 40**