INDIAN INSTITUTE OF INFORMATION TECHNOLOGY, ALLAHABAD

C3 Review test: 2nd May 2022, **Program Code & Semester:** B.Tech. IT (VI Sem.)

Paper Title: Eng. Biology, **Paper Setter:** Dr. Sintu Kumar Samanta

Max Marks: 40 **Duration: 1 hr 10 min**

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Answer all the questions. Each question carries 2 marks

(1) The nucleotide sequence of the sense strand of a DNA molecule is 5' ATGCTTGGTTAA 3'. Write the nucleotide sequence of the corresponding antisense strand and the encoded mRNA molecule. **(2)** Why the DNA synthesis in lagging strand of DNA double helix is not continuous? **(3)** Consider that the length of the coding region of a gene is 1800 base pairs. Calculate the number of codons in the corresponding mRNA molecule and molecular weight of the corresponding protein molecule (average molecular weight of an amino acid is 110 Da). **(4)** Write the importance of P site, A site and E site of ribosome in translation. **(5)** Why the polarity of a DNA molecule is conventionally denoted by 5' to 3'? **(6)** How does denaturation affect the structure and function of a protein? **(7)** Write the number of antigen binding sites in IgG, IgM and IgA antibody. **(8)** Differentiate between Defined and Complex media. **(9)** An 8 fold diluted sample was loaded in the Hemocytometer and cells were counted. If the total number of cells was found to be 800 in the 5 squares of the Hemocytometer, calculate the number of cells per ml of the original sample. **(10)** How does RNA splicing act as a post-transcriptional modification of RNA in eukaryotes? **(11)** What do you mean by 'inoculation' and 'incubation' of microbial culture? **(12)** What is the working principle of Pour-plate technique for obtaining a pure culture? **(13)** Write the various steps of processing and presentation of exogenous antigens followed by generation of immune response and memory. **(14)** Which are the two amino acids that are coded by a single codon? **(15)** What are oils and fats? **(16)** How does Neutralization involve in clearing of antigen? **(17)** A liquid sample was serially diluted with sterile water. 200 µl of cell suspension from the sample of 10^{-6} dilution was plated. It gave rise to 80 colonies on an agar plate. Determine the number of cells in the original sample and express it in 'number of cells/liter'. **(18)** Write the underlying molecular mechanism for development of autoimmune diseases. **(19)** Write the names of various types of bonds and position of carbon number of the sugar molecule that are involved in the structure of a DNA molecule. **(20)** Write/draw the 4 possible stereoisomers of this compound.