

Kalyani Mahavidyalaya
Part-II Honoures Test Examination-2017
Molecular Biology & Biotechnology
Paper - IV

Fullmarks-50

Time – 2hrs

USE SEPARATE SHEETS FOR EACH UNIT

UNIT I

Marks-30

1. Answer any five.

1 x 5 = 5

- a) Colour blindness is a sex limited trait. (T/F)
- b) Reproductive isolation is a parameter of speciation. (T/F)
- c) What is genotypic frequency?
- d) What is Thiamine-Thiamine dimer?
- e) IS elements are composite transposons? (T/F)
- f) What is induced mutation?
- g) UV is a non ionizing radiation. (T/F)

2. Answer any five.

2 x 5 = 10

- a) What is conditional lethal mutation? Give an example. 1 + 1 = 2
- b) If a colour blind female is crossed to normal male. Then what would be possible genotypes and phenotypes? 1+1=2
- c) What are the criterias of an ideal Hardy Weinberg population?
- d) What are simple and composite transposons?
- e) What do you mean by test of goodness of fit?
- f) What is spontaenious mutation? Give an example of a chemical mutagen. 1+1=2

3. Answer any three.

5 x 3 = 15

- a) After crossing between Tall and dwarf Nigella plant, 28 Tall and 24 dwarf plants are obtained. Comment on the nature of genetic inheritance of the height trait.
- b) The frequency of colour blind person is 0.01 in a population of 100. What will be the number of normal persons?
- c) What are silent, non sense and frameshift mutations? What are phenylketonuria and alkaptonuria? 3+2=5
- d) How Ac-Ds elements control the karnel coloration in maize – explain.

UNIT II

Marks-20

Answer any TEN.

2 x 10 = 20

- (1) Mention any 2 characteristics that a bio-molecule should possess for it to act as the genetic material.
- (2) For the mRNA 5'-AAA AAA AAC-3', what should be the protein product (from amino to carboxyl terminal) after translation? If the 5' and 3' polarity of the mRNA are just reversed, what should be the new peptide sequence? (Given: AAA codes for Lysine, AAC-Asparagine, CAA-Glutamine)
- (3) (a) What is meant by 'pitch' of a DNA double helix? Which form of DNA has left handed helical turns?
(b) Amino acids are covalently bound to carrier tRNA – (T/F).
- (4) In a DNA double helix if the angular twist between 2 consecutive base pairs is 36°, how many base pairs would you find in one complete helical turn? In which form of DNA (A/B/C/Z) would you find the value that you have just calculated?
- (5) (a) What is 'hyperchromic shift' associated with DNA denauration?
(b) Provide the formula used to calculate Cot value.

(6) (a) Purines have _____ membered ring.

(b) A dsDNA has 30% T, what is the percentage of C?

(7) (a) The coding region of an mRNA has 30 nucleotides (excluding the un-translated region and stop codon). How many amino acids do you expect in the corresponding polypeptide?

(b) If in a 1000 bp B DNA, there are 850 AT base pairs and 150 GC base pairs, in total how many Hydrogen bonds would you find between the base pairs?

(8) Compare A, B, C, and Z DNA with respect to any 2 parameters of your choice?

(9) (a) Deoxyadenlate is a nucleotide or a nucleoside? (b) The nitrogenous bases are attached to C1 of ribose through amide bond or glycosidic bond?

(10) With the help of a schematic representation/ flow chart depict Griffith's discovery of transformation in bacteria.

(11) In the experiment by Hershey and Chase, would you agree if I say that the 'blender' was used to form a homogenous mixture of phage and bacteria? Briefly explain your answer. Out of ^{32}P and ^{35}S , which radioisotope was used to label DNA and which one was used for protein?

(12) (a) As per Chargaff's rules, for dsDNA $(A+G)/(T+C) = 1$ (T/F)

(b) Low Cot value indicates more number of repetitive sequences (T/F)

(c) What is melting temperature (T_m) of dsDNA?

(d) T_m is directly proportional to GC content of DNA (T/F)

(13) Explain the logic behind preliminary assumptions that triplets (and not singlet or doublet) could make up our genetic code.

(14) (a) The stability of DNA to alkaline hydrolysis relative to RNA is due to absence of 2'-OH that assists in hydrolysis (T/F)

(b) If the DNA content of single human sperm (haploid) is 10^{-12} g, what should be the nuclear DNA content of mature human RBC?

(c) UAA, UGA and UAG are stop codons (T/F)

(d) Viruses might have RNA as their genetic material (T/F)