This question paper contains 3 printed pages

Your Roll No

6848

M. Sc. Ph. D. Bio Medical Sciences /II Sem.

PAPER – 3 – (BIO – 125)

(GENE REGULTION (CONCEPTS IN GENETICS)

J

Time 3 hours Maximum Marks 75

(Write your Roll No on the top immediately on receipt of this question paper)
Attempt Five questions in all, selecting at least two questions from each Section.
Attempt Section A and B in separate Answer Books All questions carry equal marks

SECTION- A

1 (a) Describe PCR and its utility in population genetic study

(b) What is understood by Wahlund's principle?

(c) Differentiate between Founder's effect and Bottleneck effect

(d) Define polymorphism

(e) Differentiate between Linkage Disequilibrium and Linkage

(f) Define epigenetics

(g) What is meant by goodness of fit chi square?

(h) Differentiate between penetrance and expressivity

(i) Define balancing selection

(j) What are tag SNPs?

2 (a) In a gene pool, the alleles *A* and *a* have initial frequencies of p and q respectively Show that the allelic and zygotic frequencies do not change from generation to generation considering there is no selection, mutation or migration, population is large, and there is random mating

(b) Describe natural selection and relative fitness Discuss the role of over dominance on the frequency of sickle cell anemia in areas where malaria is widespread

(15)

3. (a) Define inbreeding coefficient

(b) Differentiate between parental consanguinity and inbreeding

(c) What are the genetic consequences of parental consanguinity in human populations?

(15)

4 (a) What is understood by G-6-PD deficiency?

(b) Briefly describe the genetics of G-6-PD gene

(c) Describe the relationship between G-6-PD deficiency and malaria, and also its relevance in the field of pharmacogenetics

SECTION - B

Q1 A Mention three dihybrid ratios that deviate from what is expected from Mendel s laws Provide a possible molecular explanation for the deviation

6 marks

B Describe non-disjunction in Drosophila 4 marks

C What is the consequence of genomic imprinting Explain with an example

5 Marks

Q2 Distinguish between the following 15 marks

(a) Dosage compensation in mammals and Drosophila
(b) Lytic and lysogenic life cycle of phage lambda
(c) Suppressor mutation and regulatory mutation
(d) Maternal effect and maternal inheritance
(e) Phage resistance and immunity

Q3A What is the consequence of the following 10 marks

(a) Bicoid mutation in the ovary of a female Drosophila
(b) Deletion in HMLa in *S cerevisiaece*
(c) Exonic insertion of a P-element with β-galactosidase in caudal gene
(d) Point mutation in Cro gene in a lysogenic lamda phage
(e) Co-infection of *E coli* B with two different T4 phages with rIIA mutations

Q3B How did Barabara McLintock demonstrate the presence of transposable elements in genes in maize Is it different from P element of Drosophila? Explain 3+2 marks

Q4A Suggest an experiment to show that transformation and conjugation have different requirement for cell-to-cell contact 6 marks

Q4B What led to the conclusion that genes are arranged linearly on chromosomes. 4 marks

Q4C What are homeotic genes? Describe the consequence of mutation in a homeotic gene with an example 5 marks