Seat No. : _____

NF-104

December-2015

B.Sc., Sem.-V

Elective-305 : Biochemistry

Time : 3 Hours] **[Max. Marks : 70**

Instructions : (1) **All** questions carry equal marks.
(2) Draw diagram wherever necessary.

1. (a) Discuss : Isolation, purification & estimation of DNA. **14**

OR

List the properties of an ideal vector. **8**

(b) Draw & explain various steps in gene cloning. **6**

2. Write a note : (any **two**) **14**
   (a) Southern blotting technique.
   (b) Restriction mapping.
   (c) Sanger's method of DNA sequencing.

3. Explain the followings : (any **two**) **14**
   (a) The principle & steps of PCR.
   (b) Applications of PCR & its advantages over gene cloning.
   (c) Variations of PCR

4. (a) Write a note on : Mancini immunodiffusion & Ouchterlony immunodiffusion method. **7**
   (b) State principle behind ELISA. Explain the technique & state its application. **7**

OR

   (a) Discuss Hybridoma technique & state its applications.
   (b) Write a note on Immuno electrophoresis.

5. Answer in brief. **14**
   (1) Draw & label λ phage genome. **2**
   (2) Give the nomenclature of restriction enzyme giving an example. **2**
   (3) Define : PROBE & NICK. **2**
   (4) What is insertional inactivation ? **2**
   (5) State principle behind RIA. **2**
   (6) State the full form of : SIRD & DIRD. **2**
   (7) Name the scientists who developed monoclonal antibody technique. **2**

Seat No. : _____

NF-104

December-2015

B.Sc., Sem.-V

Elective-305 : Biochemistry
(Plant Biochemistry)

Time : 3 Hours] **[Max. Marks : 70**

1. (a) Write a short note on Photo pigment system. **7**
   (b) Short note on phyto-pigments. **7**

   OR

   (a) Give functions and structure of chloroplast. **7**
   (b) Explain cyclic and acyclic photophosphorylation. **7**

2. Write short note on any **two** of the following : **14**
   (a) Electron Transport System.
   (b) Factors affecting Photosynthesis.
   (c) Plant Cell Structure.

3. Write short note on following : (any **two**) **14**
   (a) Chemotropism and Phototropism
   (b) Auxins
   (c) Gibbrelin

4. Write any **two** of the following : **14**
   (a) Effect of volatile hormone.
   (b) Functions of Cytokinins.
   (c) Give general characteristics of Hormones - & - sites of synthesis.

5. Write as follow :
   (a) Explain Light Reaction. **6**
   (b) Sources/origin of ABA, 2, 4-D and GA. **4**
   (c) Give structure of Ethelene and its one function. **4**

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Seat No. : _____

NF-104

December-2015

B.Sc., Sem.-V

Elective-305 : Biochemistry
Vocational Biotechnology (Genetics)

Time : 3 Hours] **[Max. Marks : 70**

I. (A) In summer squash, white fruit is dominant over yellow fruit colour and disk shaped fruit is dominant over sphere shaped fruit. If a squash plant true breeding for white, disk-shaped fruit is crossed with a plant true – breeding for yellow, sphere – shaped fruit, what will the phenotypic and genotypic ratios be for the F1 generation and the F2 generation? Explain which of Mendel's law does it obey. **7**

(B) What is epistasis ? Giving an example each, explain what dominant and recessive epistasis. **7**

OR

(A) Write in detail on patterns of inheritance.

(B) Explain the phenomena of Incomplete dominance, multiple alleles and gene lethality giving examples.

II. A cross is made between homozygous wild – type female *Drosophila* (a^+ a^+ b^+ b^+ c^+ c^+) and triple mutant males (aa bb cc). The F1 (a^+a b^+b c^+c) females are test crossed back to the triple – mutant males and the F2 phenotypes are as follows :

a^+ b c	18
a b^+ c	112
a b c	308
a^+ b^+ c	66
a b c^+	59
a^+ b^+ c^+	321
a^+ b c^+	102
a b^+ c^+	15
Total	**1000**

Determine the order of the genes. Find the map distance from this three point cross, the coefficient of coincidence and interference. **14**

OR

(A) Write in detail on the composition of chromosomes, its packaging and significance of banding pattern. **7**

(B) Write in detail on structural and numerical aberrations of chromosomes. **7**

III. (A) Write in detail on conjugation and explain why it enables horizontal gene transfer. **7**

(B) Explain one gene one enzyme hypothesis and its implications on analysis of elucidating biochemical pathways. **7**

OR

(A) Explain how specialized transduction is different from generalized transduction.

(B) Write in short on :

(i) Use of replica plating in isolating auxotrophs.

(ii) Induced mutations to develop economically important strains of plants, animals and microbes.

IV. (A) Calculate the genotype frequencies and allele frequencies for a population of frogs with genotypes GG (100), Gg (160) and gg (140). Compare the observed genotype frequencies with expected frequencies. **7**

(B) Write a note on evolutionary genetics. **7**

OR

(A) What is Hardy-Weinberg Theory ? What are the various assumptions that are considered to explain Hardy-Weinberg equilibrium ?

(B) Write a short note on extra-chromosomal inheritance.

V. Answer the following : **14**

(1) What is test cross and its significance ?

(2) What will be the blood group of the first born to parents who both have blood group B ?

(3) A woman with one gene for hemophilia and one gene for colour-blindness on one of the X chromosomes marries a normal man. How will the progeny be ?

(4) On a pedigree tracing the inheritance of PKU, a horizontal line joins a black square and a half – black circle. What fraction of this couple's children would you expect to suffer from PKU ?

(5) Duchenne muscular dystrophy is caused by a sex – linked recessive allele. Its victims are almost invariably boys, who usually die before the age of 20. Why is this disorder almost never seen in girls ?

(6) What theory supports that chloroplasts were originally bacteria ?

(7) What do you understand by Epigenetics ?

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Seat No. : _____

NF-104

December-2015

B.Sc., Sem.-V

Elective-305 : Biochemistry
(Classical Genetics)

Time : 3 Hours] **[Max. Marks : 70**

I. (A) In summer squash, white fruit is dominant over yellow fruit colour and disk shaped fruit is dominant over sphere shaped fruit. If a squash plant true breeding for white, disk-shaped fruit is crossed with a plant true – breeding for yellow, sphere – shaped fruit, what will the phenotypic and genotypic ratios be for the F1 generation and the F2 generation ? **7**

(B) Explain why Mendel used the pea plant for his experiments and how was he able to explain the phenomenon of dominance. **7**

OR

(A) Explain how Mendel's Dihybrid Cross led to the Law of Independent Assortment.

(B) What is a test cross and its significance ? What is the phenotypic ratio obtained after a test cross if the F1 progeny is (a) AaBb, and (b) AABB ?

II. (A) What are multiple alleles ? Explain giving the example of ABO blood group system. Explain ABO incompatibility. **7**

(B) Explain complement gene action and duplicate gene action giving an insight into epistasis. **7**

OR

(A) Explain Incomplete Dominance, Co-dominance and Over dominance giving examples.

(B) Explain dominant epistasis and recessive epistasis giving examples.

III. (A) Write in detail on patterns of inheritance. **7**

(B) Explain Bridge's experiment showing non-disjunction as proof of chromosomal theory of inheritance. **7**

OR

(A) What is sex linkage ? Explain whether this phenomenon explains chromosomal theory of inheritance.

(B) Write in detail on special banding patterns of chromosomes and give the significance.

IV. A cross is made between homozygous wild – type female *Drosophila* (a^+ a^+ b^+ b^+ c^+ c^+) and triple mutant males (aa bb cc). The F1 (a^+a b^+b c^+c) females are test crossed back to the triple – mutant males and the F2 phenotypes are as follows :

a^+ b c	18
a b^+ c	112
a b c	308
a^+ b^+ c	66
a b c^+	59
a^+ b^+ c^+	321
a^+ b c^+	102
a b^+ c^+	15
Total	**1000**

Determine the order of the genes. Find the map distance from this three point cross, the coefficient of coincidence and interference. **14**

OR

Write a detailed note on structural and numerical aberrations.

V. Answer the following : **14**

(1) Explain the phenotypic ratio associated with Gene lethality.

(2) What is the probability that the only child born to parents of AO and BO is O ?

(3) What do you understand by constitutive heterochromatin ? Give example.

(4) What is pleiotropy ?

(5) What is the cause of *Erythroblastosis foetalis* ?

(6) What is the possibility of a child being hemophilic when mother is hemophilic and father is normal ?

(7) What is a giant chromosome ?