

Seat No. : _____

N17-123
November-2014
B.Sc., Sem.-V
BIC-305 : Biochemistry
(Techniques in Biotechnology)

Time : 3 Hours]

[Max. Marks : 70

Instructions : (1) All question carry equal marks.
(2) Draw diagram as and when required.

1. (a) Discuss : Isolation, purification and estimation of DNA. **12**
(b) What are restriction enzymes ? **2**
- OR**
- (a) List the basic steps of gene cloning. **5**
(b) Name the vectors used in gene cloning and explain role of plasmid as an ideal gene cloning vector. **9**
2. Write a note on : (Any **two**) **14**
 - (1) Southern blotting technique.
 - (2) Restriction mapping.
 - (3) Sanger's sequencing of DNA.
3. Explain the following : (Any **two**) **14**
 - (1) Basic concepts and working of PCR.
 - (2) Application of PCR.
 - (3) PCR Vs. Gene cloning

4. (a) Write a note on SIRD & DRID. **10**
- (b) Write principle & two applications of RIA. **4**

OR

- (a) Write a note on ELISA. **8**
- (b) What is Immuno electrophoresis ? Discuss Rocket Immuno electrophoresis. **6**

5. Answer the following : **14**

- (1) Explain nomenclature of pBR322. **(2)**
- (2) Name two life cycles of λ phage. **(1)**
- (3) Explain the role of ethidium bromide in separation of DNA. **(2)**
- (4) What is the function of DNA ligase enzyme ? **(2)**
- (5) How is a rough estimation of size of DNA fragments done in an agarose gel electrophoresis ? **(2)**
- (6) What is Western blotting technique ? **(1)**
- (7) Name the chemicals used in Maxam-Gilbert sequencing of DNA. **(1)**
- (8) Name the radioactive compound used in RIA. **(1)**
- (9) What is the full form of ELISA and RIA ? **(2)**
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B.Sc., Sem.-V

BIC-305 : Biochemistry Theory
(Classical Genetics)

Time : 3 Hours]

[Max. Marks : 70

1. (a) Mendel proposed the first two laws of Inheritance by carrying out an experiment on *Pisum sativum* by Monohybrid Cross. Discuss the experiment and the choice of experimental model. **10**

- (b) Explain what a test cross result would indicate for a single trait. **4**

OR

- (a) Dihybrid Cross experiment by Mendel led to the Law of Independent Assortment. Explain the entire experiment and how he arrived at the law. **10**

- (b) Differentiate between a test cross and a back cross. Give its significance. **4**

2. (a) What do you understand by epistasis ? Explain Recessive epistasis and Dominant epistasis giving examples. **10**

- (b) Explain incomplete dominance giving an example. **4**

OR

- (a) Explain deviation in Mendel's phenotypic ratios due to gene lethality, incomplete dominance and codominance giving examples. **10**

- (b) What are multiple alleles ? Support your definition by giving examples. **4**

3. (a) Write a short note on Chromosomal theory of Inheritance. **7**

- (b) write a note on sex linked inheritance. **7**

OR

- (a) Write in detail on the experiment that proved chromosomal theory of inheritance by non-disjunction. **7**

- (b) Write a short note on special banding patterns of chromosomes. **7**

4. (a) What is linkage ? Explain how a three point cross enables mapping of genes ? **10**
(b) What is euploidy and aneuploidy ? Explain giving an example each. **4**

OR

- (a) Write in detail on structural chromosomal aberrations. **7**
(b) What is crossing over ? How would you come to know that genes are linked ?
How is interference and coincidence associated with gene mapping ? **7**

5. Answer the following : **14**

- (a) What do you understand by contrasting characters ?
(b) How many gametes will be formed in a dihybrid cross ?
(c) When would you get a 1 : 1 : 1 : 1 ratio ?
(d) What leads to a DNA becoming a chromosome ?
(e) What do you understand by gene locus ?
(f) What is a point mutation?
(g) What is a hypostatic gene ?
(h) What do you understand by pleiotropy ?
(i) Why are females generally carriers, while males more susceptible to a disease ?
(j) What is trisomy ? Give an example.
(k) If an individual is XXY, what would implication would it have on the individual ?
(l) When does crossing over take place ?
(m) Define a centiMorgan.
(n) If there is no interference between gene A and B on a single chromosome, what inference will you make ?

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B.Sc., Sem.-V

BIC-305 : Biotechnology

Genetics (Voc.)

Time : 3 Hours]

[Max. Marks : 70

1. (a) Write in detail on Mendel's experiments and the laws derived. 7
- (b) What is chromosomal non-disjunction ? How was it the basis of proving the chromosomal theory of inheritance ? 7

OR

- (a) Deviations from Mendel's phenotypic ratio of 9 : 3 : 3 : 1 has been observed in several dihybrid crosses. Discuss. 7
 - (b) Write in detail on ABO incompatibility and Rh incompatibility. 7
2. (a) Write a detailed note on chromosome condensation and its implications. 7
 - (b) Write in detail on chromosomal aberrations. 7

OR

- (a) Linkage is an important natural phenomenon that enables gene mapping. Discuss. 7
 - (b) What is heterochromatin and euchromatin ? How can you relate it to banding patterns in chromosomes ? 7
3. (a) Explain why bacterial conjugation is a good tool for DNA transfer ? 7
 - (b) Write a short note on induced mutations being a method of getting improved strains. 7

OR

- (a) What do you understand by generalized transduction and specialized transduction ? 7

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P.T.O.

(b) Explain one gene – one enzyme hypothesis. Comment on its status now. 7

4. (a) Describe Hardy- Weinberg theory and what are the factors that affect the theory ? 10

(b) What is pedigree analysis and give its significance ? 4

OR

(a) Write in detail on extrachromosomal inheritance. 7

(b) Write a note on evolutionary genetics giving examples. 7

5. Answer the following : 14

(a) What is the significance of test cross ?

(b) When does one get a 2 : 1 phenotypic ratio ?

(c) What results in a 1 : 2 : 1 phenotypic ratio, which is a deviation from Mendel's 3 : 1 ratio ?

(d) What is pleiotropy ?

(e) Give one important function of centromere.

(f) What is telomere ?

(g) A giant chromosome, as observed in drosophila, is due to polyteny. Comment on the statement in one line.

(h) Name two methods of DNA transformation.

(i) What are auxotrophs ?

(j) If $p = 0.25$, what will be q ?

(k) What do you understand by an epigenetic change ?

(l) If both parents have blood group A, what are the chances of the first offspring being A ?

(m) The giraffe evolved to have long necks. Comment on the statement in one line.

(n) If there is no interference between gene A and B on a single chromosome, what inference will you make ?

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B.Sc., Sem.-V

BIC-305 : Plant Biochemistry (Elective)

Time : 3 Hours]

[Max. Marks : 70

1. Write short note on any **two** of the following : **14**
 - (a) Tissue system cell types and its functions.
 - (b) Plant organ system.
 - (c) Formation of plant cell wall and explain its structure.

 2. Write short notes on any **two** of the following : **14**
 - (a) C_4 metabolism of dark reaction.
 - (b) Light reaction : Cyclic photophosphorylation
 - (c) Calvin cycle

 3. Write short note on any **two** of the following : **14**
 - (a) Sucrose synthesis or sucrose breakdown
 - (b) Phosphate uptake system
 - (c) Assimilation and fixation of Nitrogen

 4. Write a note on any **two** of the following : (Types, functions) **14**
 - (a) Cyokinins
 - (b) Giberelin
 - (c) Abscissic acid

 5.
 - (a) Draw labelled figure on Non-cyclic photophosphorylation. **(5)**
 - (b) Describe Crassuiaccean acid metabolism. **(5)**
 - (c) Difference between PS-I and PS-II. **(4)**
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