

*This question paper contains 4 printed pages.*

4649

Your Roll No. ....

**B.Sc. Prog. / III**

**AS**

**BIO-302 : GENETICS, BIOTECHNOLOGY AND  
IMMUNOLOGY**

*Time : 3 hours*

*Maximum Marks : 75*

*(Write your Roll No. on the top immediately  
on receipt of this question paper.)*

*Use separate answer-sheets for Sections A & B.*

*Attempt all parts of a question together.*

**SECTION A**

*Attempt all questions.*

1. (a) Explain the following :

(i) Cosmid

(ii) Pleotropic genes

(iii) Allele

(iv) Nucleotide.

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(b) Differentiate :

(i) Monohybrid and Dihybrid Cross

(ii) Recessive and Dominant Epistasis.

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(c) Define the following : (any eight)

**P. T. O.**

- (i) Heterochromatic DNA
- (ii) Mutation
- (iii) Isochromosome
- (iv) Turner syndrome
- (v) Genotype
- (vi) Gene interaction
- (vii) Trisomy
- (viii) DNA Polymerase
- (ix) Transcription
- (x) Histones (protein). 8

(d) Give contribution of the following : (any five)

- (i) Avery, McCleod and McCarthy
- (ii) Miescher
- (iii) Morgan
- (iv) Beadle and Tatum
- (v) Meselson and Stahl
- (vi) A.H. Sturtevant
- (vii) Holley. 5

2. Describe the structure and role of Nucleosome. 8

3. What do you mean by linkage? Why didn't Mendel find linkage? 8
4. Explain the concept of Polygenic Inheritance. 8
5. Write short notes on (any four)
- (i) Dosage compensation
  - (ii) Sex linked inheritance
  - (iii) Non-allelic gene interaction
  - (iv) Ligase
  - (v) Mendel's law of segregation
  - (vi) DNA polymerase. 10

#### SECTION B

*Attempt two questions in all, including Question No. 1 which is compulsory.*

6. (a) Define :
- (i) Immunogen
  - (ii) Secondary antibody
  - (iii) Autoimmunity. 3
- (b) Distinguish between the following :
- (i) Active and Passive Immunization
  - (ii) Lymphocytes and Granulocytes. 2

(c) Expand the following :

(i) BCR

(ii) APC

(iii) PAMP

(iv) RIA

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(d) Fill in the most appropriate word in the following blanks :

(i) Immunoglobulins are synthesized and secreted by ..... cells of the B cell lineage.

(ii) Conjugation with a suitable ..... enables a weak immunogen to evoke a strong immune response.

(iii) Antigenic peptides are presented to ..... T lymphocytes by class II MHC molecules. 3

7. (a) List the cardinal features of the mammalian immune system.

(b) Explain how the complement system is activated and combats antigenic challenge. 3,7

8. Write short notes on any *two* of the following :

(i) Ouchterlony Double Diffusion Assay

(ii) Type I Hypersensitivity reaction

(iii) Properties of B cell epitopes

(iv) Innate immune response.

5,5  
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