

① 16401

[This question paper contains 4 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 5055

Unique Paper Code : 2494000022

Name of the Paper : Biochemical Correlation of Diseases

Name of the Course : B.Sc. (Hons.) Biochemistry (NEP)

Semester : VI

Duration : 2 Hours

Maximum Marks : 60

Instructions for Candidates

1. Write your Roll. No. on the top immediately on receipt of this question paper.
2. There are 6 questions.
3. Attempt **any 4** questions.
4. All questions carry equal marks.
5. **Question no. 1 is compulsory.**

P.T.O.

1. (a) Expand and explain the following terms:

- (i) MDR-TB
- (ii) SLE
- (iii) HDL
- (iv) SCID
- (v) COVID

(b) Justify the following statements:

- (i) Diabetes Mellitus Type II is considered a lifestyle disorder, but not Diabetes Mellitus type I
- (ii) Gout is observed in a patient of Von Gierke's disease.
- (iii) Lipid profile is a parameter to assess cardiovascular health.
- (iv) A deficiency in calcium levels cannot be elevated without Vitamin D.
- (v) Hemagglutination is the basis of Widal test.

(5,10)

2. (a) Identify the most probable cause and explain the biochemical basis of the following symptoms/clinical manifestation:
- (i) Loss of vision in dark
 - (ii) Polydipsia, polyuria, polyphagia
 - (iii) Frequent fractures in elderly women
 - (iv) Fairer skin, hair, eyes than other siblings
- (b) What do you understand by a balanced diet? What are the macronutrients and micronutrients required to maintain it?
- (c) What are autoimmune diseases? Explain with the help of an example. (8,4,3)
3. Differentiate between the following:
- (i) Kwashiorkor and Marasmus
 - (ii) Naked and Enveloped Virus
 - (iii) Hashimoto's Disease and Grave's Disease
 - (iv) Antigenic Shift and Antigenic Drift
 - (v) Rickets and Osteomalacia (15)

4. (a) Draw and explain the life cycle of malarial parasite.
- (b) Explain the structure of HIV with the help of a diagram.
- (c) Briefly discuss the pathogenesis, symptoms and any one diagnostic method for tuberculosis. (6,3,6)
5. (a) An excess of cortisol in the body can create an imbalance. Justify this statement by elaborating on its cause, symptoms, and treatment.
- (b) Which genetic disease is caused by a deficiency of glucocerebrosidase? Elaborate on the cause, manifestation and treatment of the disease.
- (c) What are glycogen storage disorders? Explain with the help of an example. (15)
6. Write short notes on the following:
- (i) Types of vaccines
 - (ii) Atherosclerosis
 - (iii) Tetanus
 - (iv) Rheumatoid Arthritis
 - (v) Leishmaniasis (15)

[This question paper contains 4 printed pages.]

May 2025 R

Your Roll No.....

Sr. No. of Question Paper : 5502

J

Unique Paper Code : 2492013601

Name of the Paper : Human Physiology

Name of the Course : **B.Sc. (Hons) Biochemistry
(NEP)**

Semester : VI

Duration : 2 Hours

Maximum Marks : 60

Instructions for Candidates

1. Write your Roll. No. on the top immediately on receipt of this question paper.
2. There are 6 questions.
3. Attempt **any 4** questions.
4. All questions carry equal marks.
5. **Question no. 1 is compulsory.**

P.T.O.

1 (a) Explain the following terms:

(a) ECG

(b) Anatomic dead space.

(c) Podocytes

(d) Vital capacity

(e) Platelet plug

(f) Pacemaker potential

(b) Name the following:

(a) Anticoagulant

(b) Blood buffer

(c) Precursor cells of thrombocytes (2×6, 3)

2 (a) Give the control mechanisms maintaining body Homeostasis.

(b) Detail out the extrinsic pathway of blood clotting.

(c) Show the changes in the permeability of various ion channels that result in the generation of cardiac muscle action potential.

(d) Exercise increases Cardiac output. Explain

(2, 4, 4, 5)

3. (a) What changes stimulate the central and peripheral chemoreceptors? How do these receptors regulate rate of respiration.
- (b) Draw a diagram of the brain labeling the following regions: Parietal lobe of Cerebrum, Somatic sensory cortex area. Cerebellum, pons, and medulla oblongata.
- (c) Contrast the somatic and autonomic divisions of the efferent nervous system. Give supportive diagrams. (5, 5, 5)
4. (a) Define GFR. Give one method of GFR determination. What are different factors affecting GFR?
- (b) Explain how kidneys produce hyperosmotic urine via the Countercurrent Multiplier System.
- (c) Draw a fully labeled diagram of a sarcomere showing different filaments and bands. (6, 6, 3)
5. (A) Write short notes on the following:
- (a) Enterohepatic circulation.

(b) Hepatic lobule

(B) Give the mechanism of secretion of hydrochloric acid by parietal cells in the stomach. Give one positive and one negative regulator of HCl secretion.

(C) What is cephalic phase of gastrointestinal system?
(4 x 2, 5, 2)

6. (a) Explain how?

(a) The female reproductive organs develop in the absence of Y chromosome.

(b) The fertilized egg blocks polyspermy.

(c) Sperm is protected from toxins, drugs and its own immune system.

(b) Explain the significance of Feto-placental maternal axis.
(4 x 3, 3)

This question paper contains 3 printed pages]

22/5/2025

Roll No.

--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

S. No. of Question Paper : 5542

Unique Paper Code : 2492013602

Name of the Paper : Basics of Immunology

Name of the Course : B.Sc. (Hons.) Biochemistry

Semester : VI

Duration : 2 Hours

Maximum Marks : 60

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

There are 6 questions.

Attempt any four questions.

All questions carry equal marks.

Question No. 1 is compulsory.

1. (a) Write true or false for the following statements with justification :

- (i) Hen egg albumin is a better immunogen for chicken than for goat.
- (ii) When anti bovine gamma globulin monoclonal antibodies from Balb/c mice are injected into another Balb/c mice, idiotypic antibodies are produced.
- (iii) Unlike Tc cells, NK cells can kill IgG coated target cells.
- (iv) Factor H binds to C5b67 and inhibits the complement pathway.
- (v) Fixed macrophages found in the kidney are called Kupffer cells.
- (vi) Membrane bound Immunoglobulin G is a marker for mature B cells.

P.T.O.

(b) Name the following :

- (i) The cells playing a major role in controlling the early stages of viral infection.
- (ii) An acute phase response protein.
- (iii) The split products C3a and C5a released during activation of complement system.
- (iv) Most potent professional antigen presenting cells (APC).
- (v) An enzyme that triggers generation of reactive oxygen species (ROS) by macrophages.
- (vi) A co-stimulatory signal molecule on the surface of T-cell that interacts with B7 on APC. (9,6)

2. (a) Diagrammatically represent and explain the structure of IgG.

(b) Explain key points of interaction between innate and adaptive immunity.

(c) Explain how inflammation helps in combating the early stages on infection. (5,5,5)

3. (a) What are T dependent and T independent antigens ? Explain how each of them activates B cells ?

(b) Draw a neat well labelled structure of lymph node and depict the localization of immune cells within the lymph node.

(c) Explain how IgM can exist both as membrane bound and secreted antibody. (6,4,5)

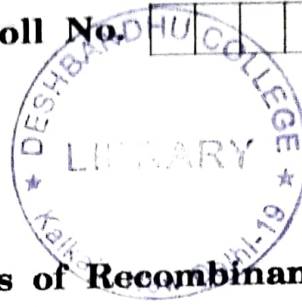
4. (a) Elaborate on the mechanisms used by cytotoxic T cells for killing a target cell.
- (b) Explain the structure and function of TCR-CD3 complex.
- (c) Explain how membrane attack complex (MAC) is formed via classical pathway ? (6,4,5)
5. (a) What is an immunogen ? Describe briefly the characteristics a molecule should have to be an immunogen.
- (b) Explain the Cytosolic pathway for antigen presentation.
- (c) Describe the sequence of events involved in the differentiation and maturation of progenitor B cell (pro-B cell) to an immature B cell in the bone marrow. (6,5,4)
6. Write short notes on : (3×5)
- (i) Opsonization
- (ii) Adjuvants
- (iii) TLRs
- (iv) NK Cells
- (v) Class Switching.

This question paper contains 3 printed pages|

27/5/25 n

Roll No.

--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--



S. No. of Question Paper : 5562

Unique Paper Code : 2492013603

Name of the Paper : Fundamentals of Recombinant DNA Technology

Name of the Course : B.Sc. (Hons.) Biochemistry (NEP)

Semester : VI

Duration : 2 Hours

Maximum Marks : 60

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

There are 6 questions.

Attempt any four questions.

All questions carry equal marks.

Question No. 1 is compulsory.

1. (A) Write the contributions of the following :

(i) Kary Mullis

(ii) Paul Berg

(iii) Bolivar and Rodriguez.

(B) State True/False and justify (any six) :

(i) Hybrid promoters are preferred for expression vectors.

(ii) Blunt ends increase the efficiency of ligation.

(iii) All three types of restriction endonucleases are useful in genetic engineering.

P.T.O.

- (iv) Factor VIII cannot be expressed in *E. coli*.
- (v) Bacterial cells are naturally competent.
- (vi) Lambda replacement vectors are used to make genomic libraries.
- (vii) Any *E. coli* strain can be used for recombinant DNA technology.

(3,12)

2. Differentiate between the following :

- (i) Real time PCR and Multiplex PCR
- (ii) Genomic and cDNA library
- (iii) Linker and Adapter
- (iv) pUC18 and Ti-Plasmid
- (v) YAC and BAC.

(15)

3. (A) 200 DNA molecules were used as a template in a PCR reaction. Calculate the number of amplicons produced after 30 cycles.

(B) What are the uses of the following in genetic engineering ? Explain with the help of a diagram :

- (i) BAL31
- (ii) T4 Polynucleotide Kinase
- (iii) Alkaline Phosphatase
- (iv) EcoRI
- (v) S1 Nuclease
- (vi) DNA ligase.

(3,12)

4. (A) What are the different classes of viral vectors ? Discuss their advantages and disadvantages in genetic engineering.
- (B) Describe the principle of Sanger's method of DNA sequencing. List *two* limitations of Sanger's method.
- (C) What are the essential features of a typical expression vector ? Give *two* examples. (6,4,5)
5. (A) Discuss the factors that affect the efficiency of a PCR reaction.
- (B) Briefly explain *two* methods of DNA uptake by cells.
- (C) Draw a labelled diagram of pGEM3Z vector. How is it different from pBR322 cloning vector ? (5,5,5)
6. Write short notes on the following (any *five*) : (15)
- (i) Pyrosequencing
 - (ii) Site directed mutagenesis
 - (iii) Homopolymer Tailing
 - (iv) Colony Hybridization
 - (v) Fusion tags and their role in purification of recombinant proteins
 - (vi) Blue-White Selection.

This question paper contains 3 printed pages|

02/6/25 K

Roll No.

--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

S. No. of Question Paper : 5608

Unique Paper Code : 2493010012

Name of the Paper : Research Methodology (DSE)

Name of the Course : B.Sc. (Hons.) Biochemistry (NEP)

Semester : VI

Duration : 2 Hours

Maximum Marks : 60

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

There are six questions.

Attempt four questions in all. All questions carry equal marks.

Question No. 1 is compulsory.

The use of a simple calculator is allowed.

1. (A) Explain the following terms :

- (i) Null Hypothesis
- (ii) Patent
- (iii) Mode
- (iv) Control
- (v) Dependent variable
- (vi) Regression.

(B) What are the different steps in Report writing ?

12,3

P.T.O.

2. Differentiate between the following pairs :

- (i) Exploratory and experimental research design
- (ii) Discrete series and continuous series coefficient of variation
- (iii) Primary and secondary data
- (iv) Experiment and survey
- (v) Random and non-random sampling.

3×5=15

3. (A) What do you mean by the term research problem ? Explain the points to be considered while selecting a problem.
- (B) Should scientists have unrestricted freedom in research, or should there be ethical limits on biosafety grounds ?
- (C) What is h-index ? Explain its significance. Calculate *h*-index from the Data shown below :

Research article :	1	2	3	4	5	6	7	8	9
Citations :	55	47	26	12	7	4	2	2	1

5,5,5

4. (A) What are the different methods of collecting data ? Explain the interview method along with its merits and demerits.
- (B) What is intellectual property right ? Briefly mention any *two* laws governing it.
- (C) What do you mean by the term correlation ? What are the different types of correlation ?
- (D) What do you mean by standard deviation ? How is it calculated ?

5,5,2,3

5. (A) Write a short note on literature review.
- (B) What is plagiarism ? List *two* risks caused by plagiarism. How can it be detected ?
- (C) Describe the problems encountered by researchers undertaking empirical research. 5,5,5
6. (A) What do you mean by the terms : Standard deviation and coefficient of variation. Find the coefficient of variation for the following data :
- 24, 26, 33, 37, 29, 31
- (B) Explain the concept of central tendency giving example. What purpose does it serve ?
- (C) Define impact factor and mention its significance.
- (D) Explain the significance of "references" in research articles. 5,4,3,3