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S. No. of Question Paper : 5811

Unique Paper Code : 2492011203

Name of the Paper : Basic Concepts of Cell Biology

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

Semester : II

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 any *four* questions.

All questions carry equal marks.

Question No. 1 is compulsory.

1. (a) State True or False and justify your answer :

- (i) Chloroplast is also called a semi-autonomous organelle.
- (ii) Glycosylation of proteins takes place in only endoplasmic reticulum.
- (iii) Lysosomal enzymes function at neutral pH.
- (iv) Microfilaments play a major role in nutrient absorption.
- (v) Integrins are important components of cell membrane.
- (vi) Emerin is located on inner membrane of mitochondria.

P.T.O.

(b) Define the following :

(i) MTOCs

(ii) Formin

(iii) Focal adhesion

(iv) Lysosomal storage disease.

9,6

2. (a) Describe briefly the polymerization and organization of microtubules.

(b) Draw a well labelled diagram of mitochondria and write down its functions.

(c) Describe briefly on histochemical staining techniques.

6,5,4

3. Differentiate the following :

(i) Mitosis and meiosis

(ii) Desmosomes and hemidesmosomes

(iii) Pinocytosis and phagocytosis.

5,5,5

4. (a) Describe the structure of light microscope and elaborate on its working principle.

(b) Explain the transport of proteins to nucleus.

(c) Draw a well labelled diagram of nuclear pore complex.

6,5,4

5. Write short notes on the following :

(i) . Biogenesis and functions of peroxisomes

(ii) Actin binding proteins

(iii) Protein glycosylation in endoplasmic reticulum.

6,5,4

6. (a) Describe briefly structure, assembly and functions of intermediate filaments.

(b) Describe briefly structure and functions of cell matrix proteins with at least *two* suitable examples.

(c) Elaborate on connexin proteins and plasmodesmata with the help of diagrams.

6,5,4

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S. No. of Question Paper : 5770

Unique Paper Code : 2492011201

Name of the Paper : Enzymes

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

Semester : II

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 any *four* questions.

All questions carry equal marks.

Question No. 1 is compulsory.

1. (A) Comment on the following statements :

(i) Covalently bound cofactors are classified as prosthetic groups.

(ii) Creatine kinase used in clinical diagnosis.

(iii) A purified enzyme has maximum specific activity.

(iv) Enzymes lowers the activation energy of a reaction to speed up the reaction rate.

(v) Competitive inhibition is a reversible form of enzyme inhibition.

(vi) K_{cat}/K_m ratio used as a measure of catalytic efficiency.

P.T.O.

(B) Give a suitable example for each of the following :

(i) Metalloenzyme

(ii) Ribozyme

(iii) Therapeutic enzyme.

12,3

2. (A) Explain the following types of inhibition using Lineweaver-Burk plots :

(i) Competitive inhibition

(ii) Mixed inhibition

(iii) Uncompetitive inhibition.

What effect does these above-mentioned inhibitors have on K_m and V_{max} ?

(B) Describe the enzyme regulation by covalent medication with the help of a suitable example.

9,6

3. Differentiate between the following :

(i) Lock and key and Induced fit hypothesis of enzyme catalysis

(ii) Discontinuous and Continuous enzyme assays

(iii) Eadie-Hofstee and Hanes plots

(iv) Single displacement and double displacement bisubstrate reactions.

3,4,4,4

4. (A) Explain how are enzymes classified ? Give suitable examples.

- (B) For an enzyme catalyzed reaction, if $k_{\text{cat}} = 600\text{s}^{-1}$, $[\text{E}_t] = 20\text{nM}$ and $V_o = 9.6 \mu\text{Ms}^{-1}$. Calculate V_{max} and K_m when $[\text{S}] = 40\mu\text{M}$.
- (C) Explain the allosteric regulation of ATCase enzyme. 7,3,5
5. (A) Explain general acid-base and covalent catalytic mechanism of enzyme action with suitable example.
- (B) Derive Michaelis-Menten equation. Under what condition is $K_m = [\text{S}]$?
- (C) Write the role of enzymes in research. Explain with *two* examples. 6,6,3
6. (A) Explain the role of the following coenzymes in enzyme-catalysed reactions with examples :
- (i) TPP
- (ii) NAD.
- (B) Write short notes on the following :
- (i) Immobilized enzymes
- (ii) Isoenzymes
- (iii) Zymogens. 6,9

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S. No. of Question Paper : **5791**

Unique Paper Code : **2492011202**

Name of the Paper : **Metabolism of Carbohydrates**

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

Semester : **II**

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 any *four* questions.

All questions carry equal marks.

Question No. 1 is compulsory.

1. (A) Justify the following statements :

- (i) Glycogenin is the primer involved in glycogen synthesis.
- (ii) Intermediates of glycolysis are not able to leave the cells in which they are formed.
- (iii) Metabolic pathways are irreversible.
- (iv) Liver glycogen contributes to blood glucose but not muscle glycogen.
- (v) Lactate accumulation takes place in muscles during strenuous exercise.
- (vi) Glucose-6-phosphate dehydrogenase deficient persons show resistance to malarial parasite.

P.T.O.

(B) Give the reaction for the following :

- (i) Committed step of glycolysis
- (ii) Reaction catalyzed by Branching enzyme
- (iii) Reaction involved in substrate level phosphorylation in TCA cycle
- (iv) Conversion of galactose 1-phosphate to glucose 1-phosphate
- (v) Reaction catalyzed by phosphoglucomutase
- (vi) Conversion of pyruvate to phosphoenolpyruvate. 9,6

2. (A) Why does glycolysis and gluconeogenesis not occur simultaneously ?
Explain the reciprocal regulation of glycolysis and gluconeogenesis with respect to PFK I and PFK II.

(B) Give the biochemical basis and symptoms of the following diseases
(any four) :

- (i) Von Gierkés
- (ii) Cori disease
- (iii) Pompe disease
- (iv) McArdle disease
- (v) Lactose intolerance. 7,8

3. (A) Explain why ATP is the most suitable form of energy currency in the cell.

(B) Differentiate between the following :

- (i) Autotrophs and Heterotrophs
- (ii) Lactate fermentation and alcohol fermentation
- (iii) Hexokinase and Glucokinase
- (iv) Oxidative phosphorylation and substrate level phosphorylation

3,12

4. (A) What is the significance of Pentose Phosphate Pathway ? Describe the fate of glucose-6-phosphate when the need for NADPH exceeds that of ribose 5-phosphate.

(B) Describe how increased level of the following molecules will affect the glycolysis rate ?

- (i) Increased level of F-6-P
- (ii) Increased ATP
- (iii) Increased Citrate.

(C) Write down the reactions affected by the following inhibitors/drugs :

- (i) Arsenate
- (ii) Fluoride
- (iii) Iodoacetate
- (iv) Malonate.

5,6,4

5. Write short notes on the following :

(i) Cori cycle

(ii) Anaplerotic reactions

(iii) Regulation of Pyruvate Dehydrogenase complex

(iv) Any *two* feeder pathways for glycolysis

4,3,4,4

6. (A) What are the advantages of storing glucose in the form of glycogen ? How does the glycogen breakdown occur under hypoglycemic conditions ?

(B) Describe in detail the role of *three* enzymes and give coenzymes involved in the conversion of pyruvate to acetyl CoA by Pyruvate dehydrogenase complex.

(C) TCA cycle provides substrate for several biosynthetic processes. Justify.

6,5,4

This question paper contains 4 printed pages]

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S. No. of Question Paper : 5661

Unique Paper Code : 2492012403

Name of the Paper : Gene Organization, Replication and Repair

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

Semester : IV

Duration : 2 Hours

Maximum Marks : 60

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

There are six questions in this question paper.

Attempt four questions in all.

All questions carry equal marks.

Question No. 1 is compulsory.

1. (a) Comment on the following :

- (i) Prokaryotes have a special type-II topoisomerase that introduces, rather than removes, negative supercoils.
- (ii) Methylated cytosines are hotspots for mutations.
- (iii) There is an inverse relationship between organism complexity and gene density.
- (iv) RNase H plays a critical role in DNA replication.
- (v) DNA polymerase I is not suitable for replication of *E. coli* genome.

P.T.O.

(b) Name the following :

- (i) Decondensed/relaxed form of genome
- (ii) Enzyme that replicates the ends of eukaryotic chromosomes.
- (iii) Two ends of the broken DNA are joined to each other by misalignment between single strands protruding from the broken ends.
- (iv) Sequences that are hotspots for recombination in *E. coli*.
- (v) Replication inhibitor used as an antiviral agent. 10,5

2. (a) (i) What do you understand by superhelical density ? Discuss with respect to positive and negative supercoiling of DNA.

- (ii) Discuss the Trombone model for coordinating replication.
- (iii) Elucidate a biological role of site-specific recombination.

(b) Discuss the role of the following proteins in DNA replication (any two) :

- (i) Topoisomerase
- (ii) Helicase
- (iii) Primase

(c) Elaborate on the mode of action of these drugs :

- (a) Cisplatin
- (b) Cytosine Arabinoside
- (c) 5-FU
- (d) Azidothymidine. 9,2,4

3. (a) What is the replicon model of Replication Initiation ? Discuss the key features of initiator sequences of Prokaryotes.
- (b) Predict whether the loss of the following *E. coli* genes would lead to lethality. Justify your answer :
- (i) dnaB
 - (ii) recBCB
 - (iii) ruvC.
- (c) A relaxed circular double stranded DNA molecule of 1600 bp is in solution where it has 10 bp per turn. Calculate the linking number (L_0) of this DNA. A DNA topoisomerase introduces 12 negative supercoils in this DNA. What are the values of L, W and T ?
- (d) What are split genes ? What are the advantages of split genes in the eukaryotic genome ? 4,4,3,4
4. (a) Explain the following :
- (i) Direct reversal of DNA damage
 - (ii) The proper structure of the double helix depends on an aqueous environment, but DNA undergoes spontaneous damage from the hydrolytic action of water.
- (b) It is likely that the linear genomes might get shorter after every round of replication. How is this problem overcome in eukaryotes ?
- (c) What are transposable elements ? Comment on different classes of transposable elements. 6,5,4

5. (a) Differentiate between the following :
- (i) Type-I and Type-II topoisomerases
 - (ii) B-DNA and Z-DNA.
- (b) Elaborate the key steps in homologous recombination, elaborating the functions of different participating proteins in a prokaryote.
- (c) Explain how the mismatch repair system operates in prokaryotes.

6,5,4

6. (a) Write short notes on the following :
- (i) Chi sites
 - (ii) SOS response
 - (iii) Ames Test
- (b) What is a replication fork ?. Draw a well labelled diagram of the same, highlighting the function of the major proteins.

9,6

This question paper contains 4 printed pages]

Roll No.

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S. No. of Question Paper : 5582

Unique Paper Code : 2492012402

Name of the Paper : Hormones : Biochemistry and Function

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

Semester : IV

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) Mention the location and function of the following cells :

- (a) Leydig cells
- (b) Zona reticularis cells
- (c) Alpha cells of Islet of Langerhans
- (d) Trophoblastic cells
- (e) PVN.

P.T.O.

(B) Comment on the following :

- (a) Urine of patients with diabetes insipidus contains no sugar.
- (b) Women have relatively higher chances of fractures after menopause.
- (c) Stress can lead to hyperglycemia
- (d) Vitamin D is actually a hormone
- (e) Hyperpigmentation is seen during pregnancy. (5,10)

2. (A) Differentiate between :

- (a) Diabetes mellitus Type I and Diabetes mellitus Type II
- (b) Hyperthyroidism and Hypothyroidism
- (c) Adrenal cortex and Adrenal medulla.

(B) Explain the physiologic basis for administering a posterior pituitary extract to induce or facilitate labour. (12,3)

3. (A) Discuss the regulation of PTH in maintaining calcium homeostasis.

(B) What is Parturition ? Explain the *four* stages of parturition. Explain why Progesterone causes low uterine contraction ? How does increasing Estrogen levels initiate parturition ? Explain the feed forward mechanism that increases strength of uterine contractions.

(C) Draw and explain the action of the Hypothalamic-pituitary axis.

(D) Elaborate upon the type of sexual dysfunction that might arise in men taking drugs that inhibit sympathetic nervous system activity as part of the treatment for high blood pressure ? Explain the biochemical mechanism. (4,4,4,3)

4. (A) List the cause and characteristic symptoms of the following diseases :
- (a) Cushing's syndrome
 - (b) Acromegaly
 - (c) Conn's syndrome
 - (d) Cretinism
 - (e) Dwarfism
 - (f) Graves's disease.
- (B) Tapping the facial nerve at the angle of the jaw in a patient with moderate hyposecretion of a particular hormone elicits a characteristic grimace on that side of the face. What endocrine abnormality could give rise to this so-called Chovstek's sign ? (12,3)
5. Write short notes on :
- (a) Hormone based contraceptives
 - (b) Fight or Flight response
 - (c) RAAS
 - (d) Lactation
 - (e) Regulation of insulin secretion. (3×5=15)

6. (A) Diagrammatically discuss the biosynthesis of thyroid hormone.
- (B) Show the hormonal changes occurring in ovarian and uterine phase during menstruation in a graphical format.
- (C) What actions of growth hormone would induce a full-grown athlete to take supplemental doses of this hormone ? What are the potential detrimental side effects ? (5,6,4)

This question paper contains 3 printed pages]

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S. No. of Question Paper : 5522

Unique Paper Code : 2492012401

Name of the Paper : Metabolism of Amino Acids and Nucleotides

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

Semester : IV

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 any four questions.

All questions carry equal marks.

Question No. 1 is compulsory.

1. (A) Justify the following statements :

- (a) Alanine and glutamine are present in much higher concentrations than any other amino acids.
- (b) Nitrogen fixation is energetically expensive.
- (c) S-adenosyl methionine (SAM) has a higher methyl group transfer potential than N⁵-methyl tetrahydrofolate.

P.T.O.

(d) Branched chain amino acid metabolism is affected by Vitamin B12 deficiency.

(e) dATP is toxic to mammalian cells.

(f) Von Gierke's disease results in hyperuricemia.

(B) Give one significant contribution of the following scientists :

(i) P. Reicherd

(ii) A. Folling

(iii) John Buchanan. (12,3)

2. (A) Write down the role of pyridoxal phosphate in amino acid metabolism.

(B) Differentiate between the following :

(i) Transamination and oxidative deamination

(ii) Positive and negative nitrogen balance

(iii) Carbamyl phosphate synthetase I and II. (6,9)

3. (A) Explain the defective enzyme, biochemical basis and any *two* symptoms of the following metabolic disorders :

(a) Maple syrup urine disease

(b) Alkaptonuria

(c) Lesch Nyhan syndrome

(d) Gout.

(B) Elaborate on the mechanism of nitrogen fixation. (3×4,3)

4. (A) Discuss *four* major biosynthetic reactions which utilize PRPP.
- (B) Write the steps to accomplish the following conversion :
- (i) Methionine to cysteine
 - (ii) Tyrosine to norepinephrine
 - (iii) Glutamate to proline
 - (iv) dUMP to dTTP.
- (C) Explain Purine nucleotide cycle and its significance. (4,8,3)
5. (A) Give the reaction catalyzed by enzyme glutamine synthetase. Explain the regulation of glutamine synthetase by covalent modification.
- (B) List the mode of action of the following inhibitors :
- (a) Allopurinol
 - (b) 5-fluorouracil
 - (c) 6-mercaptopurine
 - (d) Trimethoprim. (7,8)
6. Write short notes on the following :
- (a) Liver as a 'metabolic hub' of our body
 - (b) Inherited defects of urea cycle
 - (c) Salvage pathway of nucleotide biosynthesis. (4,5,6)

This question paper contains 4 printed pages]

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S. No. of Question Paper : **5685**

Unique Paper Code : **2493012005**

Name of the Paper : **Nutritional Biochemistry**

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

Semester : **IV**

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 any *four* questions.

All questions carry equal marks.

Question No. **1** is compulsory.

1. (A) Explain the following terms (any *five*) :

(i) Amino acid imbalance

(ii) RDA

(iii) UL of nutrients

(iv) Calorific value of food

(v) Lipotropic factors

(vi) Artificial sweeteners.

P.T.O.

(B) Give reasons for the following (any *five*) :

- (i) Alcohol isn't a nutrient
- (ii) Vitamin B12 deficiency leads to folic acid deficiency
- (iii) Vitamin E has anti-atherosclerotic properties.
- (iv) It is always advised to take rice along with pulses.
- (v) During convalescence from illness the body has positive nitrogen balance.
- (vi) Respiratory quotient falls in diabetes mellitus. 5,10

2. (A) What is the role of dietary fiber in the following ;

- (i) Colon function
- (ii) Gastric emptying
- (iii) Gut microbiota.

(B) Mention *four* important indices that can be used to assess the quality of protein. Which one is better and why ?

(C) Why is consumption of hydrogenated and reheated oils considered harmful ? What are the recommended proportions of different fatty acids in the diet ? 6,5,4

3. Differentiate the following (any *five*) :

- (A) Lactose intolerance and gluten intolerance
- (B) Positive nitrogen balance and negative nitrogen balance
- (C) Wet Beri-beri and Dry Beri-beri
- (D) Macrocytic anemia and Megaloblastic anemia
- (E) Essential fatty acid and Non-essential fatty acid
- (F) Prebiotics and Probiotics.

3×5=15

4. (A) Discuss the factors affecting the bio-availability and absorption of calcium in the gastrointestinal tract. What would be the effects of having excess calcium in the diet ?

(B) A chocolate has a glycemic index of 62 and the carbohydrate content is 40 gm whereas watermelon has a glycemic index of 80 and contains about 7 gm carbohydrate. Calculate and compare the glycemic load of the two food items. Also discuss the utility of GI and GL in dietary management of diabetics.

(C) Discuss the consequences of the following :

- (i) Low protein diet
- (ii) High protein diet
- (iii) Vegan diet.

6,3,6

P.T.O.

5. (A) Define BMR. Discuss the various factors affecting the BMR.
- (B) Discuss the deficiency and clinical signs in the following cases :
- (i) Marasmus
 - (ii) Pellagra
 - (iii) Wilson's diseases
 - (iv) Rickets
 - (v) Keshan disease. 5,10
6. (A) Mention the significance of the following reactions inside the body :
- (i) Gamma-carboxylation by Vitamin K
 - (ii) Post-translation modification of proteins by vitamin C
 - (iii) One-carbon metabolism by folic acid.
- (B) Discuss the Muscosal Block theory for regulation of iron absorption.
- (C) What do you mean by thermogenic effect of food (TEF) ? How does the meal composition influence the TEF ? 6,6,3

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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]

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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.

(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 4 printed pages.]

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.**

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.

This question paper contains **3** printed pages]

Roll No.

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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