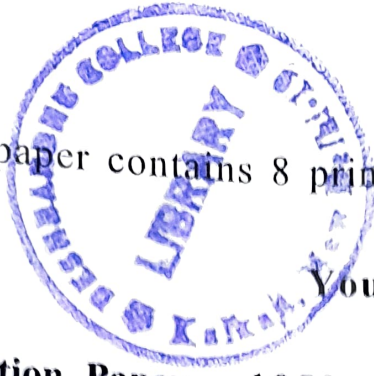


[This question paper contains 8 printed pages.]



Your Roll No.....

Sr. No. of Question Paper : 1052

I

Unique Paper Code : 2492013501

Name of the Paper : Molecular Cell Biology

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

Semester : V

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 statements (Any FOUR) :

- (i) Steroid hormones can act as transcription regulators.
- (ii) Mutation in *KDEL* sequence of a resident ER protein may lead to its loss from the cell.
- (iii) Cancer patients undergoing chemotherapy often need bone marrow transplantation.
- (iv) DAG and IP_3 act as second messengers.
- (v) Pre-sequences of mitochondrial proteins are positively charged whereas the transit peptides of chloroplast proteins are not.

(b) Discuss the contribution of following scientists :

- (i) Tim Hunt

(ii) Gunter Blobel

(iii) Yoshio Masui and Clement Markert

(c) Write the biological functions of the following proteins :

(i) SNARE

(ii) PDE

(iii) STAT

(iv) Caspases

(8,3,4)

2. (a) Explain the structure of G-protein coupled receptors and their mechanism of action with an example. How does intake of caffeine affect GPCR signaling?

(b) Comment on the following :

(i) Conventional chemotherapeutic drugs usually target all dividing cells, leading to common side effects like hair loss, nausea, and vomiting whereas oncogene- targeted drugs specifically act against cancer cells.

(ii) Treatment of cells with a drug that makes membranes permeable to protons, affect the function of lysosomes.

(c) Describe the events by which APC/c promotes the separation of sister chromatids at anaphase.

(6,4,5)

3. (a) Predict the effects of the following mutations on the ability of the cell to undergo apoptosis:

- (i) Mutation in Bad such that it cannot phosphorylate protein kinase B.
 - (ii) Mutation in Bax such that it cannot form dimers.
 - (iii) Mutation in adaptor proteins such that it cannot form dimers.
 - (iv) Overexpression of Bcl-2.
- (b) Explain the process of N-linked glycosylation of a secretory glycoprotein. What is the role of Dolichol phosphate in the synthesis of membrane glycoproteins?
- (c) Explain the molecular mechanism that leads to cancer when Rb protein and p53 protein are inactivated by mutation. (4,6,5)

4. (a) Elaborate on the four major mechanisms of regulation of CDK activity during the cell cycle.

(b) Write the mechanism of action of the following drugs/inhibitors:

A. Chemotherapeutic drugs :

(i) *Herceptin* and

(ii) *Imatinib*

B. Inhibitors of intracellular signaling :

(i) *Sildenafil* and

(ii) *Phorbol esters*

(c) Explain the role of CDK2/cyclin-A complex in ensuring that the DNA is replicated only once per cell cycle in the S-phase. (5,4,6)

5. (a) With the help of diagram, explain the following :
- (i) Role of BiP in post-translational translocation of protein into the ER lumen
 - (ii) Nitric oxide signaling cascade leading to vasodilation
- (b) How do ATR and ATM proteins regulate the DNA damage checkpoint of the cell cycle?
- (c) What is oncogene addiction? Why is this concept important for selecting molecular targets for cancer therapy? (6,5,4)
6. (a) Explain with a diagram, the steps involved in the progression of a genetically altered cell into a cancerous cell.
- (b) Explain the differences between the process of autophagy and necrosis.

- (c) Explain the Ras/MAPK signaling pathway and its activation. How does the dysregulation of this pathway lead to cancer? (5,4,6)

[This question paper contains 12 printed pages.]



19 Dec. 2024

Your Roll No.....

Sr. No. of Question Paper : 1090

I

Unique Paper Code : 2492013502

Name of the Paper : Concepts of Genetics and Evolution

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

Semester : V

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 **four** questions.
4. Q. No. 1 is compulsory.
5. All questions carry equal marks.

P.T.O.

1. (a) Give **one** word for the following :

- (i) A gene present on Y chromosome responsible for a human embryo to develop as a male.
- (ii) An allele that causes death frequently at an early developmental stage, resulting in missing of one or more genotypes as well as phenotypes of a cross.
- (iii) The test/tool used for analyzing genetic crosses in which one individual of unknown genotype is crossed with another individual with a homozygous recessive genotype for the trait in question.
- (iv) The phenomenon responsible for appearance of white-eyed females and red-eyed males in the F₁ progeny of *Drosophila* flies in a cross between a white-eyed female and a red-eyed male.

- (v) A short stretch of DNA that has a higher frequency of methylation of cytosine than the rest of the genome as represents an epigenetic mark.
- (vi) A method for estimating the age of evolutionary divergence between two species by comparing the differences in mutation rate in their DNA or protein sequences.
- (vii) A condition in which the heterozygous genotype has a higher relative fitness than either the homozygous dominant or homozygous recessive.
- (viii) A region of DNA that is shown to statistically be associated with a specific phenotype or trait that shows polygenic and continuous variation within a population.
- (ix) A phenomenon in genetics where one or more genes modify or mask the expression of another gene

- (x) The situation that occurs when one copy of a gene is inactivated or deleted and the remaining functional copy of the gene is not adequate to show the complete phenotype.
- (xi) A condition where an organism has both male and female reproductive organs
- (xii) A technique used to study genetic linkage in fungi and other lower eukaryotes which can define the position of the centromere in a chromosome.

(b) Comment on the following statements :

- (i) In the experiments conducted by Carl Correns on *Mirabilis jalapa*, the variegated branch produce progeny with three different phenotypes.
- (ii) Bridges experiment was conclusive proof for the chromosomal theory of inheritance.

- (iii) In a dihybrid cross a ratio of 9:3:3:1 can be both a Mendelian as well as Non-Mendelian inheritance.
- (iv) Recombination frequency cannot exceed 50%.
- (v) Complementation tests are used to identify gene interactions.
- (vi) Genetic imprinting is an example of a nonrandom monoallelic expression.

(6,9)

2. (a) Differentiate between :

- (i) Uniparental inheritance and uniparental disomy.
- (ii) Continuous and discontinuous variation
- (iii) Hemizygous and heterozygous
- (iv) Incomplete dominance and codominance
- (v) Chromosomal sex determination and genic sex determination

(vi) Pre and post reproductive isolation

(b) Albinism in humans is a recessive condition. What would be the probability of two out of the five children having albinism if both of their parents are carriers? (12,3)

3. (a) What is dosage compensation? Differentiate between the dosage compensation mechanism in humans and *Drosophila*.

(b) With a suitable example explain how the alleles encoding different traits separate independently. Show the genotypes as well as phenotypes.

(c) Two plants with white flowers, each from true breeding strains, were crossed. All the F1 plants had red flowers. When these F1 plants were intercrossed, they produced F2 plants consisting of 177 plants with red flowers and 142 with white flowers. (i) Propose an explanation for inheritance of flower color in this plant species and (ii) Propose a biochemical pathway for this flower pigmentation.

- (d) A color blind man married a homozygous normal woman. After 2 years they had 2 children but unfortunately, they both had Turners syndrome, although one had normal vision the other was colorblind. What accounts for this situation.

(6,3,3,3)

4. (a) The first chromosome to be mapped is the X chromosome of *Drosophila*. Why does mapping the X chromosome not require a tester while for an autosomal map a test cross is essential? What do you understand by the terms map function and Lod score?

- (b) What are different modes of speciation? Explain.

- (c) Four alleles of the Agouti gene are known to control coat colour in mice. The alleles form a dominance series $A_y > A > a_1 > a$. A researcher investigating mouse genetics traps a wild male mouse showing yellow coat colour. If the wild mouse's coat is due to A_y , describe and explain a single mating experiment that would identify the other Agouti allele.

(d) What is somatic cell hybridization? The following data shows different cell lines which were created from human mouse somatic cell fusions. Each line was examined for the presence of human chromosomes and for the production of human haptoglobin. The following results were obtained:

Cell line	Homan haptoglobin	Human chromosomes						
		1	2	3	14	15	16	21
A	—	+	—	+	—	+	—	—
B	+	+	—	+	—	—	+	—
C	+	+	—	—	—	+	+	—
D	—	+	+	—	—	+	—	—

Based upon the data, locate haptoglobin gene to its respective chromosome and justify your answer. (4,4,3,4)

5. (a) In *D. melanogaster*, cherub wings (*ch*), black body (b). and cinnabar eyes (*cn*) result from recessive alleles that are all located on chromosome 2. A homozygous wild-type fly was mated with a cherub,

black, and cinnabar fly, and the resulting F_1 females were test-crossed with cherub, black, and cinnabar males. The following progeny were produced from the testcross :

ch	b^+	cn	109
ch^+	b^+	cn^+	757
ch^+	b	cn	45
ch^+	b^+	cn	7
ch	b	cn	761
ch	b^+	cn^+	45
ch^+	b	cn^+	105
ch	b	cn^+	8

- (i) Determine the order of the genes on the chromosome. Justify which gene is in the middle.
- (ii) Calculate the distance between the three loci.

- (iii) Determine the coefficient of coincidence and the interference for these three loci.
 - (iv) What does the interference tell us about the effect of one crossover on another?
- (b) Differentiate between sex determination in humans and *Drosophila*.
- (c) What is Broad-sense heritability and how does it differ from Narrow-sense heritability? A study of quantitative variations for abdominal bristle number in female *Drosophila* yielded estimates of $V_T = 7.08$, $V_g = 4.17$, and $V_e = 2.91$. Calculate broad-sense heritability from the given data?
- (7,5,3)
6. (a) What is the probability of getting a female with pattern baldness from a bald man and a heterozygous normal female? (Pattern Baldness trait is sex influenced) If a man shows pattern baldness and his father is not bald, what are the possible genotype(s) of the mother? If a woman's

parents are not bald, she is not bald, and her husband and older daughter are both homozygous for pattern baldness, then what is the genotype of both the woman and her parents? What is the probability that the woman and her husband would have the bald daughter.

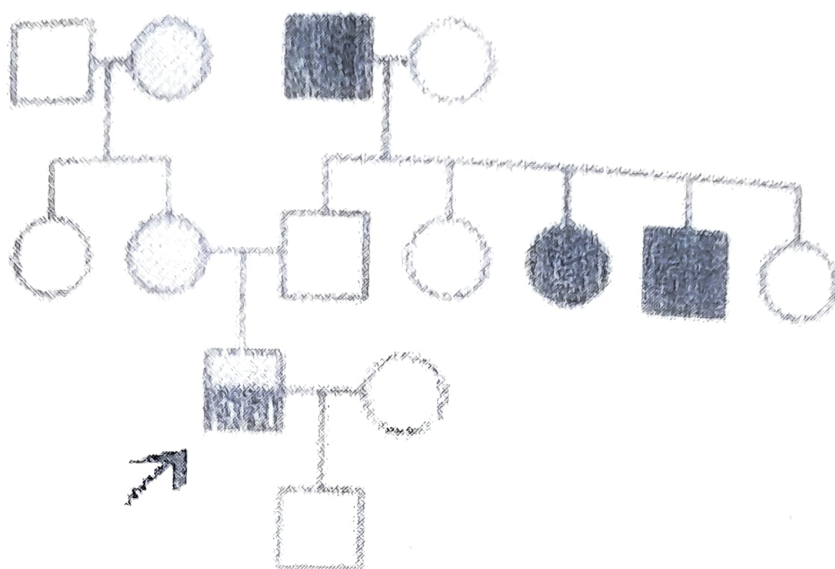
- (b) In the following pedigree, the individual 1-2 and her daughter are suffering from an autosomal dominant condition Neurofibromatosis(n) and individual 1-3 and his two children are suffering from a rare autosomal dominant condition (d) and individual III-1 is suffering from both conditions. If the penetrance of n is 0.5 and the penetrance of d is 0.8. Based on the above, answer the following :

What is penetrance? How is it different from variable expressivity?

What is the probability that the IV-1 would be suffering from both condition.

What does the arrow represent? Explain.

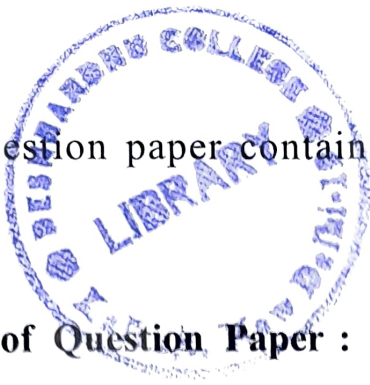
What is the genotype of the parents in Generation 1?



- (c) What is maternal effect? The shell coiling in snail is a maternal effect. A snail produced by a cross between two individuals has a shell with a dextral (right-handed) coil. This snail produces only sinistral (left-handed) progeny on selfing. What are the genotypes of the snail and its parents?

(5,5,5)

[This question paper contains 4 printed pages.]



24/12/24

Your Roll No.....

Sr. No. of Question Paper : 1109

I

Unique Paper Code : 2492013503

Name of the Paper : Gene Expression and Regulation

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

Semester : V

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. Question No. 1 is compulsory.

1. (a) Briefly explain the function of following proteins/terms :

(i) Abortive transcription

(ii) CAP

P.T.O.

- (iii) RNA Pol III
 - (iv) EF-Tu
 - (v) RISC
 - (vi) Polycistronic mRNA
 - (vii) Enhancers
 - (viii) Insulators
 - (ix) Mediator complex
 - (x) Release factors
- (b) Briefly explain the following statements :
- (i) RNA polymerase core enzyme is catalytically active but non-specific.
 - (ii) Transcriptional regulation in eukaryotes is primarily positive. (10,5)

2. Differentiate between the following (**any 5**) :

- (a) Group I and Group II introns
- (b) Rho dependent and independent transcription termination.

(c) RNA Pol I and RNA Pol II

(d) Transcription and Replication

(e) siRNA and miRNA

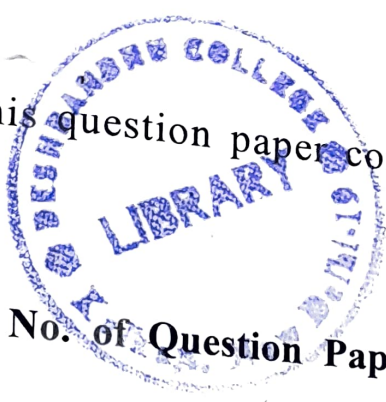
(f) Lac Repressor and Trp Repressor (15)

3. (a) What are the different consensus sequences in the promoter region of prokaryotes and eukaryotes? Explain with the help of a diagram.
- (b) You are provided with two proteins (X and Y), one of which can potentially bind onto the promoter sequence of gene Z and help RNA polymerase in regulating gene expression. Describe a technique with which you can confirm which one out of X and Y does bind to the promoter sequence.
- (c) Briefly explain how mRNA ends are processed with the help of a diagram. (5,4,6)
4. (a) Diagrammatically explain how one eukaryotic gene can give rise to two functional proteins.
- (b) Explain the phenomena of attenuation with the example of the Trp operon in bacteria.

- (c) Discuss the importance of GTP in the translation process. Explain how tRNA synthetases play the most crucial roles in determining the fidelity of translation. (4,6,5)
5. (a) Discuss the salient features of the Genetic code.
- (b) Explain four mechanisms by which eukaryotic repressors repress transcription.
- (c) Write the mechanism of action of the following :
- (i) Rifampicin
 - (ii) α - Amanitin
 - (iii) Puromycin
 - (iv) Actinomycin D (5,6,4)
6. Write short notes on the following :
- (a) DNA binding domains
 - (b) Spliceosome
 - (c) Sigma Factor
 - (d) Regulation of Gal genes in Yeast
 - (e) Histone modifications (15)

[This question paper contains 8 printed pages.]

01/01/2025 R



Your Roll No.....

Sr. No. of Question Paper : 1169

I

Unique Paper Code : 2493010006

Name of the Paper : Biochemical Applications in
Forensic Sciences

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

Semester : V

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) Discuss the methods used for identification/ collection of following items at crime scene.

(i) Latent blood

(ii) To differentiate pigment and dye

(iii) Latent fingerprints

(iv) Shoe print in mud

(v) A smudged hand written document on the table

(vi) Tire marks in soft earth

(b) Expand the following and their significance in crime investigation (**any five**) :

(i) RFLP

(ii) NHRC

(iii) CODIS

(iv) AFIS

(v) STR

(vi) EEG

(10,5)

2. (a) Discuss the appearance and causes of Cast-off spatter, Impact spatter, and Arterial Spray Spatter form during a crime.
- (b) List several skeletal features that can be used to estimate adult age when growth and tooth eruption processes have ended.
- (c) Discuss the principle of Brain Mapping and give its significance in forensic science. (6,4,5)
3. (a) Describe two methods for drug screening and mention disadvantages of each in forensic biology.

(b) Discuss the one method for development of following fingerprints from crime scene :

(i) Patent

(ii) Plastic

(iii) Latent

(c) Distinguish between polygraph and narco-analysis tests. (5,6,4)

4. (a) What are the different approaches that can be used to recover original writing in the following cases :

(i) The document obliterated with a different ink than that composed the original.

(ii) The document demolished by chemical erasure.

(iii) The document has been charred or burned.

(iv) Recovery of indented writing

(b) Discuss the use of DNA profiling technology and facial reconstruction methods in identification of victims of mass disaster such as, plane crash.

(c) Write down the one method in each case for analysis of following body fluids available at crime scene :

(i) Blood

(ii) Saliva

(iii) Vaginal fluid

(iv) Semen

(v) Urine

(4,6,5)

5. (a) Differentiate between the following :

(i) Manual strangulation and ligature strangulation.

(ii) Presumptive and confirmatory test

(iii) RFLP and STR

(b) Rigor mortis, livor mortis, and algor mortis are used to help determine time of death. Discuss the relevance of each method along with one condition that would render that method unsuitable or inaccurate for determining time of death.

(c) Discuss the important information that can be derived from following parts of hair during forensic investigation :

(i) Cortex

(ii) Medulla

(iii) Cuticle

(6,6,3)

6. (a) Define food adulteration. What are the common food adulterants present in milk, spices, ghee and sugar? How are they tested?
- (b) A woman reported that she was attacked by a masked assailant while she was walking back to home in the night. In this encounter, she scratched the arm of the assailant with her hand. The victim was not sure if the attacker was male or female. Forensic DNA analysts extracted and amplified the amelogenin gene from the epithelial cells under the victim's fingernails (supposedly belonging to the attacker) and from a buccal swab of the victim. Given below is the picture of the samples separated by gel electrophoresis. The victim's amelogenin DNA is in lane 2, and the amelogenin DNA from the fingernail scraping is in lane 4. What conclusion can you draw about the attacker from this result?



(c) Discuss the applications of following Biochemical techniques in forensic investigation.

(i) PCR

(ii) TLC

(iii) GCMS

(4,2,9)

[This question paper contains 4 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 5920

I

Unique Paper Code : 32497901

Name of the Paper : Nutritional Biochemistry

Name of the Course : **B.Sc. (H) Biochemistry (LOCF)**

Semester : V

Duration : 3 Hours

Maximum Marks : 75

Instructions for Candidates

1. Write your Roll No. on the top immediately on receipt of this question paper.
2. There are **8** questions.
3. Attempt any **5** questions.
4. **All** questions carry equal marks. Question No. **1** is compulsory.

1. (a) Give the full form and explain the significance of following terms :

(i) BV

P.T.O.

- (ii) RDA
- (iii) EFA
- (iv) SDA
- (v) SCFA
- (vi) GTT

(b) Briefly comment on any 2 of the following :

- (i) Role of Calcium and vitamin D in achievement of peak bone mass.
- (ii) Vitamin C as a cofactor in amino acid modification.
- (iii) Energy content of carbohydrates rich foods needs to include dietary fibre values.

(1.5×6=9, 2×3= 6)

2. Differentiate between on any 5 of the following :

- (a) Essential and non-essential amino acids
- (b) Macrocytic and pernicious anaemia
- (c) Saturated and unsaturated fatty acids
- (d) Marasmus and Kwashiorkor
- (e) Glycemic index and Glycemic load
- (f) Rickets and Osteomalacia

(5×3=15)

3. Give the basis for following statements :

- (a) Calcium promotes Blood clotting.
- (b) Copper deficiency leads to hypopigmentation.
- (c) Vitamin E as an antioxidant.
- (d) '4 Ds' in relation to Niacin.
- (e) Fluoride prevents dental caries.
- (f) Eating raw egg can cause biotin deficiency
(6×2.5=15)

4. (a) Give the medicinal properties of the following foods :

- (i) Asafoetida (ii) Cumin
- (iii) Ginger (iv) Turmeric
- (v) Garlic

(b) How nutrient interactions affecting ADME of drugs? Explain with suitable examples.

(2×5=10,5)

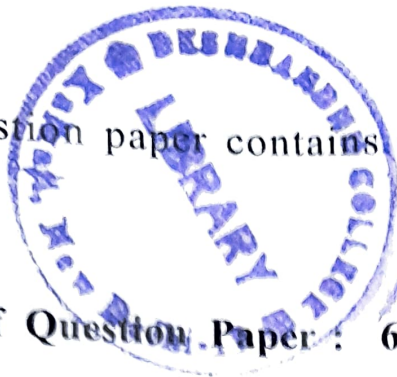
5. Critically evaluate the RDA for any 3 of the following nutrients :

- (a) Iron for pregnant and lactating women
- (b) Vitamin A for adult men
- (c) Iodine for children
- (d) Niacin for adult men

(5×3=15)

6. (a) What is omega fatty acids? What is the significance of omega 3 /omega 6 ratio for human health? Mention their sources and RDA value for adult men and women.
- (b) Define BMR? Write about the factors that affects the BMR?
- (c) What is anemia? What are different types of anemia caused by nutritional deficiencies. (5,4,6)
7. Write short notes on the following :
- (a) Role of Gut microbiome in Human health.
- (b) Role on Unsaturated fatty acids in risk of cardiovascular diseases.
- (c) Nitrogen Balance.
- (d) Vitamin A toxicity.
- (e) Drug induced nutrient deficiency. (5×3=15)
8. Give the significance of following assessments :
- (a) Anthropometric measurement
- (b) ROS Assessment
- (c) Dietary intake assessment
- (d) Glycosylated Hb (4,4,4,3)

[This question paper contains 4 printed pages]



28/12/24
Your Roll No.....

Sr. No. of Question Paper : 6034

I

Unique Paper Code : 32497901

Name of the Paper : Nutritional Biochemistry

Name of the Course : **B.Sc. (H) Biochemistry
(LOCF)**

Semester : V

Duration : 3 Hours

Maximum Marks : 75

Instructions for Candidates

1. Write your Roll No. on the top immediately on receipt of this question paper.
2. There are **8** questions.
3. Attempt any **5** questions.
4. **All** questions carry equal marks. Question no. **1** is compulsory.

1. (a) Define the following :

- | | |
|----------------------|-------------------|
| (i) BMR | (ii) UL |
| (iii) RNI | (iv) TEF |
| (v) BV | (vi) SDA |
| (vii) SCFA | (viii) Prebiotics |
| (ix) Calorific value | (x) ROS |

P.T.O.

(b) Justify the following :

(i) GTT curve is affected in a diabetic as opposed to a normal person.

(ii) PUFAs exhibit an anti-atherogenic effect.

(10, $2.5 \times 2 = 5$)

2. (a) How does phosphorus affect calcium homeostasis?

(b) Discuss any three functions of ascorbic acid in the body ?

(c) Discuss the biochemical basis for the medicinal properties of turmeric and garlic. (5,5,5)

3. (a) What are the types of dietary fiber. Explain the physiological role of dietary fiber.

(b) Define glycemic index and glycemic load. Explain why though watermelon and chocolate pie both are high glycemic index foods but glycemic load varies considerably for both?

(c) What are the essential and non-essential fatty acids? What are the harmful effects of trans fatty acids? (5,5,5)

4. (a) Define amino acid antagonism and explain the biochemical basis with two examples.

- (b) What are essential and conditionally essential amino acids? Discuss the various nutritional indices used to assess the quality of dietary proteins and which amongst them is most preferred.
- (c) Explain the doubly labelled water (DLW) method for measuring energy expenditure. (5,5,5)

5. Differentiate between **Any 3** :

- (a) Marasmus and Kwashiorkor.
- (b) Plant-based proteins and animal-based proteins.
- (c) Fat soluble versus water soluble vitamins.
- (d) Anthropometric assessment and Clinical assessment. (5, 5, 5)

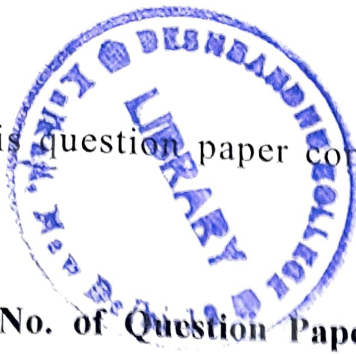
6. Write short notes on :

- (a) Wald's visual cycle
- (b) Hypervitaminosis
- (c) Nitrogen balance (5,5,5)

7. (a) Discuss the physiological role and the deficiency manifestations of vitamin K.

- (b) Discuss the dietary absorption of vitamin B12. What happened in case of pernicious anemia? Suggest a suitable treatment approach for the same.
- (c) Why are alcoholics more prone to thiamine deficiency? (6,6,3)
8. (a) Discuss the synergistic role of vitamin E and selenium.
- (b) Mention the cause of the following :
- (i) Keshan Disease
 - (ii) Menke's Disease
 - (iii) Wilson's disease
 - (iv) Pellagra
 - (v) Rickets
- (c) Discuss the physiological role of magnesium and the biochemical basis of the symptoms that occur because of the deficiency of magnesium. (5,5,5)

[This question paper contains 4 printed pages.]



26/12/24
Your Roll No.....

Sr. No. of Question Paper : 6035

I

Unique Paper Code : 32497906

Name of the Paper : Advanced Cell Biology

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

Semester : V

Duration : 3 Hours

Maximum Marks : 75

Instructions for Candidates

1. Write your Roll No. on the top immediately on receipt of this question paper.
2. There are **8** questions.
3. Attempt any **5** questions.
4. **All** questions carry equal marks. Question no. **1** is compulsory.

1. (a) Explain the following terms :

- (i) Caspases
- (ii) Karyopherin
- (iii) Quiescent Cell

P.T.O.

- (iv) Glycocalyx
- (v) Protooncogene

(b) State true/false and justify your answer.

- (i) Carbohydrate groups of glycoproteins are always exposed on the surface of the cell.
- (ii) Apoptosis does not harm nearby cells whereas necrosis does.
- (iii) Ran GTP concentration is higher in nucleus than in cytoplasm.
- (iv) Phosphorylation of CDK 1 at threonine 161 is required for its activity.
- (v) Phosphatidylserine is mainly present on inner leaflet of plasma membrane. (5,10)

2. Differentiate between the following :

- (a) Microtubule and Microfilament
- (b) Autophagy and Phagocytosis
- (c) Tumor suppressor genes and Oncogenes
- (d) Actin network and actin bundles
- (e) Apoptosis and Necrosis

(3×5=15)

3. (a) Explain the mechanism of COP II mediated selection and transport of cargo protein from ER.
- (b) How does p53 activation in response to DNA damage affect cell cycle progression?
- (c) How is the import and export of nuclear protein regulated? (5,5,5)
4. (a) What types of proteins are encoded by proto-oncogenes and how do mutations in each type of proto-oncogene cause cell to become malignant.
- (b) What is unfolded protein response (UPR)? Explain in detail the molecular mechanism of UPR pathways.
- (c) What are the potential advantages of embryonic stem cells as compared to adult stem cells for therapeutic application? (5,5,5)
5. (a) How does the cytoskeleton contribute to cell division?
- (b) What are the hallmarks of transformed (Cancer) cells?
- (c) Explain with the help of a flow diagram the cotranslational pathway of protein synthesis. (5,4,6)

6. (a) Describe the experiment used to identify MPF.
(b) What is treadmilling? How would cytochalasin and phalloidin affect treadmilling of actin filaments?
(c) Describe the molecular strategies to treat cancer.
(6,5,4)
7. (a) Mention the subcellular location and function of the following proteins :
(i) Bip
(ii) Mannose 6-P Receptor
(iii) Signal Peptidase
(iv) Catalase
(v) Cytochrome C
(b) Explain the mechanism of spindle assembly checkpoints.
(10,5)
8. Write short notes on following :
(a) Actin Binding Proteins
(b) Regulation of Meiosis
(c) Role of Bcl2 family proteins in apoptosis (5,5,5)