

Human Physiology (P.G.)

[CBCS]

M.Sc. Third Semester End Examination-2023

(Regular & Supplementary Paper)

PAPER-301

Full Marks: 40

Time: 02 Hrs

The figures in the right hand margin indicate full marks

Candidates are required to give their answers in their own words as far as practicable

Illustrate the answers wherever necessary

[Use separate answer script for each unit]

Unit – 23

[CELLULAR & MOLECULAR PHYSIOLOGY]

[F.M. – 20]

1. Answer any two questions from the following: **2x2= 4**
- a) What are 'Lamp brush Chromosome'? **2**
 - b) What is meant by C value and K-value paradise? **1+1**
 - c) State the function of iRNA. **2**
 - d) Name two syndromes caused by chromosomal aberrations. **1+1**

(2)

2. Answer any two questions from the following: 2x4 = 8

- a) What are chromatin and heterochromatin? Explain how DNA methylation and histone acetylation regulate gene expression? 2+2
- b) "DNA has high fidelity" – Explain the system responsible for it. 4
- c) Explain the process of Lariat formation in mRNA in eukaryotes. 4
- d) How does transcription termination occur in bacteria by Rho-dependent and Rho-independent mechanism? 2+2

3. Answer any one question of the following: 1x8 = 8

- a) What is genetic code? Explain the organization and function of an inducible operon system with a suitable diagram. 2+2+2+2
- b) i) Differentiate between germ cell mutation and somatic cell mutation. 4
- ii) Explain the role of RNA polymerase in the process of transcription in eukaryotes. 4

Unit – 24

[HUMAN GENETICS]

[F.M. – 20]

1. Answer any two questions from the following: 2x2= 4

- a) Write the role of cytochrome P-450 in Xenobiotics. 2

(3)

- b) What is aneuploidy? 2
- c) Explain about the law of dominance. 2
- d) Mention the process for development of tissue specific polyploidy. 2

2. Answer any two questions from the following: 2x4 = 8

- a) i) Explain how does point mutation affect the phenotype. 2+2
- ii) Write down the role of suppressor mutation. 2+2
- b) Define chromosomal non-dysjunction. How can you explain the "Down syndrome genotype" in reference with the chromosome 21 in human? 1+3
- c) What are oncogenes? Write about tumour suppressor genes. 2+2
- d) Calculate the allele and genotype frequencies for Haemoglobin variants among Nigerians where multiple alleles are present.

Haemoglobin Genotypes 2+2

AA	AS	SS	AC	SC	CC	Total
2017	783	4	173	14	11	3002

3. Answer any one question of the following: 1x8 = 8

- a) i) What makes cystic fibrosis a genetic disease?
- ii) How is cystic fibrosis treated?
- iii) Define genetic diversity.

(4)

- b) Five bacterial strains of some species were isolated which are auxotrophs for thymine. They were identified by mutation. Each was tested separately for growth on four known precursor of thymine. In the given figure a '+' sign indicates growth of that mutant strain in the presence of the specific added molecule and a '-' sign indicates failure of that mutant to grow.

Mutant	Precursor or Product				
	A	B	C	D	Thymine
1	+	-	+	-	+
2	-	-	+	-	+
3	+	+	+	-	+
4	+	+	+	+	+
5	-	-	-	-	+

Assuming a starting point of the pathway estimate the mutation point and put down the probable reaction sequence. What type of segregation has taken place in the pedigree below –

