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11/12/2018

5M

This question paper contains 4 printed pages.

Your Roll No.

No. of Ques. Paper: 128

I

Unique Paper Code : 32231501

Name of Paper : Molecular Biology

Name of Course : B.Sc. (Hons.) Zoology

Semester : V

Duration : 3 hours

Maximum Marks : 75

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

*Attempt five questions in all, including Q. No. 1 which
is compulsory. Illustrate answers with appropriate
well-labelled diagrams wherever necessary.*

(a) Define the following terms (any five):

- (i) Nonsense codons
- (ii) Polymerase switching
- (iii) Enhancers
- (iv) Replicator
- (v) Base flipping
- (vi) Helix pitch
- (vii) Exon shuffling.



5

(b) Differentiate between the following (any five):

- (i) Nucleotide and Nucleoside

P. T. O.

- (ii) B-DNA and Z-DNA
- (iii) Deamination and Depurination
- (iv) DNA pol α and DNA pol ϵ
- (v) *miRNA* and *siRNA*
- (vi) Promoter and Operator
- (vii) A-site and P-site. 10
- (c) State the best known contribution of the following scientists:
- (i) Theodor Svedberg
- (ii) Robert William Holley
- (iii) Andrew Z. Fire and Craig C. Mello
- (iv) Roger Kornberg
- (v) Phillip A. Sharp. 5
- (d) Give the functions of the following enzymes:
- (i) Peptidyl transferase
- (ii) Topoisomerase
- (iii) Methyl transferase
- (iv) Primase. 4
- (e) (i) Write the RNA transcript sequence of the following DNA template:
5'-AGCTGCGCGTAGCTATGGCCCAAGG-3'
- (ii) If 39% of the nucleotides in a DNA fragment are thymidine, calculate the percentage of rest of the three nucleotides in the fragment. $1.5 \times 2 = 3$



2. (a) Briefly describe the process of aminoacyl-tRNA formation. 5
- (b) With the help of diagram explain the spliceosome-mediated splicing mechanism. 7
3. (a) What is Chargaff's rule of nucleotide base-pairing? What features make DNA a highly stable molecule? 4
- (b) Discuss the mechanism of DNA-replication in eukaryotes explaining the role of various enzymes involved. 8
4. (a) Give a suitable example of negatively regulated operon in prokaryotes. 6
- (b) Briefly describe the role of various transcription elongation factors in eukaryotes. 6
5. (a) Explain the steps involved in 5' mG capping and polyadenylation of an RNA transcript in eukaryotes. 6
- (b) Describe different mechanisms of transcription termination in prokaryotes. 6
6. (a) What is wobble hypothesis? List the salient features of the genetic code. 6
- (b) Explain the mechanism of mismatch repair of DNA so as to maintain the cell functionality. 6

SM

7. Write short notes on any *three* of the following:

- (a) RNA polymerases in Eukaryotes
- (b) Attenuation
- (c) Release factors in translation
- (d) Riboswitches
- (e) Alternative splicing.

3×4=12



12/12/2018

6

This question paper contains 5 printed pages.

96

Your Roll No.

Sl. No. of Ques. Paper: 129

I

Unique Paper Code : 32231502

Name of Paper : Principles of Genetics

Name of Course : B.Sc. (H) Zoology

Semester : V

Duration : 3 hours

Maximum Marks : 75

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

Attempt five questions, including
Question No. 1, which is compulsory.

Simple non-programmable calculators are allowed.

1. (i) Define the following terms (any five):

- (a) Proband
- (b) Hemizygous
- (c) Episome
- (d) Pleiotropy
- (e) Tautomers
- (f) Chiasma.



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(ii) Differentiate between the following (any four):

- (a) Sexduction and Transduction
- (b) Reciprocal cross and Test cross

P. T. O.

- (c) Continuous and Discontinuous variation
 (d) Composite and Non-composite transposons
 (e) Cis and Trans phase. 8

(iii) Mention the contribution of following geneticists (any five):

- (a) Barbara McClintock
 (b) Bernard Davis
 (c) Joshua Lederberg
 (d) G. Karpechenko
 (e) Curt Stern
 (f) Alfred Sturtevant. 5



(iv) Justify the following statements (any two):

- (i) Y-chromosome does not determine sex in *Drosophila*.
 (ii) Humans with blood group O negative are universal donors.
 (iii) A *Neurospora* poky female crossed with a wild type male will produce all poky progeny. 3

- (v) (a) A cross between Red and White coloured flowers of a hypothetical plant results in 64 progenies in F₂ generation. Out of these 64, one plant has white flowers. If flower colour in this plant shows polygenic inheritance, calculate the number of genes that are involved in deciding the flower colour.

- (b) How many chromosomes would be found in somatic cells of an allotetraploid derived from two plants, one with $N=7$ and the other with $N=10$? 4

(vi) Expand the following abbreviations:

- (a) QTL
 (b) Hfr
 (c) HGPRT
 (d) SRY. 2



2. (i) State the Mendelian postulates and add a note on the reasons for success of his work. 4
 (ii) How do epistatic interactions modify the Mendelian dihybrid ratio? Explain with suitable examples. 8
3. (i) Give an experimental proof for cytological basis of crossing over. 5
 (ii) In *Drosophila*, three genes are linked in one chromosome. Assume one parent is dominant and the other one is recessive. In a test cross, the following results were obtained:

XYZ	225
xyz	245
xYZ	14
Xyz	16
xYz	98

XyZ	102
XYz	144
xyZ	156
Total	1000

- (a) How do you say that these genes are linked?
- (b) What is the order of genes?
- (c) Determine the map distance and construct the chromosomal map.
- (d) Calculate the coefficient of co-incidence and interference. $1+2+2+2=7$
4. (i) Briefly discuss the various types of chromosomal structural aberrations. 8
- (ii) Explain the molecular basis of mutations caused by UV rays. 4
5. (i) Explain the use of interrupted mating technique in bacterial chromosomal mapping using selected strains, genetic markers and nutrient media. 8
- (ii) Three mouse-human cell lines were scored for the presence (+) or absence (-) of human chromosomes, with the results as follows:

Clone	Human Chromosomes							
	1	2	3	4	5	14	15	18
A	+	+	+	+	-	-	-	-
B	+	+	-	-	+	+	-	-
C	+	-	+	-	+	-	+	-

If a particular gene is located on chromosome 3, which clones should be positive for the enzyme from that gene? 4

6. (i) What are P elements? Comment on their significance. 4
- (ii) Write a note on sex-influenced traits with suitable examples. 4
- (iii) Explain Benzer's complementation test in bacteriophages and give its significance. 4
7. Write short notes on any three:
- (i) CIB method for detection of mutation
- (ii) Dosage compensation in humans
- (iii) Extra-chromosomal inheritance in *Paramecium*
- (iv) Retrotransposons. 4+4+4



Sl. No. of Q.P.: 1683

SET 1

7

Unique paper Code:

223501

Name of the paper:

Immunology

Name of the Course:

B.Sc. (H) Zoology

Semester:

Semester V

Duration:

03 Hours

Maximum Marks:

75

Instructions for Candidates

Attempt **FIVE QUESTIONS** in all.

Question no. 1 is **COMPULSORY**.



Q1

- A) Define: 05
- i. Antigen
 - ii. Diapedesis
 - iii. Opsonization
 - iv. Haptens
 - v. Immunoglobulin
- B) Differentiate between the following: 10
- i. Active and Passive Immunity
 - ii. Macrophage and Monocytes
 - iii. MHC I and MHC II
 - iv. Primary and Secondary Immune Response
 - v. Inactivated and Attenuated Vaccines
- C) Write the contribution/s of the following scientists: 02
- i. Edward Jenner
 - ii. Rodney Porter
- D) Expand the following: 03
- i. ADCC
 - ii. MALT
 - iii. BCR
 - iv. RIA
 - v. HIM
 - vi. HLA
- E) Write the immunological significance of the following 04
- i. Interferons
 - ii. Cytokines
 - iii. NK cells
 - iv. Bursa of Fabricus.
- F) Draw well labeled sectional diagram of Thymus 03



Q2.

What is innate immunity? Explain the various barriers involved in innate immune response. 02, 10

Q3.

What are immunogens? Describe the various properties of the immunogens that contribute to the immunogenicity. 02, 10

Q4.

Discuss Gel and Coomb's classification of hypersensitivity. 06
Illustrate and discuss the endocytic pathway for processing exogenous antigen. 06

Q5.

Describe in detail the various pathways of complement activation. Add a note on the biological consequences of complement activation.

12

Q.6

Explain the process of monoclonal antibody production by hybridoma technology. Add a note on clinical uses of mono clonal antibodies.

12

Q7 Write short notes: (Any Three)

- i. ELISA
- ii. Clonal Selection Theory
- iii. Erythroblastosis Fetalis
- iv. DNA Vaccines
- v. Antigen Presenting Cells

04, 04, 04



Sl. No. of Q.P. : 1906

Unique Paper Code: 2231504

8

Name of the Paper: Developmental Biology

Name of the course: B.Sc. (Hons.) Zoology – ~~Erstwhile~~ PYUP

P-11

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. Attempt five questions in all.
3. Question No. 1 is compulsory.



(a) Define the following terms:

- (i) Differential gene expression
 - (ii) Nieuwkoop centre
 - (iii) Blastema
 - (iv) Amphimixis
 - (v) Capacitation
- (5)

(b) Differentiate between:

- (i) Splanchnopleure and somatopleure
 - (ii) Epigenesis and preformation
 - (iii) Primary and secondary egg envelopes
 - (iv) Pathological and physiological polyspermy
- (8)

(c) Give scientific contribution of each of the following:

- (i) Hilde Mangold
 - (ii) Karl Ernst von Baer
 - (iii) Wilhelm Roux
 - (iv) Edwin G. Conklin
 - (v) Ian Wilmut
- (5)



(d) Expand the following

- (i) GIFT
 - (ii) IMZ
 - (iii) TGF
 - (iv) ROS
 - (v) GGF
- (5)

(f) Name the germ layers from which each of the following is derived:

- (i) Dentine
 - (ii) Thyroid
 - (iii) Muscle
 - (iv) Adrenal medulla
- (4)

Describe

2. (a) What are morphogenetic movements? Discuss the different morphogenetic movement seen in amphibian gastrulation with the help of diagrams. (7)
(b) What are the different techniques employed to generate fate maps? (5)
3. (a) Describe the various steps involved in external fertilization (8)
(b) Discuss the different types of eggs based on the quantity of yolk (4)
Explain
4. (a) What is the primary organizer? Discuss the experiment that led to the discovery of primary organizer by Spemann and Mangold. (6)
(b) Describe the changes that take place during the growth phase of oogenesis (6)
Explain
5. (a) Diagrammatically explain the formation of extraembryonic membranes in bird. Add a note on their functions. (8)
(b) How is *C. elegans* used as a model organism to study ageing? (4)
6. Give a detailed account of different modes of regeneration found in organisms. (12)
7. Write short notes on *any three* of the following :
(a) Teratogenesis with 2 examples
(b) Embryonic stem cells
(c) Cortical reaction
(d) Hormonal regulation of metamorphosis in amphibian
(e) Cortical rotation

(3x4=12)

