Total No. of Questions : 7]

SEAT No. :

P373

[Total No. of Pages : 2

[5833]-101

M.Sc.

ZOOLOGY

ZOUT-111 : Biochemistry and Biochemical Techniques

(2019 Pattern) (4 Credits) (Semester - I)

Time : 3 Hours] *[Max. Marks : 70*

Instructions to the candidates :

1) ***Q.1 is compulsory.***
2) ***Solve any five Questions from Q.2 to Q.7.***
3) ***Question 2 to 7 carry equal marks.***

Q1) Solve any five of the followings : **[10]**

a) Define term : Chromatography.

b) What is Respiratory Quotient?

c) Write the principle of HPLC.

d) What is Carbohydrate?

e) Draw the structure of Alpha (α) helix protein.

f) Enlist water soluble vitamin.

Q2) a) What are Isozymes? Explain with suitable example. **[7]**

b) Write a note on types of centrifugation. **[5]**

Q3) a) Water is universal solvent, Justify. **[7]**

b) Atomic Absorption spectrometry used for quantification for metals. Justify. **[5]**

Q4) a) Write the classification of amino acid on the basis of their R-group. **[7]**

b) Discuss in details. Zone electrophoresis. **[5]**

P.T.O.

Q5) a) Define the terms : K_m and K_{cat}. What are their significance in enzymology? **[7]**

b) Write a note on submarine gel electrophoresis. **[5]**

Q6) a) Elaborate the principle and application of SDS-PAGE. **[7]**

b) What are polysaccharides & Classify them with suitable examples. **[5]**

Q7) Write short notes on any two of the followings : **[12]**

a) Molecular Exclusion chromatography.

b) Properties and classification of an enzyme.

c) Atomic Absorption spectrometry.

Total No. of Questions : 7]

SEAT No. :

P374

[Total No. of Pages : 2

[5833]-102

First Year M.Sc. (Part - I)

ZOOLOGY

ZOUT-112 : Cell Biology & Developmental Biology

(2019 Pattern) (4 Credits) (Semester - I)

Time : 3 Hours] *[Max. Marks : 70*

Instructions to the candidates :

1) ***Q.1 is compulsory.***
2) ***Solve any five Questions from Q.2 to Q.7.***
3) ***Question 2 to 7 carry equal marks.***

Q1) Solve any five of the following : **[10]**

a) Centrolecithal egg

b) Discoidal cleavage

c) Morphogenesis

d) Retrograde Pathway

e) Gap junctions

f) Passive transport

Q2) a) Give an account of early & late responses during fertilization in searchin. **[7]**

b) Distinguish between Anterograde & retrograde transport. **[5]**

Q3) a) Explain fluid mosaic model of plasma membrane? Discuss the role of cholesterol in plasma membrane. **[7]**

b) Describe the process of Oocyte maturation in frog. Explain how meiosis II block is removed at the time of fertilization. **[5]**

P.T.O.

Q4) a) Explain the role of RER in sorting & retrieval of proteins add a note on quality control in RER. **[7]**

b) Differentiate between transdifferentiation & metaplasia. **[5]**

Q5) a) With suitable examples explain the role of kinases & phosphatases in regulation of cell cycle. **[7]**

b) Explain the mechanism of limb development in amphibia. **[5]**

Q6) a) Explain the importance of Zebrafish mouse as model organism for mutation analysis. **[7]**

b) Explain Polymorphism in Lysosomes. **[5]**

Q7) Attempt any two of the following :

a) Differentiate between extrinsic & intrinsic factors of Apoptosis? How apoptosis differs from necrosis. **[6]**

b) Differentiate between mitosis & meiosis. **[6]**

c) Explain the process of regeneration with suitable examples. **[6]**

Total No. of Questions : 7]

SEAT No. :

P375

[Total No. of Pages : 2

[5833]-103

M.Sc. (Zoology)

ZOUT - 113 : GENETICS AND ENGLISH FOR SCIENTIFIC COMMUNICATION

(2019 Pattern) (Semseter - I) (4 Credit)

Time : 3 Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Question No. 1 is compulsory.***
2) ***Solve any five questions from Q.2 to Q.7.***
3) ***Question No.2 to Q. No.7 carry equal marks.***

Q1) Solve any five from the following : **[10]**

a) Alleles.

b) Heredity.

c) Quantitative traits.

d) Past Tense.

e) Tautology.

f) Hypothesis.

Q2) a) Discuss the concept of epistasis. Explain dominant epistasis with an example. **[7]**

b) Write a note on language as a communication. tool. **[5]**

Q3) a) Describe the concept of tense and its types with examples. **[7]**

b) Write a note on transformation in bacteria. **[5]**

P.T.O.

Q4) a) Discuss the law of independent assortment with an example. Add a note on chromosomal basis of recombination. **[7]**

b) Write a note on common errors in writtern and spoken english with examples. **[5]**

Q5) a) Discuss the outline of scientific research paper. **[7]**

b) In a given population the frequency of p is 0.45 and frequency of q is 0.55. Calculate the frequencies of all possible genotypes in the population. **[5]**

Q6) a) Determine the constitution of heterozygous parent, sequence of gene and distance from the following data of test cross. **[7]**

i) + b + – 104

ii) a b c – 180

iii) a + c – 109

iv) + + c – 21

v) a + + – 05

vi) + b c – 05

vii) a b + –31

viii) + + + – 191

b) Write a note on proof reading symbols, Jargons and abbrevations. **[5]**

Q7) Write a short notes on any two of the following : **[12]**

a) Mitochondrial Genetics.

b) Write a note on any two human genetic disorders.

c) Plagiarism in scientific writing.

Total No. of Questions : 5]

SEAT No. :

P376

[Total No. of Pages : 4

[5833]-104
M.Sc. (Part - I)
ZOOLOGY
ZODT 114 : BIOSTATISTICS
(2019 Pattern) (Semester - I) (2 Credits)

Time : 2 Hours] *[Max. Marks : 35*

Instructions to the candidates :

1) ***Q. No. 1 is Compulsory.***
2) ***Solve any three questions from Q. No. 2 to Q. No. 5.***
3) ***Question No. 2 to 5 carry equal marks.***
4) ***Figures to the right indicate full marks.***
5) ***Use of statistical table and calculator is allowed.***

Q1) Solve any five of the following :

Choose correct alternative from the following :

a) With the help of histogram, one can determine _____ **[5]**

i) Mean ii) Median
iii) Mode iv) Deciles

b) Median for arranged data is ____

i) Mean of first and last value ii) Most frequent value
iii) least frequent value iv) Middle most value

c) Which one of the following relation between variance (var(x)) and standard deviation (S.D (x)) of a variable x is true?

i) Var(x) = S.D(x) ii) $Var(x)^2 = S.D.(x)$
iii) $Var(x) = S.D.(x)^2$ iv) Var(x) = ZS.D.(x)

d) Karl - pearson's coefficient of correlation between X and Y lies between _____

i) 0 to 1 ii) –1 to 0
iii) –1 to 1 iv) 0 to ∞

e) The two regression lines intersect at _____

i) (0,0) ii) $(\overline{X}, \overline{Y})$
iii) (σ_x, σ_y) iv) None of the above

f) A coin is tossed three times in succession and the outcomes are noted. The number of sample points in the sample space is _____

i) 3 ii) 6
iii) 8 iv) 9

P.T.O.

Q2) a) Solve <u>any two</u> of the following :

i) Explain what is a random sample. State the various methods of achieving randomness. **[3]**

ii) Show that the algebraic sum of deviations of all observations from its arithmetic mean is equal to zero. **[3]**

iii) Explain the terms : range, Quartile-Deviation, standard deviation. **[3]**

b) Find variance and standard deviation of the data : –4, –2, 0, 2, 4. **[4]**

Q3) a) Solve <u>any two</u> of the following :

i) Explain the terms : bivariate data, covariance, correlation. **[3]**

ii) Explain the terms : mutually exclusive and mutually exhaustive events. **[3]**

iii) Explain the concept of conditional probability. Is this true P(A/B) = P(B/A). **[3]**

b) If the variable x denotes the maximum of the two numbers, when a pair of unbiased die is rolled, then find the probability distribution of x and its mathematical expectation. **[4]**

Q4) a) Solve <u>any two</u> of the following :

i) Explain the terms : hypothesis, null hypothesis, alternative hypothesis. **[3]**

ii) Explain the terms : Test, critical region, acceptance region. **[3]**

iii) Explain the terms : level of significance, p-value. **[3]**

b) For $X \rightarrow B(n, p)$:

i) Is this true E(x) = 7 and var(x) = 12? **[2]**

ii) E(x) = 4, S.D.(x) = $\sqrt{3}$, obtain the values of n, p and 9. **[2]**

Q5) Solve <u>any four</u> of the following :

a) If $x \rightarrow p(m)$ with p(x = 1) = 2. p(x=2), then obtain the value of parameter m of poisson distribution, write its p.m.f. of r.v.x. **[2½]**

b) Define standard normal variable, state its mean, median, mode and variance. **[2½]**

c) Explain the terms : Type I and type II errors. **[2½]**

d) Explain the chi-square test for goodness of fit. **[2½]**

e) Explain paired t-test. **[2½]**

f) Explain f-test for equality of two population variances. **[2½]**

Total No. of Questions : 5]

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[5833]-104
M.Sc. (Part - I)
ZOOLOGY
ZYODT - 114 : FRESHWATER ZOOLOGY (Theory)
(2019 Pattern) (Semester - I) (2 Credit)

Time : 2 Hours] ***[Max. Marks : 35***

Instructions to the candidates :

1) ***Q. No. 1 is Compulsory.***
2) ***Solve any three questions from Q. No. 2 to Q. No. 5.***
3) ***Questions No. 2 to 5 carry equal marks.***

Q1) Solve any five of the following : **[5]**

a) Ephemeral water bodies.

b) Hardness of water.

c) Copepoda

d) Bryozoa

e) Four major rivers of India

f) Wetlands

Q2) a) What are the physical properties of water body? Explain its importance on the biota. **[6]**

b) Write note on economic importance of freshwater Mollusca. **[4]**

Q3) a) Explain the general characters of Rotifera. Add a note on its reproduction. **[6]**

b) Explain locomotory adaptations in freshwater coleoptera. **[4]**

Q4) a) Describe the diversity of vertebrates in freshwater bodies of India. **[6]**

b) Explain osmotic and ionic adaptations in freshwater fauna. **[4]**

Q5) Solve any two of the following : **[10]**

a) Eutrophication

b) Respiratory adaptations in freshwater Hemptera.

c) Impact of sewage on freshwater fauna.

Total No. of Questions : 4]

SEAT No. :

P8845

[Total No. of Pages : 2

[5833]-11
S.Y. M.Sc.
ZOOLOGY
ZY - 302 (T) : Immunology
(2013 Pattern) (Semester - III) (2 Credits) (50305)

Time : 1½ Hours] *[Max. Marks : 25*

Instructions to the candidates:

1) ***Attempt any two questions from Q.No.1 to Q.No.3.***
2) ***Question No.4 is compulsory.***
3) ***Draw neat and labelled diagrams wherever necessary.***
4) ***Figures to the right indicate full marks.***

Q1) a) Explain primary and secondary lymphoid organs. **[5]**

b) Explain antibody classes. **[3]**

c) What is HLA? **[2]**

Q2) a) Write a short note on CD_4 and CD_8 receptors. **[4]**

b) Explain the principle and procedure of immunodiffusion and give its applications. **[4]**

c) What are NK cells? **[2]**

Q3) a) Explain immediate response to infection. **[4]**

b) Describe antibody structure and explain different antibody classes. **[4]**

c) What is passive immunization? **[2]**

Q4) Explain any two theories of antibody synthesis. **[5]**

OR

Explain the mechanism of antigen-antibody reaction.

□□□

P.T.O.

Total No. of Questions : 4]

P8845

[5833]-11
S.Y. M.Sc.
ZOOLOGY
ZY - 302 T : Environmental Biology
(2013 Pattern) (Semester - III) (2 Credits) (50305)

Time : 1½ Hours] ***[Max. Marks : 25***

Instructions to the candidates:

1) ***Attempt any two questions from Q.No.1 to Q.No.3.***
2) ***Question No.4 is compulsory.***
3) ***Neat and labelled diagrams must be drawn wherever necessary.***
4) ***Figures to the right indicate full marks.***

Q1) a) Describe the energy flow is ecosystem. **[5]**

b) Explain the microbial applications for man. **[3]**

c) Describe ecotone. **[2]**

Q2) a) Describe the ecological status of forest and their conservation. **[4]**

b) Explain semiarid habitat of India. **[3]**

c) Describe the extinct species of India. **[3]**

Q3) a) Describe the climate impact on biodiversity. **[4]**

b) Describe the various projects for conservation of Indian wildlife. **[3]**

c) Explain the factors influencing wildlife management. **[3]**

Q4) a) Give the various IUCN categories. Explain with suitable examples. **[5]**

OR

b) Describe the important wetland of India and their conservation.

□□□

Total No. of Questions : 4]

SEAT No. : ____

P8846

[Total No. of Pages : 1

[5833]-12

M.Sc.

ZOOLOGY

ZY-306T : PARASITOLOGY

(2013 Pattern) (Semester - III) (2 Credits) (50310)

Time : 1½ Hours] ***[Max. Marks : 25***

Instructions to the candidates :

1) ***Attempt any two questions from Q. No. 1 to Q. No. 3.***
2) ***Question No. 4 is compulsory.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Figures to the right indicate full marks.***

Q1) a) Describe various types of parasitic transmissions. **[4]**

b) Explain classification and morphology of Ancylostoma .Sps. **[4]**

c) What is the significance of Indirect haemogglutination test? **[2]**

Q2) a) Describe the life cycle, transmission and pathogenecity of Echinococcus Sps. **[4]**

b) Explain preparation and demonstration of specific antigens of Leishmania. **[4]**

c) What is vector? **[2]**

Q3) a) Describe merozoite s-antigens of plasmodium. **[4]**

b) Explain radio immuno assay. **[4]**

c) What is chromatin diminution? **[2]**

Q4) Explain chemical control of parasites. **[5]**

OR

What is myasis? Describe its classification. **[5]**

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Total No. of Questions : 4]

SEAT No. :

P8847

[Total No. of Pages : 1

[5833] - 13
M. Sc.
ZOOLOGY
ZY - 308 (T) : Insect Ecology
(2013 Pattern) (Semester - III) (2C)

Time : 1½ Hour] *[Max. Marks : 25*

Instructions to the candidates:

1) ***Attempt any two questions from Q.No.1 to Q. No. 3.***
2) ***Questions No. 4 is compulsory.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Figures to the right indicate full marks.***

Q1) a) Describe in detail how biotic control insects population. **[5]**

b) What are the measures for insects conservation? **[3]**

c) Describe insects detoliator. **[2]**

Q2) a) Describe the relation of insects with vascular plants. **[4]**

b) Discuss how insects compete with each other. **[3]**

c) Role of insects in ecosystem. **[3]**

Q3) a) Discuss the cycling of nutrition in insects. **[4]**

b) Describe the aquatic and soil insects. **[3]**

c) Effect of humidity on insects-explain. **[3]**

Q4) Write short notes on any one of the following. **[5]**

a) Threats to insects and conservation measures.

b) Leaf shredding insects.

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Total No. of Questions : 4]

SEAT No. :

P8848

[Total No. of Pages : 2

[5833] - 14
M.Sc. - II
ZOOLOGY
ZY - 403 (T) : Mammalian Reproductive Physiology
(2013 Pattern) (Semester - IV) (2 Credits)

Time : 1½ Hour] *[Max. Marks : 25*

Instructions to the candidates:

1) ***Attempt any two questions from Q.No.1 to Q. No. 3.***
2) ***Question No. 4 is compulsory.***
3) ***Figures to the right indicate full marks.***
4) ***Draw neat labelled diagrams wherever necessary.***

Q1) a) Explain structure and function of male reproductive system. **[5]**

b) Explain the surgical methods of contraception in female. **[3]**

c) What is puberty? **[2]**

Q2) a) Explain the hormonal regulation of pituitary gonadotropins. **[4]**

b) Explain the barrier method of contraception. **[3]**

c) Explain the environmental factors in breeding. **[3]**

Q3) a) Explain invitro fertilization & give its applications. **[4]**

b) Explain the structure & function of endothelio-chorial placenta. **[3]**

c) Explain the hormonal regulation of testosterone. **[3]**

Q4) a) Explain the oestrous cycle. **[5]**

OR

b) Give the hormonal aspect of infertility. **[5]**

♦ ♦ ♦

P.T.O.

Total No. of Questions : 4]

P8848

[5833] - 14
M.Sc. - II
ZOOLOGY
ZY - 403 (T) : Biodiversity Assessment
(2013 Pattern) (Semester - IV) (2 Credits)

Time : 1½ Hour] ***[Max. Marks : 25***

Instructions to the candidates:

1) ***Attempt any two questions from Q.No.1 to Q. No. 3.***
2) ***Question No. 4 is compulsory.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Figures to the right indicate full marks.***

Q1) a) What is biodiversity distribution, Add note on India as a mega diversity nation. **[5]**

b) What are the biodiversity hotspots of the world? **[3]**

c) Define endangered species. **[2]**

Q2) a) Describe the role of Devrai movement of conservation in India. **[4]**

b) Explain ex-situ conservation. **[3]**

c) Write a note on Blue data book. **[3]**

Q3) a) Write a note on tools and techniques used to assess the biodiversity. **[5]**

b) Write the characteristics features of Phylum Annelida. **[3]**

c) Define rare species. **[2]**

Q4) a) What are keystone species? Explain is it necessary to conserve them. **[5]**

OR

b) Explain five kingdom classification system proposed by whittaker. **[5]**

Total No. of Questions : 7]

SEAT No. :

P377

[Total No. of Pages : 2

[5833]-201

M.Sc. (Zoology)

ZOUT121 : MOLECULAR BIOLOGY AND BIOINFORMATICS

(2019 Pattern) (Semester - II) (4 Credits)

Time : 3 Hours] *[Max. Marks : 70*

Instructions to the candidates :

1) ***Q.1 is compulsory.***
2) ***Solve any five questions from Q.2 to Q.7.***
3) ***Questions 2 to 7 carry equal marks.***

Q1) Solve any 5 of the following : **[10]**

a) What is cot ½?

b) Give the names of multiple sequence alignment.

c) What is parsimany approach?

d) Name the bonds present in B form of DNA.

e) What is satellite DNA?

Q2) a) Explain the concept of phylogenetic tree and give its evolutionary significance. **[7]**

b) Explain the nucleotide excision repair. **[5]**

Q3) a) What are the nucleosomes? Explain their role in chromatin organization: **[7]**

b) Explain the termination of transcription in bacteria. **[5]**

Q4) a) Explain any two types of DNA damage. **[7]**

b) What is the difference between structural and functional genomics? Add a note on metabolomics. **[5]**

P.T.O.

Q5) a) What is genetic code? Explain the phenomenon of degeneracy of genetic code. **[7]**

b) What are non-replication transposons. **[5]**

Q6) a) What will happen to DNA when it is exposed to : **[7]**

i) Enzyme helicase

ii) High temperature (100°C).

b) Describe the structure of RNA polymerase. Add a note on inhibitors of RNA polymerase. **[5]**

Q7) Write short notes on any two of the following : **[12]**

a) Explain the process of replication. Give the regulation of replication in prokaryotes.

b) Describe the types of DNA polymerases found in E.coli.

c) Explain the process of m-RNA splicing.

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Total No. of Questions : 7]

SEAT No. :

P378

[Total No. of Pages : 2

[5833]-202

M.Sc. (Part - I)

ZOOLOGY

ZOUT122 : ENDOCRINOLOGY & PARASITOLOGY

(2019 Pattern) (Semester - II) (4 Credits)

Time : 3 Hours] *[Max. Marks : 70*

Instructions to the candidates :

1) ***Q.1 is compulsory.***
2) ***Solve any five questions from Q.2 to Q.7.***
3) ***Questions 2 to 7 carry equal marks.***

Q1) Solve any five of the following : **[10]**

a) Biological rhythms.

b) Signal transduction cascade.

c) Steroid hormones

d) Altruism

e) Assay

f) Paratenic

Q2) a) Describe morphology and lifecycle of Echinococcus sp. **[7]**

b) Write a note on cytoplasmic receptors. **[5]**

Q3) a) Explain adenohypophysial hormones. **[7]**

b) Write a note on conspecific transmission. **[5]**

Q4) a) Discuss circumsporozoite protein and menozoites s-antigens in plasmodium. **[7]**

b) Write a note on types of hormones. **[5]**

P.T.O.

Q5) a) Discuss mechanism of hormone action in thyroid hormones. **[7]**

b) Explain pathogenicity, treatment and prophylaxis of schistosoma. **[5]**

Q6) a) Describe chemical control of parasites. **[7]**

b) Write a note on hormonal regulation of protein metabolism. **[5]**

Q7) Write a short notes on any two of the following : **[12]**

a) Immunodiagnostic assays.

b) Complement fixation test.

c) Role of x & y organs in crustaceans.

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Total No. of Questions : 7]

SEAT No. :

P379

[Total No. of Pages : 2

[5833]-203
M.Sc. (Part - I)
ZOOLOGY
ZOUT - 123 : Comparative Animal Physiology & Environmental Biology
(2019 Pattern) (Semester - II) (4 Credits)

Time : 3 Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Question No.1 is compulsory.***
2) ***Question No.2 to 7 carry equal marks.***
3) ***Solve any five questions from Q.No.2 to Q.No.7.***

Q1) Solve Any Five from the following : **[10]**

a) What is ventilation.
b) Define thermoregulation.
c) Hyper and Hypoosmotic regulators.
d) Wetland.
e) Endemic species.
f) Biomes.

Q2) a) Write a note on concept of ecosystem. Add a note on food chain with example. **[7]**

b) Explain the process of digestion in intestine. **[5]**

Q3) a) What is oxygen dissociation curve. Add a note on its significance. **[7]**

b) Discuss the applications of microbes in environment. **[5]**

Q4) a) Describe the concept of wildlife management. Add a note on any one project for conservation of wildlife in India. **[7]**

b) Explain the structure of skeletal muscle. **[5]**

Q5) a) Describe the process of urine formation in mammalian kidney. **[7]**

b) Write a note on forest habitat in India. **[5]**

P.T.O.

Q6) a) Describe Biomes. Add a note on classification of Biomes. **[7]**

b) Explain neurohaemal and Endocrine organs. **[5]**

Q7) Write a short note on any Two of the following: **[12]**

a) Define and Explain osmolarity and toxicity.

b) Explain the principle of neural integration.

c) Biodiversity of India.

□□□

Total No. of Questions : 5]

SEAT No. :

P380

[Total No. of Pages : 4

[5833]-204
M.Sc. (Zoology)
ZODT - 124: Metabolic Pathways
(2019 Pattern) (Semester - II) (2 Credits)

Time :2 Hours] *[Max. Marks : 35*

Instructions to the candidates:

1) ***Q.No.1 is compulsory.***
2) ***Solve any three questions from Q.No.2 to Q.No.5.***
3) ***Questions No. 2 to 5 carry equal marks.***

Q1) Solve any five of the following. **[5]**

a) Define first law of thermodynamics.

b) Define ketogenesis.

c) Define Metabolism.

d) Define Entropy.

e) Define free energy.

f) What is redox potentials?

Q2) a) Explain the role of branching enzyme in glycogen synthesis. **[6]**

b) Explain the energetics of Glycolysis to TCA in aerobic condition. **[4]**

Q3) a) Explain the reactions in which glucose is formed from non-carbohydrate source. **[6]**

b) What is linkage step? Explain the structure and function of PDH complex. **[4]**

Q4) a) Describe complex III and complex IV of ETC. **[6]**

b) Explain the oxidation of odd chain fatty acids. **[4]**

P.T.O.

Q5) Solve any TWO of the following. **[10]**

a) What is oxidative deamination? Explain with suitable example.

b) "Inosine monophosphate (IMP) is the precursor of both guanosine and adenosine monophosphates", Explain.

c) Explain the conversion of α-ketoglutarate to succinyl COA to succinate.

□□□

Total No. of Questions : 5]

P380

[5833]-204
M.Sc. (Zoology)
ZODT - 124: ICTHYOLOGY
(2019 Pattern) (Semester - II) (2 Credits)

Time :2 Hours] ***[Max. Marks : 35***

Instructions to the candidates:

1) ***Q.No.1 is compulsory.***
2) ***Solve any three questions from Q.No.2 to Q.No.5.***
3) ***Questions No. 2 to 5 carry equal marks.***

Q1) Solve any five of the following. **[5]**

a) Air bladder.

b) Aglomerular kidney.

c) What is ornamental fish?

d) Name any two common diseases in fish.

e) Name any two indegenous ornamental fish.

f) What is evryhayline fish?

Q2) a) Discuss various anatomical modifications in digestive system of fishes. **[6]**

b) Give the structure and functions of gills. **[4]**

Q3) a) Describe any two orders from class osteichthyes with two examples. **[6]**

b) Explain the seasonal changes of gonads in fishes. **[4]**

Q4) a) Give an account of water & salt balance in Euryhayline fishes. **[6]**

b) Describe anadromous and catadromous fishes. **[4]**

Q5) Solve any two of the following. **[10]**

a) Maintenance of Aquarium.

b) Enlist types of scales in fishes.

c) Explain the various endocrine organs in fishes.

□□□

Total No. of Questions :7]

SEAT No. :

P381

[Total No. of Pages :6

[5833] - 301

M.Sc. - II

ZOOLOGY

ZOUT 231 : Animal Physiology - I

(2019 Pattern) (Semester - III) (4 Credits) (Special)

Time : 3 Hours] *[Max. Marks :70*

Instructions to the candidates:

1) ***Question 1 is compulsory.***
2) ***Solve any Five questions from Q.2 to Q.7.***
3) ***Questions 2 to 7 carry equal marks.***

Q1) Solve any five of the following: **[10]**

a) Define : Buoyancy.

b) What is gastro intestinal hormone?

c) What is calorimetry?

d) What is chloride shif?

e) Define : Acclimatisation.

f) State : All or none law.

Q2) a) Define respiration. Describe the internal and external respiration. **[7]**

b) Explain the role of enzymes in protein digestion. **[5]**

Q3) a) What is biological clock? Explain lunar and tidal rhythm with suitable example. **[7]**

b) Distinguish between tolerance and resistance. **[5]**

Q4) a) What is action potential? Discuss role of various ion channels. **[7]**

b) Explain the phyletic distribution of luminescent organism. **[5]**

P.T.O.

Q5) a) Explain transport of CO_2. Add a note on lung volume and capacities. **[7]**

b) Describe the components of digestive system. **[5]**

Q6) a) Define muscle twitch. Explain sliding filament theory of muscle contraction. **[7]**

b) Discuss various methods of membrane permeation. **[5]**

Q7) Write short notes on any Two of the following: **[12]**

a) What is resting membrane potential ? Explain the structure of plasma-membrane and give it's function.

b) Explain gastrointestinal hormones.

c) Describe the structure of swimbladder and explain the role of swim bladder to achive neutral buoyancy.

Total No. of Questions :7]

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[5833] - 301

M.Sc. - II

ZOOLOGY

ZOUT 231 : Entomology - I

(2019 Pattern) (Semester - III) (4 Credits) (Special)

Time : 3 Hours] ***[Max. Marks :70***

Instructions to the candidates:

1) ***Question 1 is compulsory.***
2) ***Solve any Five questions from Q.2 to Q.7.***
3) ***Questions 2 to 7 carry equal marks.***

Q1) Solve any Five of the following: **[10]**

a) Define Exopterygota.

b) Write the structure and example of geniculate antenna.

c) Explain tegmina.

d) Explain saltatorial leg.

e) Explain photocytes.

f) Explain monopolar neuron.

Q2) a) Describe morphology of head of a typical insect. **[7]**

b) Explain the characters of Dictyoptera with two examples. **[5]**

Q3) a) Explain in brief interrelationship of insects with other arthropods. **[7]**

b) Describe structure of integument in insects. **[5]**

Q4) a) Give an account of the alimentary canal of any orthopteroid insect. **[7]**

b) Explain the characters of odonata with two examples. **[5]**

Q5) a) Give the distinguishing characters of order Thysanura with two examples. **[7]**

b) Explain course of blood circulation in insects. **[5]**

Q6) a) Mention the distinguishing characters of Diptera with two examples. **[7]**

b) Explain the structure and functions of malpighian tubules. **[5]**

Q7) Write short notes on any Two of the following: **[12]**

a) Piercing and sucking type of mouthparts.

b) Endocrine glands in insects.

c) Ommatidium of an insect.

Total No. of Questions :7]

P381

[5833] - 301

M.Sc. - II

ZOOLOGY

ZOUT 231 : Genetics - I

(2019 Pattern) (Semester - III) (4 Credits)

Time : 3 Hours] ***[Max. Marks :70***

Instructions to the candidates:

1) ***Q.1 is compulsory.***
2) ***Solve any Five questions from Q.2 to Q.7.***
3) ***Questions 2 to 7 carry equal marks.***

Q1) Solve any five of the following: **[10]**

a) Explain directional selection with suitable example.

b) Describe the features of mitochondrial DNA that makes it suitable for studying relationship between organisms.

c) Explain why it is important to have high degree of heterozygosity in a population.

d) Explain the consequences of long term assortative mating in a population.

e) How does sympatric speciation differ from allopatric speciation.

f) Define "heritability". How is heritability estimated?

Q2) a) Distinguish between metric and non-metric traits. Give suitable example. **[7]**

b) Justify the statement, "Drosophila melanogaster" is emerging as a powerful translational model of human disease. **[5]**

Q3) a) What are the different modes of selection and their effect on gene frequencies in a population? **[7]**

b) Describe selective conditions which can maintain balanced polymorphism. **[5]**

Q4) a) Define multiple allele and how do they arise in a population over a period of time. If a gene has four alleles, how many gene types are possible? **[7]**

b) A cross was set between parents of genetype Ab/aB and ab/ab. The mutant alleles 'a' and 'b' are recessive to their respective wild type alleles A and B. Map positions of genes A and B are 40 cM and 55cM respectively. Out of 1000 progeny obtained from the cross, how many are expected to show both A and B phenotypes? **[5]**

Q5) a) Justify the statement, "Genotypic frequencies are a binomial function of allele frequencies after generations of random mating". **[7]**

b) Suppose a lady comes to you for a advice. She tells you that her brother has hemophilia, but both her parents are normal. She wishes to marry a man who has no history of hemophilia in his family and wants to know the probability of her children having this disease. What would you tell her and how would you explain your conclusion. **[5]**

Q6) a) Why do researchers use molecular markers to understand phylogenetic relationship? What are its advantages? **[7]**

b) Explain the strategies adopted to complete the sequencing of human genome. What is its status at present? **[5]**

Q7) Write short notes on Any Two of the following: **[12]**

a) VNTRs

b) Inbreeding

c) Applications of reverse genetics.

Total No. of Questions : 7]

SEAT No. :

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[Total No. of Pages : 2

[5833] - 302
M.Sc. (Part-II)
ZOOLOGY
ZOUT 232: Fundamentals of Systematics and Economic Zoology
(2019 Pattern) (Semester - III) (4-Credit)

Time : 3 Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Question No.1 is compulsory.***
2) ***Solve any five Questions from Q.No. 02 to Q.No. 07.***
3) ***Question No. 02 to 07 carry equal marks.***

Q1) Solve any Five from the following. **[10]**

a) Systematics

b) Species

c) RFLP

d) Economic Zoology

e) Coral reefs

f) Importance of Sponqes in Industry.

Q2) a) Discuss the concept of biological classification. Add a note on taxonomic keys. **[7]**

b) Describe the economic importance of nematodes. **[5]**

Q3) a) Describe the economic importance of insects. **[7]**

b) Discuss the steps involved in taxonomy. **[5]**

Q4) a) What is molecular systematics? Add a note on DNA fingerprinting technique and its applications in systematics. **[7]**

b) Write a note on Lac culture and its economic importance. **[5]**

P.T.O.

Q5) a) Discuss the economic importance of dairy industry in India. **[7]**

b) Write a note on fire kingdom system of classification. **[5]**

Q6) a) Describe the concept of taxonomic hierarchies. Add a note on zoological nomenclature. **[7]**

b) Discuss the economic importance of vermiculture industry in India. **[5]**

Q7) Write a short note on any Two of the following. **[12]**

a) Molecular phylogenetics

b) Model Animals in Pharma Ceutical Industry

c) Prawn culture.

Total No. of Questions : 7]

SEAT No. :

P383

[Total No. of Pages : 2

[5833] - 303
M.Sc. (Part-II)
ZOOLOGY
ZOUT 233: Research Methodology and Insect Physiology and Biochemistry
(2019 Pattern) (Semester - III) (4-Credit)

Time : 3 Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Question 1 is compulsory.***
2) ***Solve any five Questions from Q.No. 2 to Q.No. 7.***
3) ***Question No. 2 to 7 carry equal marks.***

Q1) Solve any Five of the following. **[10]**

a) What is ventilation?

b) How proteins are digested by insects?

c) What is literature reviews?

d) Enlist types of haemocytes in Insect.

e) Define chromatography.

f) Define NMR.

Q2) a) Explain the structure of muscles and give physiological role of flight muscle. **[7]**

b) Explain the characteristics and components of good research. **[5]**

Q3) a) Describe the structure of integument. Write a note on sclerotization. **[7]**

b) Explain the processing and analysis of data collection. **[5]**

Q4) a) Write the importance of Approaches and methodology in scientific Research. **[7]**

b) What is digestion? Describe physiology of digestion and absorption of proteins. **[5]**

P.T.O.

Q5) a) Describe role of Microsomal enzymes in insecticides degradation and defortification. **[7]**

b) Write in detail about the fluorescence microscopy. Give its significance. **[5]**

Q6) a) Explain the electrophoresis technique used for purification of biomolecules. Give its application. **[7]**

b) What is baemolymph? Describe physico-chemical characteristics of plasma. **[5]**

Q7) Write a short notes on any Two of the following. **[12]**

a) What is hormone? Describe chemistry and physiology of Juvenile hormone.

b) Mention the points of differences between qualitative and quantitative research.

c) Describe process of carbohydrate digestion and absorption in insect.

Total No. of Questions :5]

SEAT No. :

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[Total No. of Pages :4

[5833] - 304

M.Sc. (Part - II)

ZOOLOGY

ZODT - 234 : Immunology

(2019 Pattern) (Semester - III) (2 Credits) (Theory)

Time : 2 Hours] *[Max. Marks :35*

Instructions to the candidates:

1) ***Q. No. 1 is compulsory.***
2) ***Solve any three questions from Q. No.2 to Q. No. 5.***
3) ***Question No.2 to 5 carry equal marks.***

Q1) Solve any five of the following. **[5]**

a) Define Immunology.

b) Name any two allergic diseases in humans.

c) What is autoimmunity?

d) Define Immunogenetics.

e) Give two examples of Primary Lymphoid Organs.

f) What is RIA?

Q2) a) Give an account of Primary Lymphoid Organs. **[6]**

b) Explain briefly Innate and Adaptive Immunity. **[4]**

Q3) a) Explain antibody structure with special focus on constant and variable regions of heavy and light chains. **[6]**

b) Explain the concept of Antibody class switching. Add a note on its significance. **[4]**

P.T.O.

Q4) a) Write a short note on Immune deficiencies and Immune disorders. **[6]**

b) State Principle and applications of Immunoelectrophoresis. **[4]**

Q5) Solve any two of the following: **[10]**

a) What is vaccine? Describe any three types of vaccines.

b) Discuss the process of Antigen - Antibody Reaction.

c) Describe briefly the Principle and Applications of Hybridoma technology.

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Total No. of Questions :5]

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[5833] - 304

M.Sc. (Part - I)

ZOOLOGY

ZODT - 234 :Genetics Toxicology

(2019 Pattern) (Semester - III) (2 Credits) (Theory)

Time : 2 Hours] ***[Max. Marks :35***

Instructions to the candidates:

1) ***Q. No. 1 is compulsory.***
2) ***Solve any three questions from Q. No.2 to Q. No. 5.***
3) ***Question No.2 to 5 carry equal marks.***

Q1) Solve any five of the following. **[5]**

a) Define Carcinogen.

b) Define teratology.

c) Define Eco toxicology.

d) What are benign tumors?

e) Define mutation frequency.

f) What is neutral mutation.

Q2) a) Explain the Drosophila test system to assess the genotoxic potential of a test compound. **[6]**

b) Explain how congenital malformation can be caused genotoxic exposure? **[4]**

Q3) a) What are chromosomal aberrations? Explain the various aberrations with suitable examples. **[6]**

b) Describe plant test system. **[4]**

Q4) a) Explain how tautomeric shift in DNA bases during replication leads to mutations. **[6]**

b) Describe the genotype of *Salmonella typhimurium* TA 98 genotype used in Ames test. **[4]**

Q5) Attempt any two of the following. **[10]**

a) Various branches of toxicology.

b) Use of yeast test system in genotoxic screening.

c) Hazard assessment and risk analysis of chemicals.

Total No. of Questions :7]

SEAT No. :

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[Total No. of Pages :7

[5833] - 401

M.Sc. (Part - II)

ZOOLOGY

ZOUT 241 : Animal Physiology - II

(2019 Pattern) (Semester - IV) (4 Credits)

Time : 3 Hours] *[Max. Marks :70*

Instructions to the candidates:

1) ***Question 1 is compulsory.***
2) ***Solve any Five questions from Q.2 to Q.7.***
3) ***Questions 2 to 7 carry equal marks.***

Q1) Solve any Five of the following: **[10]**

a) Define Homeostasis.

b) Define - Neuropeptides.

c) What is HPA axis?

d) Define - Heart sound.

e) Define : Metabolic rate.

f) Explain the term euryhaline.

Q2) a) Describe the components of blood. Give it's funtion. **[7]**

b) What is high altitude sickness? Explain various physiological adaptations of high altitude. **[5]**

Q3) a) Describe the structure of internal ear. Explain physiology of hearing. **[7]**

b) 'Ammonia formed in body is toxic'. Explain. **[5]**

Q4) a) Discuss ureotelism. Add a note on : Urea cycle. **[7]**

b) Explain energy cost of running and swimming. **[5]**

P.T.O.

Q5) a) What is osmoregulation. Explain regulation of salt and water balance in mammals. **[7]**

b) Explain structure and function of taste bud. **[5]**

Q6) a) Define cardiac output. Describe internal structure of Heart. **[7]**

b) What is synapse? Explain it's structure. **[5]**

Q7) Write short notes on any Two of the following: **[12]**

a) Structure and function of neuron.

b) Electrocardiography.

c) Extrinsic pathway of blood clotting.

Total No. of Questions :7]

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[5833] - 401

M.Sc. (Part - II)

ZOOLOGY

ZOUT 241 : Entomology - II

(2019 Pattern) (Semester - IV) (4 Credits)

Time : 3 Hours] ***[Max. Marks :70***

Instructions to the candidates:

1) ***Question 1 is compulsory.***
2) ***Solve any Five questions from Q.2 to Q.7.***
3) ***Questions 2 to 7 carry equal marks.***

Q1) Solve any Five of the following: **[10]**

a) Define vitellogenesis in insects.

b) Define energids.

c) Explain anatrepsis.

d) Explain role of juvenille hormone.

e) Explain oviparity with example.

f) Define ageing.

Q2) a) Describe the process of fertilization in insects. **[7]**

b) Sketch and label, telotrophic ovariole. **[5]**

Q3) a) Describe cleavage and blastoderm formation in insect. Add a note on its control. **[7]**

b) What is gastrulation? Explain variations in the process of gastrulation in insect. **[5]**

Q4) a) Describe embryonic development of alimentary canal in insects. **[7]**

b) Describe formation of dorsal closure and dorsal organ in insects. **[5]**

Q5) a) What is metamorphosis? Explain gradual metamorphosis in insects. **[7]**

b) Explain eclosion from the egg in insects. **[5]**

Q6) a) Describe apodous larva with suitable examples. **[7]**

b) Describe exarate pupa with suitable examples. **[5]**

Q7) Write short notes on any Two of the following: **[12]**

a) Hemimetabolous development.

b) Polyemboryony.

c) Occurrence and initiation of diapause.

Total No. of Questions :7]

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[5833] - 401

M.Sc. (Part - II)

ZOOLOGY

ZOUT 241 : Genetics - II

(2019 Pattern) (Semester - IV) (4 Credits)

Time : 3 Hours] ***[Max. Marks :70***

Instructions to the candidates:

1) ***Q.1 is compulsory.***
2) ***Solve any Five questions from Q.2 to Q.7.***
3) ***Questions 2 to 7 carry equal marks.***

Q1) Solve any five of the following: **[10]**

a) What are triplet repeat disorder"? Explain with suitable example.
b) Outline conventional methods for studying behavioural genetics.
c) Distinguish between Aminocentesis and chorionic villi sampling.
d) List three examples of single gene disorder affecting protein metabolism pathway. Indicate biochemical lesions in the pathway flow chart.
e) Write a note on p^{53} gene.
f) Differentiate between mosacism and chimerasim.

Q2) a) Explain the genetic basis of schizophrenia. **[5]**

b) Construct a restriction map of a circular DNA plasmid using the following data. Your map should indicate the relative positions of the restriction sites along with the distances between restiriction sites.

Restriction enzyme	Fragment Size (Bps)
uncut DNA	7950
DNA cut with Bgl II	7950
DNA cut with EcoR I	7950
DNA cut with Hpa I	7950
DNA cut with EcoRI + Bgl II	5416, 2534
DNA cut with Bgl II + Hpa I	6632, 1318
DNA cut with EcoRI + Hpa I	4098, 3852

[7]

Q3) a) What is dosage compensation? Explain the mechanism of dosage compensation in human. How does it differ from Drosophila? **[7]**

b) Write a note on syndromes associated with sex chromosome abnormalities. **[5]**

Q4) a) Phenylketonuria (PKU) syndrome frequency in India is 1 out of 10,000 child. PKU is because of homozygous recessive allele (aa). Calculatge the frequency of this allele and the normal allele. Calculate the percentage of carriers in the population. **[7]**

b) Describe the methods of physical mapping using EST. **[5]**

Q5) a) Write a note on cell cycle regulation. **[5]**

b) Four allels of a biallelic gene A, B, C and D located on different chromosome of an organism X was allowed to assort independently. Which gamete will produce highest variability and how? **[7]**

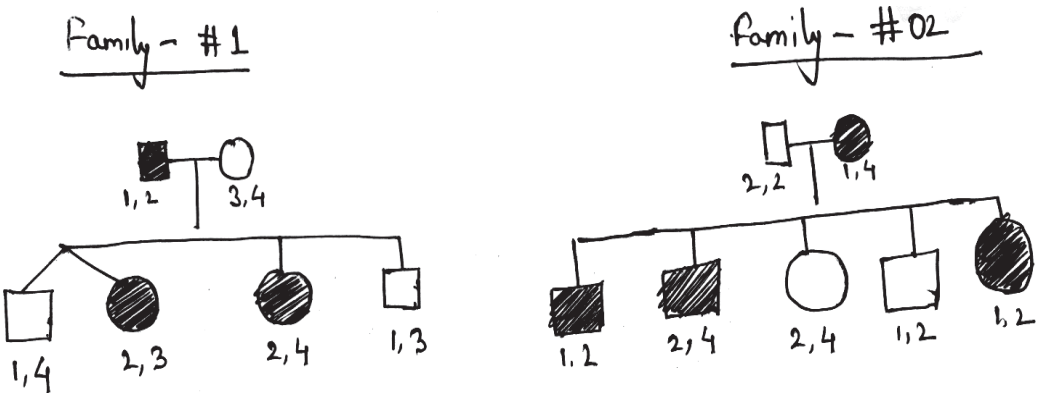
Q6) a) Explain how the pedigree analysis methodology is a valuable tool in human genetics studies. **[5]**

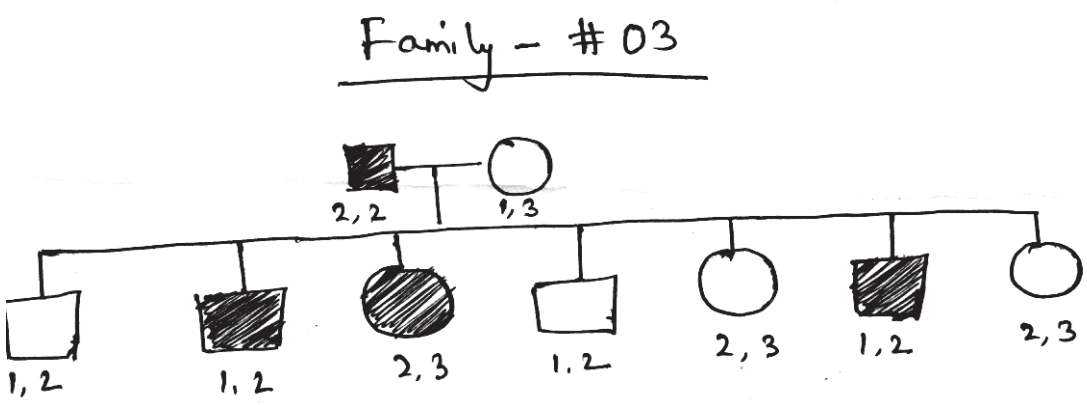
b) After conducting an exhaustive survey indifferent parts of Maharashtra State, you obseved a genetic disorder in following three families which may be linked to a specific locus - X on a chromosome. The locus - X has four allels, each with different number of repeats observing the give three family pedigrees answer the following questions.

(Affected individuals are darkened and locus - X genotype is listed below each individual).

i) What is the most likely mode of inheritance for this disorder.

ii) Which of the following families can be used to calculate LOD score for the linkage testing between the locus - X and the gene of interest? Why? **[7]**





Q7) Write short notes on Any Two of the following: **[12]**

a) HLA associated disease.

b) Chromosome walking.

c) Parametric and non parametric analysis.

Total No. of Questions : 7]

SEAT No. :

P386

[Total No. of Pages : 2

[5833] - 402
M.Sc. (Part-II)
ZOOLOGY
ZOUT 242 : Mammalian Reproductive Physiology and Aquaculture
(2019 Pattern) (Semester - IV) (4-Credits) (Theory)

Time : 3 Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Question 1 is compulsory.***
2) ***Solve any five Questions from Q.No. 02 t0 Q.No. 07.***
3) ***Questions No. 02 to 07 carry equal marks.***

Q1) Solve any Five of the following. **[10]**

a) What is Puerperium?

b) What is suckling reflex?

c) What is meant by Amniocentesis?

d) Give the scientific name of 'Giant freshwater Prawn' and its growth potential.

e) What is Intensive fish culture?

f) Name the major protozoan diseases in fish.

Q2) a) Describe the various events and stages of parturition. **[7]**

b) Discuss polyculture of Indian Major Carps. **[5]**

Q3) a) Discuss the management practices carried out during fish culture in ponds. **[7]**

b) Give an account of hormonal regulation in females with respect to reproduction. **[5]**

Q4) a) Describe placenta formation and mention the various types of placenta. **[7]**

b) Give the application of Information Communication Technology (ICT) in production and marketing in fisheries. **[5]**

P.T.O.

Q5) a) Describe the various fish preservation methods and justify its need. **[7]**

b) Explain the process of conception and blastocyst formation during pregnancy. **[5]**

Q6) a) Describe the various 'Assisted Reproductive Technologies' as techniques to increase reproductive potential. **[7]**

b) Mention the various aquatic weeds in fish ponds and suggest measures for their control. **[5]**

Q7) Write a short notes on any Two of the following. **[12]**

a) Ageing and reproduction.

b) Induced breeding.

c) Pearl formation.

Total No. of Questions :5]

SEAT No. :

P387

[Total No. of Pages :4

[5833] - 403

M.Sc. (Part - II)

ZOOLOGY

ZODT 243 : Histology and Histochemistry (2 Credits)

(2019 Pattern) (Semester - IV) (Theory)

Time : 2 Hours] *[Max. Marks :35*

Instructions to the candidates:

1) ***Q. No. 1 is compulsory.***
2) ***Solve any three questions from Q. No.2 to Q. No. 5.***
3) ***Question No.2 to 5 carry equal marks.***

Q1) Solve any five of the following. **[5]**

a) What is cryostat?

b) Define Histology.

c) What is mordant?

d) Name any two components of Schiff's reagent.

e) What are mucopoly saccharides?

f) What do you mean by staining?

Q2) a) Explain histochemical method for tissue localization of Acid Phosphatase Enzyme. **[6]**

b) Describe briefly Feulgen reaction and its significance. **[4]**

Q3) a) Explain the process of embedding and block making. **[6]**

b) Give an outline of histochemical classification of carbohydrates. **[4]**

Q4) a) Discuss the scope and importance of histochemistry. **[6]**

b) Give an account of the principle and design of Automated microtome. **[4]**

P.T.O.

Q5) Solve any two of the following. **[10]**

a) Give an outline of histochemical classification of lipids.

b) Discuss how histochemical methods are useful in the detection of various types of carcinoma.

c) Explain the procedure of whole-mount preparation.

Total No. of Questions :5]

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[5833] - 403

M.Sc. (Part - II)

ZOOLOGY

ZODT 243 : Pest Control (2 Credits)

(2019 Pattern) (Semester - IV)

Time : 2 Hours] ***[Max. Marks :35***

Instructions to the candidates:

1) ***Q. No. 1 is compulsory.***
2) ***Solve any three questions from Q. No.2 to Q. No. 5.***
3) ***Question No.2 to 5 carry equal marks.***

Q1) Solve any five of the following. **[5]**

a) Define Pest

b) Household pests

c) Insecticidal formulations

d) Biological control measures

e) Autocidal control

f) Non-insect pests.

Q2) a) Describe the veterinary entomology with reference to important measures to control the pest. **[6]**

b) Write a note on sterile male technique. **[4]**

Q3) a) Explain the cultural methods of pest control. **[6]**

b) Describe the chemosterilant used for Autocidal control with examples. **[4]**

Q4) a) Explain the principle of applications of integrated pest management. Add a note on Biological control method. **[6]**

b) Write a note on any three non-insect pest with their control measures. **[4]**

Q5) Solve any two of the following. **[10]**

a) Attractant of repellants.

b) Knapsack sprayer

c) Mechanical control measures.

Total No. of Questions :5]

SEAT No. :

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[Total No. of Pages :4

[5833] - 404

M.Sc. (Part - II)

ZOOLOGY

ZODT - 244 : Pollution Biology

(2019 Pattern) (Semester - IV) (2 Credits)

Time : 2 Hours] *[Max. Marks :35*

Instructions to the candidates:

1) ***Q. No. 1 is compulsory.***
2) ***Solve any three questions from Q. No.2 to Q. No. 5.***
3) ***Question No. 2 to 5 carry equal marks.***

Q1) Solve any five of the following. **[5]**

a) Describe Atmosphere.

b) Bioaccumulation.

c) What is pesticide? Enlist the types of pesticides.

d) What are the characteristics of sound?

e) Pollutants.

f) Limnology.

Q2) a) Define pollution. Describe sources of air pollution. **[6]**

b) What is biomedical waste? Explain handling and management of Biomedical waste. **[4]**

Q3) a) Define Bioassay. Explain methods of Bioassay. **[6]**

b) Explain the histological methods to study the impact of pollution on animals. **[4]**

P.T.O.

Q4) a) What is pollution monitoring? Write a note on strategies for monitoring of soil and noise pollution. **[6]**

b) What is radioactive pollution? Explain the types and sources of radioactive pollution. **[4]**

Q5) Solve any two of the following. **[10]**

a) Explain biological methods for assessment of environmental quality.

b) Define Biomagnification and explain the causes and consequences.

c) Define eutrophication & explain the process of Eutrophication.

Total No. of Questions :5]

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[5833] - 404

M.Sc. (Part - II)

ZOOLOGY

ZODT - 244 : Apiculture (Theory)

(2019 Pattern) (Semester - IV) (2 Credits)

Time : 2 Hours] ***[Max. Marks :35***

Instructions to the candidates:

1) ***Q. No. 1 is compulsory.***
2) ***Solve any three questions from Q. No. 2 to Q. No. 5.***
3) ***Question No. 2 to 5 carry equal marks.***

Q1) Solve any five of the following. **[5]**

a) Rock bee

b) Newton hive

c) Nosema

d) Propolis

e) CBRTI

f) Apiary

Q2) a) Give classification of honeybee, Apis cerana. Add a note on its biology. **[6]**

b) Describe Langstroth hive. **[4]**

Q3) a) What are the bacterial disease of honeybees. Give its control measures. **[6]**

b) Describe products of Apiculture Industry. **[4]**

Q4) a) Describe modern methods in beekeeping. **[6]**

b) Write a note on history of beekeeping. **[4]**

Q5) Write short note on any two of the following. **[10]**

a) Describe any four beekeeping equipments.

b) Write a note on enemies of bees.

c) Traditional honey extraction methods.