JHARGRAM RAJ COLLEGE

M.Sc. Semester-I Examination, 2022

ZOOLOGY

Paper-ZOO 101

Time- 2 hours **Use Separate Scripts for Each Group** Full Marks- 40

Each question carries EQUAL *mark*

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

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ZOO 101.1

(Non chordate Biology)

1. Answer any two questions from the following: 2×2=4
   a) What are 'IJ nematodes'?
   b) What is the significance of cyclomorphosis in rotifera?
   c) What do you mean by 'atroch' and 'moonoroch'?
   d) Distinguish between ectoprocta and entoprocta.

2. Answer any two questions from the following: 2×4=8
   a) Explain Gastrea theory regarding origin of metazoa. 4
   b) "Nematode intestine is designed to withstand the mechanical stress"- justify. 4
   c) Give an account of conservation status of Gooty tarantula. 4
   d) Discuss the economic significance of Foraminifera. 4

3. Answer any one question from the following: 1×8=8
   a) What are 'resting eggs' and 'corona' in rotifera? Give an account of mastax in rotifera with necessary diagram. 2+6
   b) Compare trochophore larva with Muller's larva. State the role of lophophore during feeding in bryozoa. Why bryozoans are called discontinuous feeders? 3+4+1

ZOO 101.2

(Chordate biology)

4. Answer any two questions from the following: 2×2=4
   a) How biochemical affinity of tornaria larva and bipinnaria larva is significant in chordate origin?
   b) Write the name and location of two mammalian integumentary gland.
   c) State the importance of counter-current mechanism in fish respiration.
   d) How dopplar shift of echo convey information about an insect's wing beat towards the bat who created the echo?

5. Answer any two questions from the following: 2×4=8
   a) What is endostyle? 'Thyroid colloid is the direct evolutionary successor to the endostylar mucus of a protochordate ancestor" - justify. 1+3
   b) Trace out the origin of chordate through Barrington and Young' s view. 4
   c) Write a brief note on origin of lung in animal. 4
   d) How root effect contributes to the gaseous secretion of fish's gas bladder? 4

6. Answer any one question from the following: 1×8=8

a) State the human lineage from the fossil. State the features of Cro-Magnon man. What was the controversy with Sahelanthropus in tracing human phylogeny? 2+2+4

b) How echolocation signals vary with the niche of bats? What are the sensory adaptations of bat's basilar membrane for echolocation? Diagrammatically represent the double pumping mechanism of fish respiration. 2+2+4

JHARGRAM RAJ COLLEGE

M.Sc. Semester-I Examination, 2022

ZOOLOGY

Paper-ZOO 102

Time- 2 hours **Use Separate Scripts for Each Group** Full Marks- 40

Each question carries EQUAL *mark*

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

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ZOO 102.1

(Histochemistry)

7. Answer any two questions from the following: 2×2=4
   e) Name IHC markers of adult B cells and helper T cells.
   f) State the principle of simultaneous capture technique in case of EHC (enzyme histochemistry).
   g) What are the objective of fixation in tissue processing for histochemistry?
   h) What is antigen retrieval in immunohistochemistry?

8. Answer any two questions from the following: 2×4=8
   e) Write a note on Heat Induced Epitope Retrieval (HIER). 4
   f) What is the importance of endogenous peroxidase blocking step in IHC. 4
   g) Differentiate between (i) orthochromasia and metachromasia (ii) stain and dye 2+2
   h) Write the workflow of HE staining from collection of tissues to the mounting of sections. 4

9. Answer any one question from the following: 1×8=8
   c) Write the working principle of DAB staining and benzidine reaction for myeloperoxidase in blood smear. 4+4
   d) Write short notes on any four: (i) Amphoteric dye (ii) Mayer's albumin (iii) Mordants (iv) Gomori's reaction for alkaline phosphatase (v) Reporter enzymes 2+2+2+2

ZOO 101.2

(Animal physiology)

10. Answer any two questions from the following: 2×2=4
    e) What kind of reactions are going on between free radicals and antioxidants?
    f) What is Haldane effect?
    g) State the role of Hif-1 in hypoxia.
    h) Distinguish between myogenic and nemogenic heart with suitable example.

11. Answer any two questions from the following: 2×4=8
    e) What is thermogenesis? How do lizards maintain core heat? 2+2
    f) What is mean arterial pressure? Write a note on its regulation mediated by renin-angiotensin-aldosterone system. 1+3

g) Comment on R and T states of haemoglobin. Distinguish between Extrinsic and Intrinsic pathway of prothrombin activator formation. 2+2

h) Compare Preload and Afterload. Draw the action potential curve of ventricle and mention different phases. 2+2

12. Answer <u>any one</u> question from the following: 1×8=8

c) Describe the different 'diving responses' showed by marine tetrapods instead of prolonged anaerobiosis. Write a note on the autonomic regulation of heart rate. 4+4

d) Define homeostasis. Discuss the different components of a feedback system with suitable example. Explain the relationship of ECG waves with atrial and ventricular systole of heart. 1+3+4

JHARGRAM RAJ COLLEGE

M.Sc. Semester-I Examination, 2022

ZOOLOGY

Paper-ZOO 103

Time- 2 hours **Use Separate Scripts for Each Group** Full Marks- 40

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

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ZOO 103.1

(Immunology)

13. Answer any two questions from the following: 2×2=4
    i) What is isotype switching?
    j) What are the advantages of ELISA and RIA.
    k) Define Hapten with suitable example.
    l) What is the role of IL7 in B cell maturation.

14. Answer any two questions from the following: 2×4=8
    i) Describe the Lectin pathway with suitable diagram. 4
    j) Write a short note on NKT cells. What do you mean by graft rejection? 3+1
    k) Why the hypervariable region of the heavy chain donates maximum variability in the paratope of an immunoglobulin molecule. 4
    l) Comment on the oxygen dependent and oxygen independent mechanisms of clearance of pathogen by a macrophage. 4

15. Answer any one question from the following: 1×8=8
    e) Write a brief account on principle and procedure of Southern blot hybridization. Mention two key differences between exogenous and endogenous antigen processing pathway. 6+2
    f) i. A new-born child having blood group A+ generates anti-B antibody only after the age of ten to twelve months - explain the phenomenon in the light of allelic exclusion principle.
    ii. Write a short note on the structure of MHC II. 4+4

ZOO 103.2

(Methods in biology)

16. Answer any two questions from the following: 2×2=4
    i) State the types of probes used in FISH.
    j) What is a shuttle vector and why it is used?
    k) State two significant differences between bioventing and biospraging?
    l) Write the importance of buffer loading dye and ethidium bromide in Agarose gel electrophoresis.

17. Answer any two questions from the following: 2×4=8

i) State the limitation of microbial bioremediational process. Define relative centrifugal force. 3+1

j) State the role of β mercapthenol, APS, glycine and SDS in electrophoresis of proteins. 1+1+1+1

k) What is cDNA library? State the two major problems while freezing biological items. 2+2

l) What is Nested Primer? State the role of SYBR green in qPCR 1+3

18. Answer <u>any one</u> question from the following: 1×8=8

e) Comment on different mechanisms of biomineralization. What is quantitative real time PCR and how it is quantified? Write the significance of T_m value in PCR. 3+3+2

f) Write two applications of flow cytometry. State the role of constructed wetland in phytoremediation.4+4

JHARGRAM RAJ COLLEGE

M.Sc. Semester-I Examination, 2022

ZOOLOGY

Paper-ZOO 104

Time- 2 hours **Use Separate Scripts for Each Group** Full Marks- 40

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ZOO 104.1

(Cell Biology)

19. Answer <u>any two</u> questions from the following: 2×2=4
    m) What do you mean by processivity of the motor proteins?
    n) Why ubiquitin is essential for proteasome-mediated degradation?
    o) Mention the differences between flippase and floppase.
    p) Write down the significance of PDI.

20. Answer <u>any two</u> questions from the following: 2×4=8
    m) How do fibronectin and laminin contribute to embryonic development? What are MMPs? 3+1
    n) Write down the mechanism of SRP mediated translocation of protein with a clear diagram. 4
    o) Describe activation of Ras with schematic representation. What is juxtacrine cell signalling? 3+1
    p) What is the mechanism of formation of second messenger IP3? What is the relationship between the formation of IP3 and an elevated level of Ca^{2+}? 4

21. Answer <u>any one</u> question from the following: 1×8=8
    g) [i] Illustrate the cell cycle regulation from G1 to S with diagram.
    [ii] State the role of protein phosphatases in cell cycle regulation.
    [iii] Write a note on Anaphase promoting Complex. 4+2+2
    h) What are MAPs? Enumerate the structural organization of microtubule with suitable diagram. What is microtubular dynamics instability? 1+5+2

ZOO 104.2
(Cytogenetics)

22. Answer <u>any two</u> questions from the following: 2×2=4
    m) State two limitations of cis-trans test.
    n) State the Hardy-Weinberg Law.
    o) What is sexduction?
    p) Why Hft lysates are preferentially used in transduction experiments than Lft lysates?

[Turn over

23. Answer any two questions from the following: 2×4=8

m) Graphically represent the relationship between allele frequencies and genotype frequencies for a locus with two alleles. State the different aspects of the relationship. 2+2

n) Write a short note on RSV genome organization. 4

o) Five different rII deletion strains of phage T_4 were tested for recombination by pairwise crossing in *E. coli* B. The following results were obtained, where + = r^+ recombinants produced and o = no r^+ recombinants produced. Draw a deletion map compatible with following data: 4

	A	B	C	D	E
E	0	+	0	+	0
D	0	0	0	0	
C	0	0			
B	+	0			
A	0				

p) [i] Differentiate between Generalized transduction and Specialized transduction. [ii] In a transduction experiment the donor was $c^+d^+e^+$ and the recipient was c d e. Selection was for c+. The four classes of transductants from this experiment are shown in the following table:

Class	Genetic composition	Number of individuals
1	$c^+d^+e^+$	57
2	c^+d^+e	76
3	$c^+d\ e$	365
4	$c^+d\ e^+$	2

Determine the cotransduction frequency for c^+ and d^+ & c^+ and e^+ 2+(1+1)

24. Answer any one question from the following: 1×8=8

g) [i] Explain the mechanism of Signal transduction and regulation of gene expression by oncoproteins.

[ii] A tribal population in jungle-mahal, the frequencies of alleles determining the ABO blood groups were estimated as 0.74 for i, 0.16 for I^A and 0.10 for I^B. Assuming random mating, what are the expected frequencies of ABO blood types? 4+4

h) [i] How do you determine whether two different rII mutations are at same locus or not with explanations.

[iii] Following are the number of colonies of different transformant classes from a cross of trp^+, his^+, tyr^+, as the donor with trp^-, his^-, tyr^- as the recipient.

1. $trp^-his^-tyr^-$ =685,
2. $trp^-his^+tyr^-$ =418
3. $trp^-his^+tyr^+$ =3660
4. $trp^+his^-tyr^-$ =2660
5. $trp^+his^-tyr^+$ =107
6. $trp^+his^+tyr^-$ =1180
7. $trp^+his^+tyr^+$ =11940

Calculate the linkage distances between the genes and construct the linkage map. 4+(3+1)

JHARGRAM RAJ COLLEGE
M.Sc. Semester II Examination, 2022
ZOOLOGY
Paper- ZOO 201

Time- 2 hour **Use separate scripts for each unit** Full Marks- 40

The figures in the right-hand margin indicate marks
Candidates are required to give their answers in their own words as far as practicable

Unit I: ZOO 201.1
(Biosystematics)

1. Answer ***any two*** questions: 2×2=4

a) In case of DNA barcoding, what gene come under consideration and why?

b) Differentiate nomenclature from taxonomy.

c) Why typological species concept faces challenges with sibling species?

d) What do you mean by character and character state?

2. Answer ***any two*** questions: 2×4=8

a) "Evolutionary species concept adds an evolutionary time dimension to the biological species concept" – justify the statement. 4

b) What is typological species concept and why it still remains valid in the era of molecular systematics? 4

c) Write a note on criticism of biological species concept. 4

d) Discuss how naming of living organisms could be done as per taxonomical rule. 4

3. Answer ***any one*** question: 1×8=8

a) What are the underlying principles of zoological codes?

b) Write a note on ICZN.

[TURN OVER]

Unit II: ZOO 201.2
(Ecological Principles)

4. Answer ***any two*** questions: 2×2=4

a) Why an ecosystem is considered as a cybernetic system?

b) Distinguish between age specific and time specific life table.

c) Mention the features of a stable community.

d) What do you mean by edge effect?

5. Answer ***any two*** questions: 2×4=8

a) Give an account of different types of ecotones. What is the relation of edge/area ratio with fragmentation? 3+1

b) State the role of keystone species in maintenance of stability in an ecosystem. What does the principle competitive exclusion result when two species compete for the same resource? 2+2

c) What are nodes and links of a food web? What is the linkage density if number of species and links are 4 and 3 respectively? 2+2

d) Explain Bet Hedging strategy with example. 4

6. Answer ***any one*** question: 1×8=8

a) What are resistance stability and resilience stability? Explain niche width and resource partitioning. What are ecological equivalents? 2+4+2

b) Find out the effective population size in a population of 500 rats with female: male 1:1, when all the females breed with only 10 males. Explain Lotka Voltera model of prey-predator interaction. State the role of exotic species with one example. 1+5+2

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JHARGRAM RAJ COLLEGE

M.Sc. Semester II Examination, 2022

ZOOLOGY

Paper- ZOO 202

Time- 2 hours **Use separate scripts for each unit** Full Marks- 40

The figures in the right-hand margin indicate marks
Candidates are required to give their answers in their own words as far as practicable

Unit I: ZOO 202.1

(Biophysics)

1. Answer ***any two*** questions:

   2×2=4

   a) State two biological significance of micelles.

   b) How does unsaturated and lower fatty acid affect the membrane fluidity?

   c) Comment on SUV (small unilamellar vesicle) and GUV (giant unilamellar vesicle).

   d) Why is it useful for blood to travel slowly through capillary beds?

2. Answer ***any two*** questions:

   2×4=8

   a) Write down the Hagen-Poiseuille's equation. State its significance in haemodynamics.2+2

   b) State and explain Gibbs-Donnan effect. Mention two biological applications of it. 3+1

   c) "Hypoproteinemia and anemia are responsible for turbulence in blood circulation"- justify. What is osmotic work? 3+1

   d) Mention the importance of Reynolds number of blood flow in coronary and femoral arteries. 4

3. Answer ***any one*** question:

   1×8=8

a) State the Bernoulli's principle. "Very slight changes in diameter of a vessel can change its conductance tremendously" – elaborate the statement. 2+6

b) Define resting membrane potential. Write down the Nernst equation. Give a brief account on the origin of RMP. What is spike potential? 1+2+3+2

[TURN OVER]

Unit II: ZOO 202.2

(Biochemistry)

4. Answer ***any two*** questions:

   2×4=8

   a) Define abzyme and ribozyme.

   b) Give two biological examples where hydrophobic effect plays a vital role.

   c) What are the components of proton motive force?

   d) Differentiate between PFK-1 and PFK-2.

5. Answer ***any two*** questions:

   2×4=8

   a) How substrate cycling in glycolytic pathway help some insects to remain active in relatively low temperature? Name the constituent enzymes of PDH complex. 3+1

   b) Write a short note on suicide inhibition of enzyme action. 4

   c) State the significance of hydrogen bonding in biological macromolecules. 4

   d) Write a brief note on the structure of ATP synthase. State its role in oxidative phosphorylation. 3+1

6. Answer ***any one*** question:

   1×8=8

a) “Glutamate, glutamine and alanine play critical roles in nitrogen metabolism” – elaborate the statement. How isomerase helps in oxidation of unsaturated fatty acid? (2+2+2)+2

b) State the role of carnitine in transport of long chain fatty acids. Explain the process of melatonin biosynthesis from its precursor amino acid. 4+4

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JHARGRAM RAJ COLLEGE

M.Sc. Semester II Examination, 2022

ZOOLOGY

Paper- ZOO 203

Time- 2 hour **Use separate scripts for each unit** Full Marks- 40

The figures in the right-hand margin indicate marks
Candidates are required to give their answers in their own words as far as practicable

Unit I: ZOO 203.1

(Molecular Biology)

7. Answer ***any two*** questions: 2×2=4
   a) State the role of Pol γ and Pol δ in eukaryotic replication.
   b) Why O^C mutation is Cis-Dominant but I^S mutation is Trans Dominant?
   c) State the importance of KOZAK sequence.
   d) What is SELEX? State its application.

8. Answer ***any two*** questions: 2×4=8
   a) Briefly describe the region-specific interaction of σ^{70} with the transcription promoter. 4
   b) Write a note on the role of DNA methylation in regulation of eukaryotic transcription.4
   c) State the role of EF-TU and EF-TS in Translation. 2+2
   d) How $3^{/}$ UTR binding proteins help in translation initiation in eukaryotes? 4

9. Answer ***any one*** question: 1×8=8
   a) What is end replication problem? "Sliding DNA clamps increase the processivity of associated DNA polymerase during replication" explain the statement with proper justification. 2+6=8
   b) Draw and describe the structure of 'Repressor' molecule of lac operon. Comment on the positions & consequences of different mutations of 'Repressor' in repression. How does binding of inducer releases repressor from operator? 3+3+2

Unit II: ZOO 203.2

(Parasitology)

10. Answer ***any two*** questions: 2×2=4
    a) What do you mean by exflagellation?
    b) Define zoonosis with example.
    c) Define commensalism with one example from human.
    d) What are mechanical vector and biological vector?

11. Answer ***any two*** questions: 2×4=8
    a) How molecular mimicry helps parasite to escape host's immune response. 4
    b) Describe the life cycle of *Leishmania sp*. with labelled diagram. 4
    c) Which stage of *Plasmodium sp*. invades the RBC? What is the mechanism of RBC invasion by parasites? 1+3
    d) Describe the structure of cestode tegument with suitable diagram. 4

12. Answer ***any one*** question: 1×8=8
    a) Briefly describe the mechanism of surface antigen change in parasite to avoid host immune response. What do you mean by antigenic capping? 5+3
    b) Discuss the role of sandfly saliva in promoting Leishmania transmission. Give example of one soft tick and one hard tick. Mention the control measure of tick. 4+2+2

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JHARGRAM RAJ COLLEGE

M.Sc. Semester-III Examination, 2021

ZOOLOGY

Paper-ZOO 301

Time- 2 hours **Use Separate Scripts for Each Group** Full Marks- 40

Each question carries EQUAL *mark*

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

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ZOO 301.1

(Basic and applied Entomology)

25. Answer any two questions from the following: 2×2=4
    q) State the advantages of opisthognathous orientation of head.
    r) What is the significance of extra-oral digestion?
    s) What do you mean by apolysis?
    t) What are non-insect hexapods?

26. Answer any two questions from the following: 2×4=8
    q) Give a brief account of different types of wing coupling found in insect wing. 4
    r) Name one steroid and one lipid hormone that are instrumental in insect metamorphosis. Why is corpus cardiacum called a neurohaemal organ? 2+2
    s) Enumerate the structure of light producing organ of firefly. 4
    t) What is the utility of diapause in temperate and tropical regions? How is diapause different from quiescence? 2+2

27. Answer any one question from the following: 8×1=8
    i) Describe the life cycle of a coleopteran major pest for stored grain. How is economic injury level different from economic threshold? 6+2
    j) Give a brief account of different cell types of insect midgut. State the significance of peritrophic matrix. 5+3

ZOO 301.2

(Ecotoxicology)

28. Answer any two questions from the following: 2×2=4
    q) Define therapeutic index.
    r) What do you mean by dispositional antagonism?
    s) Mention two toxicological effect of lead.
    t) What do you mean by toxicological bioavailability of xenobiotics?

29. Answer any two questions from the following: 2×4=8
    q) State the purpose of genetic toxicological assay. Comment on Comet assay. 2+2
    r) Comment on immunomodulation by organophosphate and organochlorine pesticide in human. 4
    s) Comment on the factors that influence the toxicity of xenobiotics in an aquatic environment. 4

t) State the significance of ‘Three Ps’ of toxicology. 4

30. Answer <u>any one</u> question from the following: 8×1=8

i) Comment on different types of DNA damages that was caused by mutagenic toxins. Elucidate the role of carboxyl esterase towards removal of xenobiotic compounds. 4+4

j) Write a short note on different types of exposure systems in laboratory aquatic toxicological practices. Comment on any two molecular biological approaches of immunotoxicology. 4+4

JHARGRAM RAJ COLLEGE

M.Sc. Semester-III Examination, 2021

ZOOLOGY

Paper-ZOO 301

Time- 2 hours **Use Separate Scripts for Each Group** Full Marks- 40

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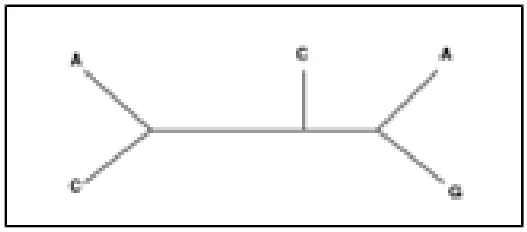
ZOO 302.1

(Molecular Evolution)

31. Answer any two questions from the following: 2×2=4
    a) What are the destabilizing forces of Hardy-Weinberg equilibrium?
    b) Write a short note on neo-Darwinism.
    c) Differentiate paralogs from orthologs.
    d) Differentiate synapomorphy from symplesiomorphy.

32. Answer any two questions from the following: 2×4=8
    u) Write down the principles of micro-complement fixation. 4
    v) How many branches will be there on a tree with 'x'-number of tips? 4
    w) What will be the volume of tree space if you have n-tips? 4
    x) How do we find the maximum parsimony tree for a given data? Briefly write down the steps. 4

33. Answer any one question from the following: 8×1=8
    k) Write down the steps of determining the length of the given phylogenetic tree using Fitch algorithm. 8



    l) i. What are the axioms of Juke & Cantor model?
       ii. How clustering methods differ from distance-based methods. 4+4

ZOO 302.2

(Microbiology)

34. Answer any two questions from the following: 2×2=4
    u) Define growth rate and generation time. Give an example of thermophile bacteria.
    v) What is auto inducer? Give an example.
    w) What is Prion? Give two examples of Prion disease.
    x) State the difference between enriched and differential media with examples.

35. Answer <u>any two</u> questions from the following: 2×4=8

u) Explain magnetosome with its function. Write down two key properties of complex media. 2+2

v) What is acid fast bacteria? Comment on its cell wall structure. 2+2

w) What is a biofilm? Mention two ways in which a biofilm is advantageous for microbes. 2+2

x) What are thermoacidophiles? Why growth yields of most methanogens are much lower than those of microbes that grow aerobically? 2+2

36. Answer <u>any one</u> question from the following: 8×1=8

k) Discuss the detailed mechanism of bacterial chemotaxis. Why Gram-negative bacteria are more pathogenic than Gram-positive. 6+2

l) What is quorum sensing? Describe how does it occur? Describe the five phases of microbial growth curve observed when microbes are grown in a batch culture. 2+2+4

JHARGRAM RAJ COLLEGE

M.Sc. Semester-III Examination, 2022

ZOOLOGY

Paper-ZOO 303B

Ecology Special Paper

Time- 2 hours **Use Separate Scripts for Each Group** Full Marks- 40

Each question carries EQUAL *mark*

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

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ZOO 303B.1

(Biodiversity & Conservation Ecology)

37. Answer any two questions from the following: 2×2=4
    u) Distinguish between species reintroduction and translocation.
    v) What do you mean by Nagoya protocol?
    w) Write down the selection criteria of biodiversity hotspot.
    x) State the role of CITES in wildlife crime.

38. Answer any two questions from the following: 2×4=8
    y) Define JFM. State its background and implications. 1+3
    z) Comment on the component, working principle and advantage of GIS. $1^1/_2+1^1/_2+1$
    aa) State the salient features of conservation strategy of major wildlife in West Bengal mentioning one Heritage site of the state. 4
    bb) Define protected area and its importance with implementation of flagship species in the context. 1+2+1

39. Answer any one question from the following: 8×1=8
    m) What is the primary objective of telemetry? Distinguish a tiger from a tigress through pugmark. Define biodiversity hotspot & megadiversity country with examples. $1+2+2^1/_2+2^1/_2$
    n) Write down the distribution, habitat preference and conservation initiative of Great Indian Bustard. Discuss the major threat of wild elephant in India. (1+1+3)+3

ZOO 303B.2

(Aquatic Ecology)

40. Answer any two questions from the following: 2×2=4
    y) What are upwelling and mesoscale process in ocean?
    z) What do you mean by bathyplankton and rheoplankton?
    aa) Name a bioremediation process for river ecosystem?
    bb) Distinguish between sewage and sludge.

41. Answer any two questions from the following: 2×4=8
    y) What is fluvial hydrosystem approach? 4
    z) Define wetland. Comment on the distribution of wetland in India. 1+3

aa) What do you mean by water right? What is hydrological budget of the earth? Mention any two activities included in water conservation strategy. 1+2+1

bb) Distinguish between conservation and restoration. What are the strategies for conservation of coastal dunes? 1+3

42. Answer <u>any one</u> question from the following: 8×1=8

m) State the relation between mangrove forest and coral reef ecosystem. What is marine snow? Point out geomorphological features of coastal ecosystem. 2+2+4

n) Discuss the problems and management of coral ecosystem. Mention different types of waste water management. What is NRCD? 5+2+1

JHARGRAM RAJ COLLEGE

M.Sc. Semester-III Examination, 2022

ZOOLOGY

Paper-C ZOO 304

(CBCS)

Time- 2 hours **Use Separate Scripts for Each Group** Full Marks- 40

Each question carries EQUAL *mark*

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

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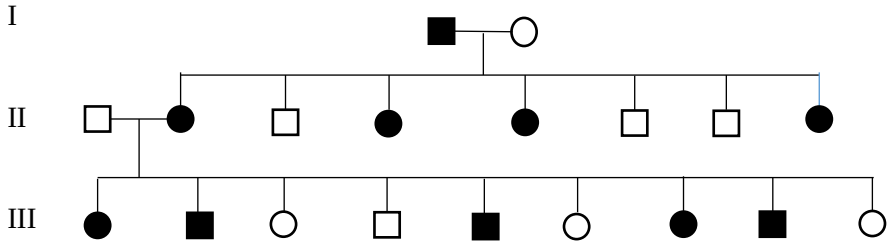
C ZOO 304.1

(Genetics)

43. Answer <u>any two</u> questions from the following: 2×2=4
    - y) Define linkage and give example.
    - z) State two important criteria to identify X-linked recessive traits.
    - aa) What do you understand by 'Genic balance System'?
    - bb) Distinguish between constitutive heterochromatin and facultative heterochromatin.

44. Answer <u>any two</u> questions from the following: 2×4=8
    - cc) What is linkage group? What is the probability that two (2) out of five (5) offsprings will have blue eyes in the cross Bb x Bb [where B= Brown eye dominant over b= blue eye]? 1+3
    - dd) Briefly describe the nucleosome structure with suitable diagram. 4
    - ee) Pedigree pattern of a trait followed through three generations. Identify the nature of trait and justify your answer. 1+1+2



    - ff) Write a short note on charging of t-RNA. 4

45. Answer <u>any one</u> question from the following: 8×1=8
    - o) (i) Using a flow chart show case the sex determination mechanism of both male and female *Drosophila* along with role of genes in correct order.
      (ii) Suppose you have carried out a series of two point crosses for four genes (A,B,C,D) and obtained the following recombination frequencies :

Gene loci in test cross	Recombination frequency %

A and B	50
A and C	50
A and D	50
B and C	25
B and D	6
C and D	29

Map the 4 loci showing their linkage groups, order of the loci in each linkage group, the distance between the loci of each group. 5+3

p) The following three recessive markers are known in lab mice: h (hot foot), o (obese) and w (waved). A trihybrid of unknown origin is test crossed, producing the following offsprings:

Phenotype	Number
h o w	357
+ + +	343
h o +	74
+ + w	66
+ o +	79
h + w	61
+ o w	11
h + +	9
	1000

Find out the correct gene order. Calculate the map distance and coefficient of coincidence and comment on the interference. 1+4+2+1

C ZOO 304.2
(Haematology)

46. Answer <u>any two</u> questions from the following: 2×2=4
    cc) Name the location of haemopoietic tissue in arthropod and mammalia.
    dd) What do you mean by ESR?
    ee) Write the location and function of EpoR.
    ff) Describe the fate of RBC after death.

47. Answer <u>any two</u> questions from the following: 2×4=8
    cc) Why pernicious anaemia is also known as megaloblastic anaemia? What are its symptoms? 1+3
    dd) How embryonic stem cells are different from adult stem cells? What is perpura? 2+2
    ee) What is thalassemia? Write the role of megakaryocyte? 2+2
    ff) What do you mean by primary and secondary lymphoid organs? Describe the symptoms of chronic lymphocytic leukaemia. 2+2

48. Answer <u>any one</u> question from the following: 8×1=8
    o) Discuss the process of erythropoiesis. Mention the regulating factors of erythropoiesis. 5+3

p) What is coagulation? State briefly the role of platelets in coagulation. Mention the factors involved in coagulation. 1+4+3

JHARGRAM RAJ COLLEGE

M.Sc. Semester IV Examination, 2022

ZOOLOGY

Paper- ZOO 401

Time- 2 hour **Use separate scripts for each unit** Full Marks- 40

The figures in the right-hand margin indicate marks
Candidates are required to give their answers in their own words as far as practicable

Unit I: ZOO 401.1
(Environmental Pollution & Management)

4. Answer ***any two*** questions: 2×2=4

a) What is the cause of Minamata disease and Blackfoot disease?
b) State two criteria of Alien Invasive Species.
c) Name the environmental movements that are known as "Southern version of Chipko movement" and "Green Game Political Populism".
d) State two objectives of World Conservation Strategy.

5. Answer ***any two*** questions: 2×4=8
   a) Write a short note on the role of global warming in bioinvasion. 4
   e) Write about degradable and nondegradable pollutants with example. What do you mean by biological magnification? 2+2
   f) Comment on different stress indicators in aquatic ecosystem. 4
   g) State the causes and effects of eutrophication. 4

6. Answer ***any one*** question: 1×8=8
   c) Comment on the effect of greenhouse gases on human life. Write a note on global warming. 4+4
   d) Why do oligochaetes consider as highly suitable organism for bioindicator? How fishing activities and marine transportation industries aid the process of bioinvation? State one chemical and one genetical microbiological technique, that are used in biomonitoring. 3+3+2

Unit II: ZOO 401.2
(Biostatistics)

4. Answer ***any two*** questions: 2×2=4
   a) Why cannot the value of SD never be negative?
   b) What is the difference between SD & SE?
   c) Write down the Bayes' theorem and multiplication rule.
   d) What is histogram? How does it differ from Bar graph?

5. Answer ***any two*** questions: 2×4=8

a) During their first swim through a water maze, 15 laboratory rats made the following number of errors: 2, 17, 5, 3, 28, 7, 5, 8, 5, 6, 2, 12, 10, 4, 3. Find the mean, median, mode & Inter Quartile Range (IQR) of the data set. 4

b) Indicate whether the following skewed distributions are positively skewed because the mean exceeds the median or negatively skewed because the median exceeds the mean.

i) a distribution of test scores on an easy test, with most students scoring high and a few students scoring low. 2

ii) a distribution of ages of college students, with most students in their late teens or early twenties and a few students in their thirties or fourties. 2

e) Indicate whether each of the following statements typifies descriptive statistic/ or inferential statistics. 4

i) Students in your statistics class are, on average, 23 years old.
ii) The population of the world exceeds 7 billion.
iii) Either four or eight years have been the most frequent terms of office served by Indian Prime Ministers
iv) Twenty-four percent of all college students favour further higher education (e.g., Ph.D.)

f) Write note on :

i) Null hypothesis. 2
ii) Degrees of freedom. 2

6. Answer ***any one*** question: 1×8=8

a) Assume that the burning times of electric bulbs approximate a normal curve with a means of 1200 hours and a standard deviation of 120 hours. In a large number of new lights are installed at the same time along a newly open road, at what time will

i) 1% fail?

ii) 50% fail?

[Provided area under standard normal curve with t values

Area		z
0.01	⟶	- 2.33
0.5	⟶	0.0]

iii) If a new inspection procedure eliminates the weakest 8% of all light before they are marketed, the manufacturer can safely offer customer's money back guarantee on all light that fail before how many hours of burning time. 2+2+4

b) What is standard normal curve? Assume that GATE scores approximate a normal curve with a mean of 600 and a standard deviation of 100. Sketch a normal curve and shade in the target area described by each of the following scores: less than 400; more than 650; less than 700. 2+6

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JHARGRAM RAJ COLLEGE
M.Sc. Semester IV Examination, 2022
ZOOLOGY
Paper- ZOO 402

Time- 2 hour **Use separate scripts for each unit** Full Marks- 40

The figures in the right-hand margin indicate marks
Candidates are required to give their answers in their own words as far as practicable

Unit I: ZOO 402.1
(Developmental Biology)

7. Answer ***any two*** questions: 2×2=4

a) How does specification differ from determination?

b) What is Apical Ectodermal Cap (AEC)?

c) State the role of Resact?

d) Name two BMP inhibitors that help ectodermal cells to become neural tissue.

8. Answer ***any two*** questions: 2×4=8

a) Give a brief account on Instructive and Permissive induction with suitable example. 4

h) State the significance of acrosome reaction during fertilization in sea urchin. 4

i) "The fast block to polyspermy is achieved by changing the electric potential" – Explain it. 4

j) Describe in brief the role of Ca^{++} in the activation of mammalian egg. 4

9. Answer ***any one*** question: 1×8=8

g) i) What do you mean by primary embryonic induction?

ii) How does β- catenin get localized specifically opposite to the point of sperm entry? 2+6

h) i)What is morphallactic regeneration?

ii)"Head region of *Hydra* acts both as an organizing region and as an inhibitor of inappropriate head formation" – justify the statement. 2+6

Unit II: ZOO 402.2
(Neuroendocrinology)

4. Answer ***any two*** questions: 2×2=4

   a) What is neuropeptide?

   b) State the cognition related symptoms of Alzheimer's disease.

   c) Mention name and functional mechanism of two animal produced neurotoxins.

   d) State the role of Heat Shock Protein in steroid hormone receptor action.

5. Answer ***any two*** questions: 2×4=8

   a) Write a short note on localization of cytokine receptor in brain. 4

   b) What is the precursor molecule of melatonin? With diagram describe the regulation of melatonin synthesis. 1+3

   i) Define MEPP. Write a short note on electrical synapse. 2+2

   j) Gamma amino butyric acids (GABA) functions both as inhibitory and excitatory neurotransmitter – explain. 4

6. Answer ***any one*** question: 1×8=8

   a) i) Describe the role of α – synuclein in the development of Parkinsonism.

   ii)Write a short note on diagnosis and management of Myasthenia Gravis. 6+2

   b) i) What is nuerite guidance?

   ii) Discuss the role of agrin and neuregulin in synaptogenesis.

   iii)Mention the different types of receptor system that involved in neurotropin signaling. 2+4+2

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JHARGRAM RAJ COLLEGE
M.Sc. Semester IV Examination, 2022
ZOOLOGY
Paper- ZOO 403B
ECOLOGY SPECIAL PAPER

Time- 2 hour **Use separate scripts for each unit** Full Marks- 40

The figures in the right-hand margin indicate marks
Candidates are required to give their answers in their own words as far as practicable

Unit I: ZOO 403B.1
(System Ecology)

10. Answer ***any two*** questions: 2×2=4

a) What are analytical and simulation models?

b) Why littoral zone is considered as most productive?

c) What is TEEB?

d) State evolutionary time hypothesis.

11. Answer ***any two*** questions: 2×4=8

a) Write a note on supporting service of ecosystem with example. 4

k) Discuss the merits and demerits of ecotourism. 4

l) Mention the rationale of ecorestoration. What do you mean by least and more intensive process of ecorestoration. 2+2

m) Explain deterministic and stochastic models emphasizing their differences. 4

12. Answer ***any one*** question: 1×8=8

k) i) Distinguish between natural and man made forest.

ii)Describe any three types of tropical forests in India after Champion and Set (1963). 2+6

l) i)What do you mean by dominant species in a community?

ii)Give example of a dominant species which is not a top carnivore.

iii)How does harshness factor play a role in community?

iv) Explain the importance of Shannon Index in a community with example. 2+1+2+3

Unit II: ZOO 403B.2
(Human Ecology)

4. Answer ***any two*** questions: 2×2=4

   a) What do you mean by bioinvasion?

   b) What is carbon trading?

   c) Mention four sources of indoor pollution.

   d) Define environmental management system.

5. Answer ***any two*** questions: 2×4=8

   a) Discuss the objectives of watershed management. 4

   b) What are the criteria for awarding ecomark? 4

   c) What is photochemical smog? How it is generated? What is thermal inversion? 1+2+1

   d) Discuss the benefits and drawbacks of EIA. 2+2

6. Answer ***any one*** question: 1×8=8

   a) i) What is acid rain?

      ii) State the chemistry of acid rain.

      iii)What is dry deposition?

      iv)Discuss the ecological effect of acid rain. 1+2+1+4

   b) i) What are hazardous and non-hazardous wastes.

      ii) Give an account of effects and control measure of biomedical wastes. 3+5

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