Chhatrapati Shahu Ji Maharaj
University, Kanpur

Answer Script Details
Barcode 11526986

Roll No. 24080022030
Total Mark 42/75.00

Exam M.SC-III_ODD_EXAM_NOV_2025
Subject B050901T - Ethology Biodiversity and Wildlife Conservat

Question wise Mark Summary

Q.No	Mark	Q.No	Mark	Q.No	Mark	Q.No	Mark
1A	3/5						
1B	3/5						
1C	3/5						
1D	3/5						
1E	3/5						
1F	3/5						
1G	3/5						
1H	3/5						
1I	3/5						
2	0/15						
3	0/15						
4	0/15						
5	7/15						
6	0/15						
7	0/15						
8	0/15						
9	8/15						

Chhatrapati Shahu Ji Maharaj University
Kanpur, Uttar Pradesh

PART-I

Date of Exam: 02/12/2025 Shift: 3rd Room No.: 24

Paper Code: B050901T Subject: Zoology Paper I Year/Sem.: 3rd

Name of Candidate: ALSHIFA ALAM

Roll No.: 2 4 0 8 0 0 2 2 0 3 0

Signature of Candidate | Signature of Invigilator | COE Facsimile

PART-II

MARKS OBTAINED

Q.	1	2	3	4	5	6	7	8	9	10
(a)										
(b)										
(c)										
(d)										
(e)										
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(g)										
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(i)										
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Total										

Total Marks in Figures | Max. Marks

Total Marks in Words

B050901T

Paper Code

Signature of Evaluator

PART-III

Course: M.Sc. Final Zoology

Session: 2025-26 Year/Semester: 3rd

Subject: Zoology Paper I

Paper Code: B 0 5 0 9 0 1 T

Exam Date: 0 2 1 2 2 0 2 5

Name of Candidate: ALSHIFA ALAM

Father's Name: MOHD ALAM

महाविद्यालय का कोड College Code: K N 0 4

परीक्षा केन्द्र का कोड Exam Centre Code: K N 0 4

परीक्षा का प्रकार Type of Exam: संस्थागत Regular ● भूतपूर्व परीक्षार्थी Ex. Student ○ व्यक्तिगत Private ○ बैक पेपर परीक्षा Back paper Exam ○

ANSWER BOOKLET NO.

11526986

B050901T

Paper Code

PART-IV

नामांकन संख्या Enrollment Number: C S J M A 2 4 0 0 0 0 1 3 7 8 9

परीक्षार्थी अनुक्रमांक संख्या Candidate's Roll Number: 2 4 0 8 0 0 2 2 0 3 0

पेपर कोड Paper Code: B 0 5 0 9 0 1 T

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नोट : 1. परीक्षार्थी को निर्देशित किया जाता है कि आवरण पन्ने के पृष्ठ भाग पर अंकित सभी निर्देशों को सावधानी पूर्वक पढ़ें। 2. बॉक्स में भरी जाने वाली प्रविष्टियाँ बायीं तरफ से शुरू की जायें। 3. गोलों को काले या नीले बॉलपेन से भरा जायें।

INSTRUCTIONS TO THE CANDIDATE FOR FILLING PART-I

1. Read the instructions carefully given on the answer script and admit card.
2. Write Date of Exam, Shift, Paper Code & Name of Subject Correctly.
3. Write Name & Roll No. Correctly.
4. Write Semester & Branch Correctly.

INSTRUCTIONS TO THE CANDIDATE FOR FILLING PART-III

1. Use blue or black ball point pen for writing alphabets & numerals in ☐ Boxes.
2. Carefully study the example before you start marking.
3. As shown in the example below blacken the circles completely.

Correct method	Incorrect method
① ● ③ ④	✓ ✗ ◉ ⊘

4. Make no Stray marks on this sheet.
5. **DO NOT WRITE OR MARK ON THE BAR CODE.**

परीक्षार्थी के लिए निर्देश

1. प्रश्न पत्र एवं उत्तर पुस्तिका पर दिये गये निर्देशों को ध्यान से पढ़ें।
2. कवर पृष्ठ के दूसरी तरफ कुछ न लिखें।
3. उत्तर पुस्तिका के पृष्ठों पर दोनों तरफ लिखें।
4. प्रश्न पत्र पर अपने अनुक्रमांक के अतिरिक्त कुछ न लिखें।
5. प्रश्न पत्र कोड एवं प्रश्न पत्र कोड सावधानी पूर्वक लिखें।
6. अपनी स्थिति स्पष्ट लिखें।
7. उत्तर पुस्तिका के पृष्ठों की संख्या देखें। अगर उत्तर पुस्तिका में पृष्ठ (1–24) से कम है या फटे हुए हैं तो परीक्षा शुरू होने के पूर्व दूसरी उत्तर पुस्तिका ले लें।
8. प्रश्नपत्र को देख, यदि प्रश्नपत्र के विषय कोड, विषय का नाम तथा प्रश्न में कोई त्रुटि है तो उसके परीक्षा शुरू होने के 30 मिनट के अन्दर कक्ष निरीक्षक को तत्काल सूचित करें, उसके बाद विश्वविद्यालय द्वारा कोई कार्यवाही नहीं की जायेगी।
9. प्रश्नों के उत्तर लिखने के लिये पेंसिल का प्रयोग न करें।
10. B कोपी या अतिरिक्त ग्राफ नहीं दिया जायेगा।

IN ORDER TO AVOID UFM (UNFAIR MEANS) :

1. The Roll No. and Answer Book no. found elsewhere or any other symbol found in the answer book will be treated as unfair means.
2. Any tempering of Bar Code and Booklet no shall be treated as Unfair Means.
3. Do Not bring the materials like slip of paper/mobile/digital diaries/ study material/ revision notes in examination hall. Possession of the mobiles/ digital diaries/ electronic watch and any other electronic gadget except memory less scientific calculator shall be considered as UFM case.
4. Do not keep or paste currency note in answer script it shall be consider as UFM.

INSTRUCTIONS TO THE CANDIDATE

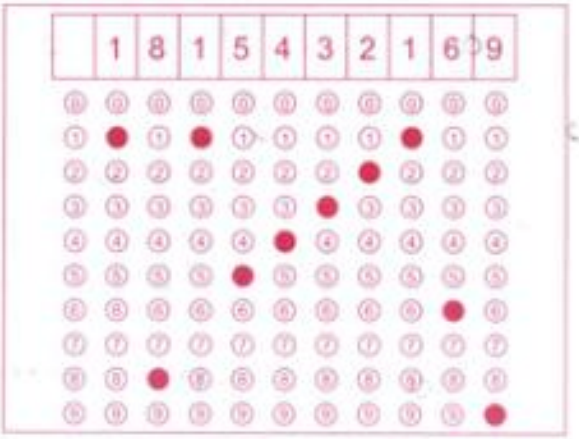
1. Read the instructions carefully given on the Question Paper, Admit Card & Answer Script.
2. Do not write anything on back side of the cover page.
3. Write on both sides of pages of answer book.
4. Do not write anything on question paper except Roll Number.
5. Write Paper Code & Question Paper Id carefully.
6. CHECK the number of pages (1-32) or any other kind of damage in your answer script, if found than change the answer script immediately before the commencement of examination.
7. CHECK the Question Paper for any kind of discrepancy e.g. Subject Code, Subject Name and Question of the Question Paper during first THIRTY MINUTES of the commencement of the exam, so that it can be corrected in TIME. After that no corrections shall be entertained by the university.
8. Do not use pencil for answering the question.
9. Write status correctly e.g. those appearing in carry over papers should fill in status as Carry Over. Those appearing as Ex-Students should fill in status as ex.
10. No supplementary answer book & graph paper will be provided.

अनुचित साधन से बचने हेतु:

1. उत्तर पुस्तिका के निर्देशित स्थान को छोड़कर अनुक्रमांक एवं उत्तरपुस्तिका का क्रमांक कहीं और न लिखे तथा कोई भी चिन्ह न बनायें क्योंकि यह अनुचित साधन प्रयोग की परिधि में आता है।
2. उत्तर पुस्तिका के बारकोड अथवा उत्तर पुस्तिका संख्या पर छेड़ करने पर अनुचित साधन प्रयोग माना जायेगा।
3. परीक्षा कक्ष में निम्न वस्तुएं साथ न लायें, जैसे लिखे हुए कागज के टुकड़े, मोबाईल, डिजिटल डायरी, कोपी, पुस्तक यह सभी वस्तुएं जो अनुचित साधन के अन्तर्गत आती है। केवल संबंधित प्रश्नपत्र में ही मेमोरी लैस साइंटफिक कैल्कुलेटर ले जाने की अनुमन्यता होगी।
4. उत्तर पुस्तिकाओं में रूपये न रखें न ही उत्तर पुस्तिका में चिपकायें। ऐसा करना अनुचित साधन प्रयोग की परिधि में आता है।

INSTRUCTIONS TO THE CANDIDATE FOR FILLING PART-IV

1. Use blue or black ball point pen for writing alphabets & numberals in ☐ Boxes.
2. Use blue or black ball point pen for filling the circles.



Note - If your Roll No. is of 10 digits, Please leave first three columns.

Paper Code
B050901T

01

(SEC - A)

Short Answers

Ans. 1 (A)

Ethology

- The study of animal behaviour is called ethology.
- The Animal behaviour refers to the ways an animal interact with others and its physical environment.
- There are following categories or patterns of animal behaviour –
  1) Instinctive Behaviour
  2) Learned Behaviour
  3) Complex Behaviour.

1) Instinctive Behaviour ⇒ It is also called inborn or innate Behaviour.
It is present from the birth.
These are genetically herited characteristics that impels an animal to behave in a certain fixed way.
Ex – (1) Building nest by birds.
(2) Parental care.

2) Learned Behaviour ⇒ It is a behaviour that an animal

develops as a result of learning.

These are of two types-
Non-associative learning
Associative learning.

Non-associative learning includes
- Habituation
- Sensitization.

Associative learning includes -
→ Classical conditioning
→ Operant conditioning

Ans. 1(B)

Biological rhythm

- Biological rhythm refers to the cyclic changes in physiological processes, behaviours, and biochemical properties of living organisms.
- It influenced by internal biological clocks and external environmental cues.
- It is important for the synchronization of internal rhythms with external environment.

There are following types of Biological Rhythms —

① Circadian rhythms :— daily cycles of rhythms of about 24 hrs.
Ex - Sleep wake cycle, temperature, feeding pattern etc.

② Ultraradian rhythms :— Cycles with ~~more less~~ less than 24 hrs.
Ex - Respiration, heart beat.

③ Infradian rhythm :— Rhythms with cycle more than 24 hrs.
Ex - Menstrual cycle in females of humans.
Regulate reproductive timing.

④ Circannual rhythm :— Annual biological rhythms.

Ex - Birds migration, breeding, hybernation.

Importance of Biological rhythm.

① • Regulate the diurnal vs nocturnal behaviour
• Regulate foraging strategies of animals.
• Regulate short term behaviours like vocalizations and social interactions
• Regulate birds migration V/s Resource avalability.

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Ans. 1 (a)

Hamilton's Rule

Hamilton's Rule is a formula developed by W.D. Hamilton which explain when altruistic will evolve through kin selection.

Rule is written as –

$$rB > C$$

r = Coefficient of relatedness.
How closely helper is related to receipient ranges from 0 to 1.

B = Benefit
- It is the reproductive benefit gained by the receiver.
- How many extra offspring it can produce.

C = Cost
- It is the reproductive cost to the helper.

- If $rB > C$, then altruistic behaviour will evolve because it increases the inclusive fitness of individual.

Paper Code: B050908T 05

Ans. 1 (d)

Animal Communication

- Animal communication refers to the process where one individual (sender) sends a signal that influence the behaviour of another individual (receiver).

- There are following modes of communication in animals —

(i) Visual communication :- The animal communicate by displaying beautifully coloured feathers, fins, scales or other secondary sexual characteristics.

Ex → Peacock displaying its colored feathers to attract female for mating.

(ii) Auditory communication → The animals use vocalization to communicate -

Ex- Male frog produce mating calls to attract females.

(iii) Chemical communication :- # Pheromone, scent marking glands found between digits, near eyes etc

are used to communicate.
Ex. Female moth release sex pheromones to attract males from considerable distance away.

(iii) Tactile Communication:- Communication through touch. Common in primates.
Ex- Grooming in primates.

(iv) Electrical Communication:- Communication through electrical signals.
Ex- African tapier fish.

Ans. 1 (E)

Biodiversity

- Biodiversity refers to the variety of life found on Earth.
- It includes animal and plant species as well as their environment

Levels of Biodiversity

- Genetic diversity
- Species Diversity
- Ecosystem Diversity

① Genetic Diversity :- The total variety of geretic characteristics found within a species.
It includes differences in DNA of individuals of same species.

② Species Diversity :- The total no. of species present in an ecosystem is called species Diversity.

③ Ecosystem Diversity :- The total variety of ecosystems present in a particular region or across biosphere. Ex- Ponds, Lakes, forests ee, Grasslands etc.

Species Richness

- Species Richness refers to the total no. of species present present in an ecosystem.
- Example :-

If forest A has 10 species of Birds and forest B has 12 species of Birds then forest B has higher species Richness

How to measure?

S = The total no. of species present in a sample.

Importance –

① Higher species richness indicates healthy, stable ecosystem.

② It provides functional redundancy, it means if one species is lost the other can fulfill its ecological role.

Ans. 1 (F)

- **Simpon's index (D)**

It measure the probability that two individuals that are randomly selected from a sample belongs to one species.

Formula :–

$$D = \sum \frac{n_i(n_i-1)}{N(N-1)}$$

or $$D = \sum (p_i)^2$$

where $$p_i = \frac{n_i}{N}$$

where, n_i = no. of individuals of species i.

N = Total no. of individuals

of all species.

Interpretation:-

The value of D varies from 0 to 1

Close to 0 = Higher diversity
Close to 1 = Lower diversity.
(Higer abundance of one specie.)

- Simpon's index of diversity = 1 - D
  Higher value = Higher Diversity.
- Simpon's reciprocal index = $\frac{1}{D}$
  Higher value = Higher Diversity.
- Simpon's index is used to measure Species Proportional Abundance.
- It gives more weight to dominant species.

Ans. 1 (G)

In-situ Conservation

- In-situ Conservation is the conservation of species in their natural habitat.
- It includes protected areas.

Methods of in-situ Conservation

- National parks
- Wildlife sanctuaries
- Biosphere Reserves.

① **National parks:-** It is protected area strictly reserved for betterment of wildlife. No human activity is allowed.

Ex- (1) Jim Corbett National Park
(2) Nadampha National Park.
(3) Kaziranga National Park.

② **Wildlife sanctuaries:-** It is the protected area for the conservation of animals and their habitats. Human activity is allowed under regulatory framework

Ex- Chilka Lake Bird Sanctuary.

(8) Biosphere Reserves:- It is a multipurpose protected area where man is the integral part of the system.

Cores:- ① Core zone
② Buffer zone
③ Transition zone.

Ans. 1 (H)

Endangered species

- Endangered species are plant or animals which are at the risk of extinction in the near future due to variety of reasons.
- Causes of Endangerment :-

① Habitat fragmentation
② Pollution
③ Climate change
④ Overexploitation
⑤ Invasive Alien species
⑥ Poaching and illegal wildlife Trade

Examples of Endangered species

① Bengal Tiger — Endangered
② Asiatic lion — Endangered
③ Indian vultures — Critically endangered

- Red panda — Endangered
Ganges River Dolphin — Endangered.

Conservation Strategies for Endangered Species:

1. Legal Protection and Policies
   - Ex- Wildlife Protection Act (1972)
   Endangered Species Act. (USA)
2. Establishment of Protected area and Reserves.
3. Captive Breeding
4. Restoration.
5. Public Education and Awareness

Ans. 1 (ii)

Causes of biodiversity loss:-

1. Habitat destruction/ fragmentation.

Alteration or destruction of habitats because of urbanization, industrilization, deforestation, etc.

Effect:- Animals lose their homes, food sources and breeding areas

2. Pollution:- Types- • Air pollution
   • Soil pollution
   • Water pollution

Effect :- Toxins harm or kill organisms, destroy habitats.

③ Overexploitation :- Unsustainable use of natural resources.
Ex- Overfishing, hunting or logging.

④ Invasive Alien species ⇒ Non-native species introduced into an ecosystem intentionally or accidently.
Ex- Nile perch in Lake Victoria.

Effect :- They often prey or bring disease to native species.

⑤ Climate change :- Rise in temperatures, changing rainfall patterns, melting of glaciers.

⑥ Natural disasters :

Ex- Earthquakes, volcanic eruptions, floods droughts, etc.
Effect :- Can lead to habitat loss of wipe out populations.

⑦ Disease :- for example :- Chytrid fungus effecting amphibians globally.

Effect :- Can lead to rapid decline in species that has no immunity.

(SEC - B)
(Ans. 5)

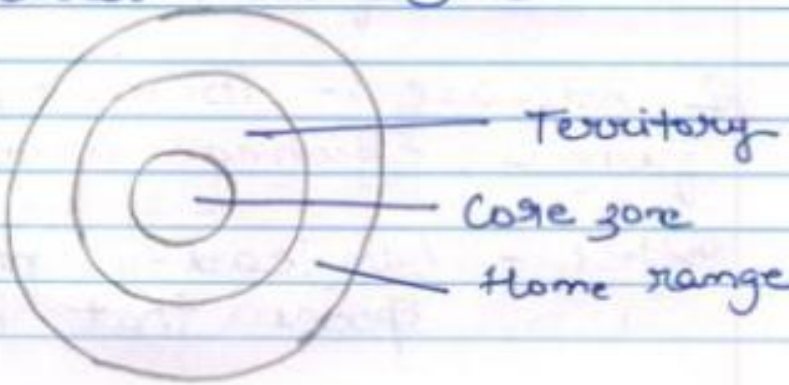
Territorial Behaviour

- It is a social behaviour that partitions resources.
- It is a method in which animal or group of animal defend their territory from incursions of others of its species.

Home range :- It is a large area where animals moves throughout their adult life.

Territory :- Within a home range is present territory. Intruders are driven away from the territory by aggressive displays.

Core zone :- Within a territory, there is much smaller area called core zone.



Types Of Territory :-

Wilson classified territories into following types :-

① Type A ⇒ An area for resting, feeding, and mating. Ex- Non human primates.

② Type B → An area for resting and mating Ex- Birds and fishes.

③ Type C → An area for mating. Ex. Colonial sea birds

④ Type D = An area for resting and roosting Ex. Birds and Bats

⑤ Type E = An area for feeding. Ex- golden winged sunbirds and humming birds protect nectar from shrinks and robins.

Size of Territory :-

- The size of territory varies from species to species
- It depends on body size, group size and food requirements.

Markings of territory :-

① Visual marking :- Animals show off by displaying beautifully coloured feathers, fins, scales and other secondary sexual

characteristics.

(2) Acoustic marking:— Animals that can produce sound use vocalization to mark their territories.
Ex- Birds, frogs, lizards.

(3) ~~Tac~~ Olfactory marking:— Pheromones, scent marking glands found b/w digits or near eyes etc.
Ex- Cats, tiger, lion.

(4) Electric markings:— Ex- African tapir fish.

Examples of Territoriality in Animals

In fishes

The male stickleback fish choose an area and defend it vigously. It build nest in its territory and attract females to ~~build~~ breed the red colour spot on the belly of male stickle back act as a premuptial signal for females and warning signal for males.

In Amphibians

Female Amphibian bullfrog often

choose territories which are defended by large and stronger males.

Adaptive value of Territorial Behaviour:

① Access to food resources:
Territorial Behaviour provide access to food resources to animals.

② Access to mate.

- Territory can be used as mating arenas.

③ Offspring protection:
Territorial Behaviour provides protection to offsprings from predators.
for example → Nesting birds defend area around the nest from predators.

④ Reduce conflict between individuals by spacing:

Territories reduce conflict b/w individuals by creating space between the individuals Reduce direct competition or aggression.

⑤ Increased fitness.

Territorial Behaviour contributes to the total reproductive success of individuals.

(SEC-C)

(Ans. 9)

Wildlife Protection Act 1972

Wildlife Protection Act, 1972 is a comprehensive legislation enabled by the Parliament of India.

It provides a legal framework for the protection of wildlife, conservation of natural habitats, and regulation of poaching, hunting, trade of wildlife.

Features:-

① Extensive coverage:- The laws covers fauna and flora and applies across all of India.

② Establishment of Protected Areas:- The laws empowers the government to declare —
- National parks
- Wildlife sanctuaries
- Conservation reserves
- Community reserves.

③ Prohibition of Hunting

Hunting of wild animals scheduled under schedule I to VI is strictly prohibited except under certain situations.

④ Regulation of Trade and Commerce :- The act regulates and prohibited the poaching and illegal trade of wildlife.

⑤ Creation of Advisory and Regulatory Boards:-
- National and State Wildlife Boards
- Wildlife Crime Control Bureau (WCCB)

⑥ Penalties and offences

Strict penalties are prescribed for the offences such as poaching, illegal trade, smuggling of wildlife. Especially involving species under Schedule I and II.

Short Comings of the Act

① Lack of Community involvement :-

The Act gives little space to local communities who often live in or around the forests

② Human - Wildlife Conflict

The Act focuses more on the protection of wildlife rather than creating strategies to reduce human-wildlife conflict.

③ Vague Definitions:

Some terms such as "hunting", "vermin" are not clearly defined leading to loopholes

④ Inadequate Protection to plants:-

While animal receives significant attention, plant species are poorly covered with only few under schedule VI.

⑤ Overlapping to jurisdiction

Several laws leads to conflict and overlapping to jurisdiction.

Amendments of the Act-

The Act was amended several times to make it more effective.

Amendment of 1991:

- Prohibition of hunting of all wildlife animals except under certain condition
- Introduce the concept of Plant Protection
- Established Central Zoo Authority

Amendment of 2002

- Introduce the concept of community and conservation reserves.
- Established ~~Wildlife~~ Encourage community involvement in wildlife conservation programmes.

Amendment of 2006

- Established Wildlife Crime Control Beauro (WCCB).
- Strengthen measures against wide poaching networks.

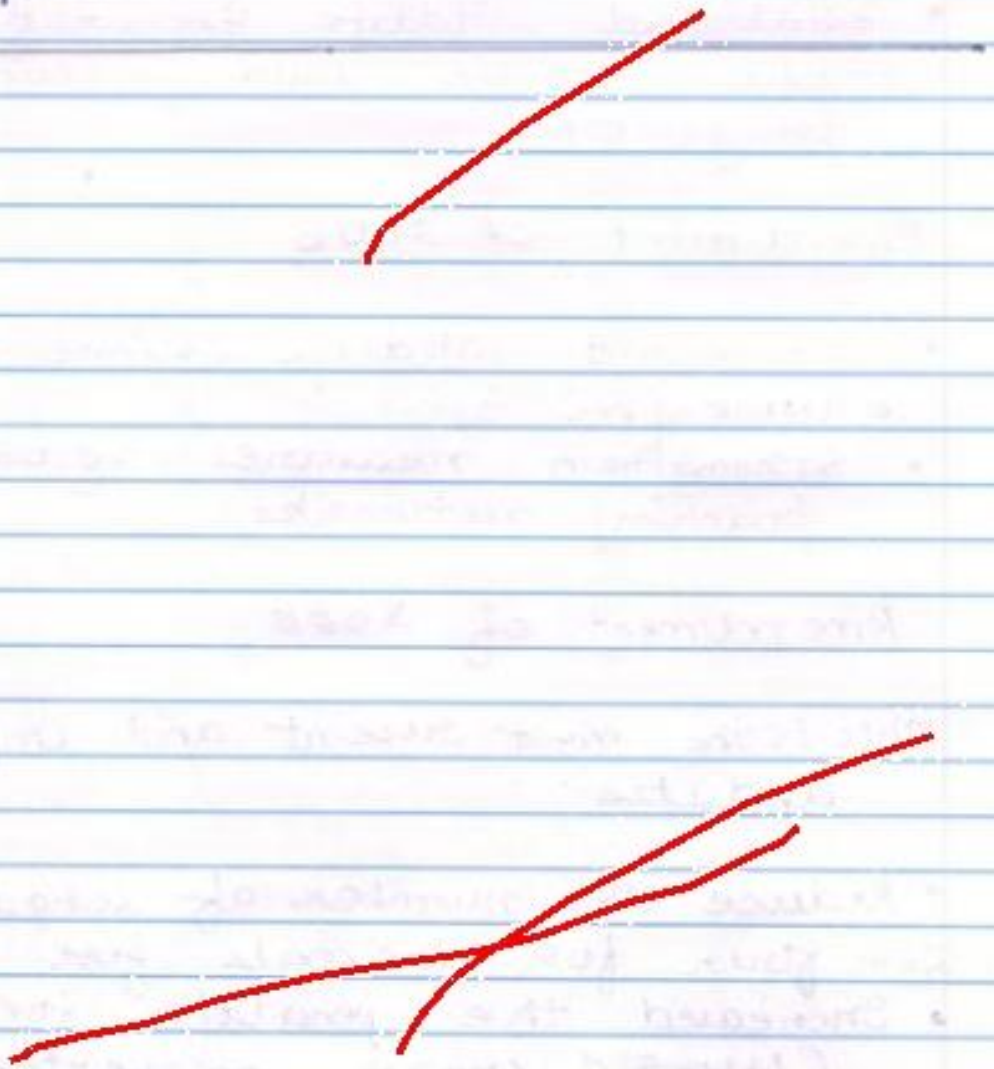
Amendment of 2022.

This is the most recent and important updates.

- Reduce the number of schedules from six to four for animals for clarity.
- Increased the penalties for violations (Upto ₹1 crore for certain offences)
- Introduced provisions for preventing the spread of non-native species who often prey on native species.
- Allow the transfer and ownership of elephants from the government permission
- Aligns Indian laws with International Conventions like CITES (Convention on

Paper Code B050901T 22

International Trade in Eng Endangered Species of Wild flora and fauna) to regulate the trade of endangered species.



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