XII BIOLOGY

Marks: 35

BIO-ZOOLOGY

Part - I

8×1=8

Note: i) Answer all the questions.

ii) Choose the most appropriate answer from the given four alternatives and write the option code and the corresponding answer.

1) Inhibin hormones secretes form
   a) Sertoli cells b) Nurse cells
   c) Spermatogonic cells d) All the above

2) ABO blood group in man is controlled by
   a) Multiple alleles b) Lethal genes
   c) Sex linked genes d) X-linked genes

3) When lactose is present in the culture medium
   a) Transcription of lac y, lac z, lac a genes occurs
   b) Repressor is unable to bind to the operator
   c) Repressor is able to bind to the operator
   d) Both (a) and (b) are correct

4) _____ can be confirmed by Widal test
   a) Typhoid b) Cholera c) Diphtheria d) AIDS

5) How many amino acids are arranged in the two chains of Insulin?
   a) Chain A has 12 and Chain B has 13
   b) Chain A has 21 and Chain B has 30 amino acids
   c) Chain A has 20 and Chain B has 30 amino acids
   d) Chain A has 12 and Chain B has 20 amino acids

6) Predation and parasitism are which type of interactions?
   a) (+,+) b) (+, 0) c) (--,--) d) (+, --)

7) The organization which published the red list of species is
   a) WWF b) IUCN c) ZSI d) UNEP

8) SMOG is derived from
   a) Smoke b) Fog c) Both A and B d) Only A

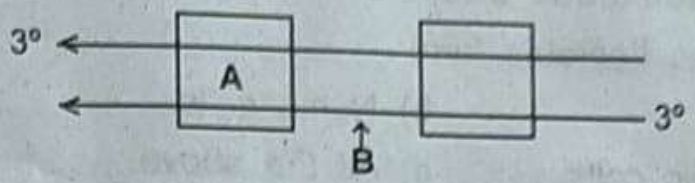
Part - II

Note: Answer any four questions. 4×2=8

9) Write different types of binary fission?

10) Differentiate foeticide and infanticide?

11) Name the parts marked 'A' and 'B' in the given transcription unit:



12) List out three major categories in which fossilization occur?

13) Define - Oenology

14) Explain hibernation and aestivation with examples.

Part - III

Note:- Answer any three questions.
Question No.19 is compulsory:- 3×3=9

15) Draw a labeled sketch of Spermatozoan.

16) What is multiple allele?

17) Who disproved Lamarck's Theory of acquired characters? How?

18) How was Insulin obtained before the advent of rDNA technology? What were the problems encountered?

19) Define - 4R.

Part - IV

Note:- Answer all questions:- 2×5=10

20) a) Briefly explain about Invitro fertilization (IVF) or Test tube baby.

[or]

b) It is established that RNA is the first genetic material. Justify giving reasons.

21) a) Explain the structure of immunoglobulin with suitable diagram.

[or]

b) Mention the major threats to biodiversity caused by human activities. Explain.

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COMMON HALFYEARLY EXAMINATION –2023
XII – BIO - ZOOLOGY – ANSWERS

PART – I

CHOOSE THE BEST ANSWER: **(8 × 1 = 8)**

1.	a) Sertoli Cells
2.	a) Multiple alleles
3.	d) Both (a) & (b) are correct
4.	a) Typhoid
5.	b) Chain A has 21 and Chain B has 30 amino acids
6.	d) (+,-)
7.	b) IUCN
8.	c) Both A & B

PART – II (4 X 2 = 8)

9. Simple irregular binary fission, Transverse binary fission, Longitudinal binary fission, Oblique binary fission

10. **Female foeticide** refers to 'aborting the female in the mother's womb'.
Female infanticide is 'killing the female child after her birth'.

11. **A –** Promoter site
B – Structural gene

12. Fossilization fall under three main categories –
i) Actual Remains
ii) Petrifaction
iii) Natural Moulds & casts

13. **Oenology** is the science and study of **wine** and wine making

14. In certain conditions, if the organism is unable to migrate, it may avoid the stress by becoming inactive. This is seen commonly in bears going into hibernation (winter sleep) during winter. Some snails and fish go into aestivation (summer sleep) to avoid summer related problems like heat and desiccation.

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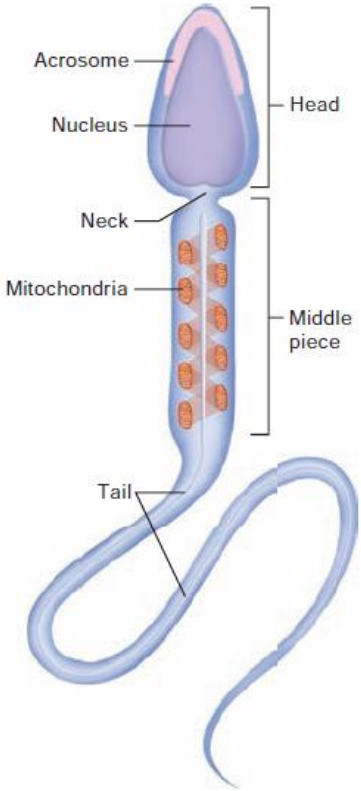
PART – III (3 X 3 = 9)

15. Spermatozoa:



16. When three or more alleles of a gene that control a particular trait occupy the same locus on the homologous chromosome of an organism, they are called multiple alleles and their inheritance is called **multiple allelism**

17. Lamarck's "Theory of Acquired characters" was disproved by **August Weismann** who conducted experiments on mice for twenty generations by cutting their tails and breeding them. All mice born were with tail. Weismann proved his germplasm theory that change in the somatoplasm will not be transferred to the next generation but changes in the germplasm will be inherited.

18. In the early years, insulin isolated and purified from the pancreas of pigs and cows was used to treat diabetic patients. Due to minor differences in the structure of the animal insulin as compared to human insulin, it resulted in the occurrence of allergic reactions in some diabetic patients.

19. '4R'- Refuse, Reduce, Reuse and Recycle mantra is the best available remedy for plastic waste pollution

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PART – IV (2 X 5 = 10)

20. a) ***In Vitro* Fertilization (IVF) or Test tube baby:**

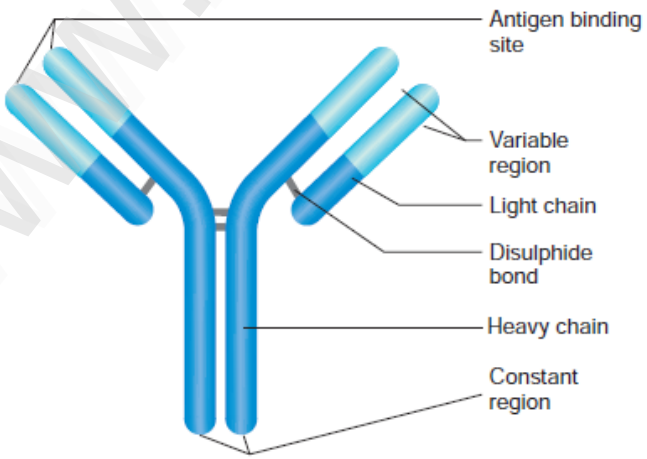
In this technique, sperm and eggs are allowed to unite outside the body in a laboratory. One or more fertilized eggs may be transferred into the woman's uterus, where they may implant in the uterine lining and develop. Excess embryos may be cryopreserved (frozen) for future use. Initially, IVF was used to treat women with blocked, damaged, or absent fallopian tubes. Today, IVF is used to treat many causes of infertility. The basic steps in an IVF treatment cycle are ovarian stimulation, egg retrieval, fertilization, embryo culture, and embryo transfer.

Egg retrieval is done by minor surgery under general anesthesia, using ultrasound guide after 34 to 37 hours of hCG (human chorionic gonadotropin) injection. The eggs are prepared and stripped from the surrounding cells. At the same time, sperm preparation is done using a special media. After preparing the sperms, the eggs are brought together. 10,000-1,00,000 motile sperms are needed for each egg. Then the zygote is allowed to divide to form 8 celled blastomere and then transferred into the uterus for a successful pregnancy. The transfer of an embryo with more than 8 blastomeres stage into uterus is called **Embryo transfer technique**.

20. b) Three molecular biologists in the early 1980's (Leslie Orgel, Francis Brick and Carl Woese) independently proposed the 'RNA world' as the first stage in the evolution of life, a stage when RNA catalysed all molecules necessary for survival and replication. The term 'RNA world' first used by Walter Gilbert in 1986, hypothesizes RNA as the first genetic on Earth. There is now enough evidence to suggest that essential life processes (such as metabolism, translation and splicing etc.,) evolved around RNA. RNA has the ability to act as both genetic material and catalyst. There are several biochemical reactions in living systems that are catalysed by RNA. This catalytic RNA is known as ribozyme. But, RNA being a catalyst was reactive and hence unstable.

This led to evolution of a more stable form of DNA, with certain chemical modifications. Since DNA is a double stranded molecule having complementary strand, it has resisted changes by evolving a process of repair. Some RNA molecules function as gene regulators by binding to DNA and affect gene expression. Some viruses use RNA as the genetic material. Andrew Fire and Craig Mellow (recipients of Nobel Prize in 2006) were of the opinion that RNA is an active ingredient in the chemistry of life.

21 a) **Structure of Immunoglobulin:**



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Antibodies are immunoglobulin (Ig) protein molecules synthesized on exposure to antigen that can combine specifically with the antigen.

In the 1950s, experiments by **Porter and Edelman** revealed the basic structure of the immunoglobulin. An antibody molecule is **Y** shaped structure that comprises of four polypeptide chains, two identical light chains **(L)** of molecular weight 25,000 Da (approximately 214 amino acids) and two identical heavy chains **(H)** of molecular weight 50,000 Da (approximately 450 amino acids). The polypeptide chains are linked together by di-sulphide (S-S) bonds. One light chain is attached to each heavy chain and two heavy chains are attached to each other to form a Y shaped structure. Hence, an antibody is represented by H2 L2. The heavy chains have a flexible hinge region at their approximate middles.

Each chain (**L** and **H**) has two terminals. They are C - terminal (Carboxyl) and amino or N-terminal. Each chain (**L** and **H**) has two regions. They have variable (**V**) region at one end and a much larger constant (**C**) region at the other end. Antibodies responding to different antigens have very different (V) regions but their (C) regions are the same in all antibodies. In each arm of the monomer antibody, the (V) regions of the heavy and light chains combines to form an antigen – binding site shaped to 'fit' a specific antigenic determinant. Consequently each antibody monomer has two such antigen – binding regions. The (C) regions that forms the stem of the antibody monomer determine the antibody class and serve common functions in all antibodies.

The functions of immunoglobulin are agglutination, precipitation, opsonisation, neutralization etc.,

21. b) Major threats to biodiversity caused by human activities:

Human activities, both directly and indirectly are today's main reason for habitat loss and biodiversity loss. Fragmentation and degradation due to agricultural practices, extraction (mining, fishing, logging and harvesting) and development (settlements, industrial and associated infrastructures) leads to habitat loss and fragmentation leads to formation of isolated, small and scattered populations and as endangered species.

Some of the other threats include specialised diet, specialized habitat requirement, large size, small population size, limited geographic distribution and high economic or commercial value. Large mammals by virtue of their size require larger areas to obtain the necessities of life – food, cover and mates than do smaller mammals. Individual home range of Lion can be about 100 square Km. Mammals have specialized dietary needs such as carnivores, frugivores and the need to forage over much larger areas than general dietary herbivores and omnivores. Mammals also have low reproductive output other than small rodents.

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