DIRECTORATE OF GOVERNMENT EXAMINATION, CHENNAI - 600006
HSC SECOND YEAR EXAMINATION, MARCH/APRIL - 2023
ZOOLOGY – KEY ANSWER

TOTAL MARKS: 70

NOTE : 1) Answer written only in BLACK or BLUE should be evaluated
2) Choose the correct answer and write the option code
3) If one of them (option or answer) is wrong, then award zero mark only
4) Marks can be awarded, if students write in their own sentences with Zoology related concepts and explanations.

PART – I					
Answer all the questions:					15×1 =15
Q. No	**TYPE -A**		**TYPE - B**		
1	(b)	Extinction	(b)	Mesozoic era	1
2	(a)	Statins	(b)	Seagull (Fish eating birds)	1
3	(a)	Formation of three germ layer embryo from single layer embryo	(c)	Liver	1
4	(b)	AUG	(b)	IgE	1
5	(d)	All of the above	(a)	Formation of three germ layer embryo from single layer embryo	1
6	(b)	Mesozoic era	(c)	Spermarche	1
7	(b)	Homo erectus	(b)	AUG	1
8	(a)	Catadromous	(b)	Homo erectus	1
9	(c)	Spermarche	(d)	All of the above	1
10	(c)	Liver	(a)	Catadromous	1
11	(d)	Leydig cell	(b)	Over exploitation	1
12	(b)	Over exploitation	(a)	Conjugation	1
13	(b)	IgE	(a)	Statins	1
14	(b)	Seagull (Fish eating birds)	(b)	Extinction	1
15	(a)	Conjugation	(d)	Leydig cell	1

PART - II

	Answer any six questions. **Question number 24 is compulsory.**	**6×2 =12**
16	**Plasmotomy :** Plasmotomy is the division of multinucleated parent into many multinucleate daughter individuals with the division of nuclei.	2
17	**Spermiogenesis:** The spermatids are transformed into mature spermatozoa by the process called spermiogenesis. **Spermatogenesis:** Spermatogenesis is the sequence of events in the seminiferous tubules of the testes that produce the male gametes, the sperms.	1 1
18	**Mayer-Rokitansky syndrome :** All women are born with ovaries, but some do not have functional uterus. This condition is called Mayer-Rokitansky syndrome.	2
19	**Lyonisation :** Mary Lyon suggested that Barr bodies represented an inactive chromosome. In females becomes tightly coiled into a heterochromatin, a condensed and visible form of chromatin (Lyon's hypothesis). (OR) Number of Barr bodies observed in cell was one less than the number of x–chromosome.	2
20	**Okazaki fragments :** The discontinuously synthesized fragments of the lagging strand called as Okazaki fragments.	**2**
21	**Bioremediation :** The use of naturally occurring or genetically engineered microorganisms to reduce or degrade pollutants is called bioremediation	**2**
22	**Red Data book :** Red Data book or Red list is a catalogue of taxa facing risk of extinction.	**2**
23	**Eutrophication :** When run-off from land containing nutrients reaches water bodies like lakes, it results in dense growth of plant life. This phenomenon is called Eutrophication.	**2**
24	**Chicken Pox:** **Mere attempt**	**2**

PART - III

Q.NO	Answer any six questions Question number 33 is compulsory	6x3=18
25	**Juvenile phase :** Juvenile phase is the period of growth between the birth of the individual upto reproductive maturity. **Reproductive phase :** During reproductive phase the organisms reproduce and their offsprings reach maturity period.	1½ 1½
26	**Labled sketch of spermatozoan :** Diagram parts	2 1
27	**Tubectomy :** Tubectomy is the surgical sterilisation in women. In this procedure, a small portion of both fallopian tubes are cut and tied up through a small incision in the abdomen or through vagina. **Vasectomy :** Vasectomy is the surgical procedure for male sterilisation. In this procedure, both vas deferens are cut and tied through a small incision on the scrotum to prevent the entry of sperm into the urethra.	1½ 1½
28	**Salient features of Mutation Theory :** 1. Mutations or discontinuous variation are transmitted to other generations. 2. In naturally breeding populations, mutations occur from time to time. 3. There are no intermediate forms, as they are fully fledged. 4. They are strictly subjected to natural selection. **(Any three)**	3
29	**Functions of immunoglobulin :** 1. Agglutination 2. Precipitation 3. Opsonisation 4. Neutralization **(Any three)**	3
30	**Fermentors :** A fermentor (bioreactor) is a closed vessel with adequate arrangement for aeration, agitation, temperature and pH control. Drain or overflow vent to remove the waste biomass of cultured microorganisms along with their products.	1½ 1½
31	**PCR :** 1. Two primers (or) One Set of primer 2. synthesize new DNA 3. Thermus aquaticus Bacteria (or) Taq	1 1 1

32	**Natality :** Populations increase because of natality. Natality is equivalent to birth rate and is an expression of the production of new individuals in the population by birth, hatching, germination (or) fission. **(or)** $\text{Birth rate (b)} = \frac{\text{Number of birth per unit time}}{\text{Average population}}$ **Mortality :** Mortality is the population decline factor and is oppposite to natality. Mortality can be expressed as a loss of individuals in unit time or death rate. **(or)** $\text{Death rate (d)} = \frac{\text{Number of death per unit time}}{\text{Average population}}$	1 ½ 1 ½
33	AIDS facilitates the attack by other organisms : AIDS is caused by human immuno deficiency virus. Due to HIV infection , decrease in the number of helper T Lymphocytes the person starts suffering from infections and becomes immune deficient and unable to protect against any infection.	3

PART - IV

Answer all the questions.		**5×5=25**
34 (a)	**Explain the various phases of the menstrual cycle :** 1. Menstrual phase - 3-5 days - Explanation 2. Follicular or proliferative phase - extends from the 5th day of the cycle until the time of ovulation - Explanation 3. Ovulatory phase - 14th day - Explanation 4. Luteal or secretory phase – Remaining days - Explanation	1 1 ½ 1 1 ½
(OR)		

34 (b)	**Infertility :** Inability to conceive or produce children even after unprotected sexual cohabitation is called infertility. **Causes for infertility:** 1. Tumours formed in the pituitary or reproductive organs. 2. Inherited mutations of genes responsible for the biosynthesis of sex hormones. 3. Malformation of the cervix or fallopian tubes. 4. inadequate nutrition before adulthood. 5. Long-term stress damages many aspects of health especially the menstrual cycle. 6. Ingestion of toxins (heavy metal cadmium). 7. Heavy use of alcohol, tobacco and marijuana. **8.** Injuries to the gonads and aging also cause infertility. 9. Pelvic inflammatory disease (PID),uterine fibroids and endometriosis are the most common cause of infertility in woman 10. Low body fat or anorexia in woman, i.e psychiatric eating disorder characterized by the fear of gaining weight. 11. Undescended testes and swollen veins (varicocoele) in scrotum 12. Under developed ovaries or testes. 13. Tight clothing in men may raise the temperature in the scrotum and affect sperm production. 14. Female may develop antibodies against her partner's sperm. 15. Males may develop an auto immune response to their own sperm (**Any Four points**)	**1** **4**
35 (a)	**Salient features of Human Genome Project:** 1. The human genome contains 3 billion nucleotide bases. 2. An average gene consists of 3000 bases, the largest known human gene being dystrophin with 2.4 million bases. 3. The chromosomal organization of human genes shows diversity. 4. There may be 35000-40000 genes in the genome and almost 99.9 nucleotide bases are exactly the same in all people. 5. Functions for over 50 percent of the discovered genes are unknown. 6. Less than 2 percent of the genome codes for proteins. 7. Repeated sequences make up very large portion of the human genome. Repetitive sequences have no direct coding functions but they shed light on chromosome structure, dynamics and evolution. 8. Chromosome 1 has 2968 genes whereas chromosome Y has 231 genes. 9. Scientists have identified about 1.4 million locations where single base DNA differences occur in humans. **(Any Five Points)**	5
	(OR)	

35 (b)

Adaptive Radiation :

The evolutionary process which produces new species diverged from a single ancestral form becomes adapted to newly invaded habitats is called adaptive radiation. — 1

Darwin's finches :

- Darwin's finches are the birds whose common ancestor arrived on the Galapagos about 2 million years ago.
- During that time Darwin's finches have evolved in to 14 recognized species differing in body size, beak shape and feeding behavior.
- Changes in the size form of the beak have enabled different species to utilize different food resources such as insects , seeds, nectar from cactus flowers and blood from iguanas, all driven by Natural Selection. — 2
- Genetic varation in the ALX1 gene in the DNA of Darwin finches is associated with variation in the beak shape.

Australian Marsupials :

- Marsupials in Australia and placental mammals in North America are two subclasses of mammals they have adapted in similar way to a particular food resource, locomotory skill or climate.
- They were separated from the common ancestor more than 100 million year ago and each lineage continued to evolve independently.
- Despite temporal and geographical separation, marsupials in Australia and placental mammals in North America have produced varieties of species living in similar habitats with similar ways of life. — 2
- Their overall resemblance in shape, locomotory mode, feeding and foraging are superimposed upon different modes of reproduction.

36 (a)

Healthy Life style modifications :

1. Avoid eating junk food and foods that have preservatives and colouring agents.
2. Physical exercises such as brisk walking and yoga can be done regularly.
3. Following medical advice, if any health problems in addition to life style disorders.
4. To avoid smoking drugs and drinking alcohol.
5. To follow a healthy balanced diet rich in vitamins and proteins.
6. 7 – 8 hours of sleep every day is required. **(Any 5 Points)** — 5

(OR)

36 (b)

S. No	Primary Immune Response	Secondary Immune Response
1.	It occurs as a result of primary contact with an antigen	It occurs as a result of second and subsequent contacts with the same antigen
2.	Antibody level reaches peak in 7 to 10 days	Antibody level reaches peak in 3 to 5 days
3.	Prolonged period is required to establish immunity	It establishes immunity in a short time
4.	There is rapid decline in antibody level	Antibody level remains high for longer period
5.	It appears mainly in the lymph nodes and spleen	It appears mainly in the bone marrow, followed by the spleen and lymph nodes

5

37 (a)	**Andvantages of clonig :** 1. Offers benefits for clinical trials and medical research. 2. It can help in the production of proteins and drugs in the field of medicine. 3. Aids stem cell research. 4. Animal cloning could help to save endangered species. **(Any Two)** **Disandvantages of clonig :** 1. Animal and human activists see it as a threat to biodiversity saying that this alters evolution which will have an impact on populations and the ecosystem. 2. The process is tedious and very expensive. 3. It can cause animals to suffer. 4. Reports show that animal surrogates were manifesting adverse outcomes and cloned animals were affected with disease and have high mortality rate. 5. It might compromise human health through consumption of cloned animal meat. 6. Cloned animals age faster than normal animals and are less healthy than the parent organism as discovered in Dolly. 7. Cloning can lead to occurrence of genetic disorders in animals. 8. More than 90% of cloning attempts fail to produce a viable offspring. **(Any Three)**	2 3
	(OR)	
37 (b)	**Population dispersion :** Populations have a tendency to disperse or spread out in all directions, until some barriers are reached. **Types of Population dispersion :** **Migration :** Migration is a peculiar and unique kind of mass population movement from one place to another and back. **Eg**: To avoid the severe winter cold, Siberian cranes migrate from Siberia to Vedanthangal in tamil Nadu and return back in spring. (or) Some fishes are known to migrate from sea to fresh water (anadromous migration – Salmon) and some from fresh water to sea (catadromous migration – Eel) **Emigration :** Under natural conditions, emigration usually occurs when there is over crowding. This is regarded as an adaptive behaviour that regulates the population in a particular site and prevents over exploitation of the habitat. Further, it leads to occupation of new areas elsewhere. **Immigration:** It leads to a rise in population levels. If the population increases beyond the carrying capacity, it can result in increased mortality among the immigrants or decreased reproductive capacity of the individuals.	1 1 1 1 1

38 (a)	**General strategies in biodiversity conservation :** 1. Identify and protect all threatened species 2. Identify and conserve in protected areas the wild relatives of all the economically important organisms 3. Identify and protect critical habitats for feeding, breeding, nursing, resting of each species 4. Air, water and soil should be conserved on priority basis 5. Wildlife Protection Act should be implemented	1 1 1 1 1
	(OR)	
38 (b)	**Process of sweage treatment :** **1. Primary treatment :** • Primary treatment involves the physical removal of solid and particulate organic and inorganic materials from the sewage through filtration and sedimentation. **2. Secondary treatment :** • The Primary effluent is passed into large aeration tanks where it is constantly agitated mechanically and air is pumped into it. • This allows vigorous growth of useful aerobic microbes into floc. While growing, these microbes consume the major part of the organic matter in the effluent. • This significantly reduces the BOD • These gases form biogas and can be used as a source of energy. **3. Tertiary treatment** • This treatment removes the remaining inorganic compounds and substances, such as nitrogen and phosphorus. • UV is an ideal disinfectant for waste water. Since it does not alter the water quality. It also inactivate chlorine-resistant microorganisms like Cryptosporidium and Giardia.	1 2 2