SHRI VIDHYABHARATHI MATRIC HR.SEC.SCHOOL

SAKKARAMPALAYAM , AGARAM (PO) ELACHIPALAYAM
TIRUCHENGODE(TK), NAMAKKAL (DT) PIN-637202
Cell : 99655-31727, 94432-31727

COMMON HALF YEARLY EXAMINATION 2019

STD: XII **14.12.2019**

SUBJECT: ZOOLOGY (PS) **ANSWER KEY** **MARKS : 70**

PART – I

	CHOOSE THE CORRECT ANSWER	
Q.No	CONTENT	Marks
1	b) Vorticella	15X1=15
2	c) (A) is true and (R) is false	
3	c)Saheli	
4	a)dextral	
5	c)DNA is having thymine	
6	a)Mesozoic era	
7	c) i-(C),ii-(A),iii-(D),iv-(B)	
8	a)WBC	
9	d) i-True, ii-True, iii-False, iv-False	
10	b) Chain A has 21 and Chain B has 30	
11	c)Predominant plants only	
12	a)Well developed tracheal system in arthropods.	
13	d)near the equator	
14	d) To announce environmental abiotic factors.	
15	a)Used water of our homes, can be taken to sea through closed underground pipes.	
	PART – II Answer any 6 of the following questions. Questions No.24 is compulsory.	6x2=12
16		1

SPERMIOGENESIS	SPERMATOGENESIS
Spermogenesis is a part of spermatogenesis in which the haploid spermatids formed from	Spermatogenesis is the sequence of all the events involved in the formation of male gametes or the

	secondary spermatocytes are transformed into mature spermatozoa.	sperms in the seminiferous tubule of the testis.
	It is a stage in the maturation phase of spermatogenesis.	It includes multiplication, growth and maturation phase.

1

17 The reproductive system has four main functions namely,

- to produce the gametes namelysperms and ova
- to transport and sustain these gametes
- to nurture the developing offspring
- to produce hormones

1

1

18

- The DNA as a nucleoid is organized into large loops held by protein.
- DNA of prokaryotes is almost circular and lacks chromatin organization, hence termed genophore.

1

1

19 **Struggle for existence:**

- ❖ Organisms struggle for food, space and mate. As these become a limiting factor, competition exists among the members of the population. Darwin denoted struggle for existence in three ways –
- ❖ Intra specific struggle between the same species for food, space and mate. Inter specific struggle with different species for food and space.
- ❖ Struggle with the environment to cope with the climatic variations, flood, earthquakes, drought, etc.,

1

1

20 **<u>Mutation theory</u>**

(i)According to de Vries, sudden and large variations were responsible for the origin of new species

(ii) Lamarck and Darwin believed in gradual accumulation of all variations as the causative factors in the origin of new species.

1

1

21

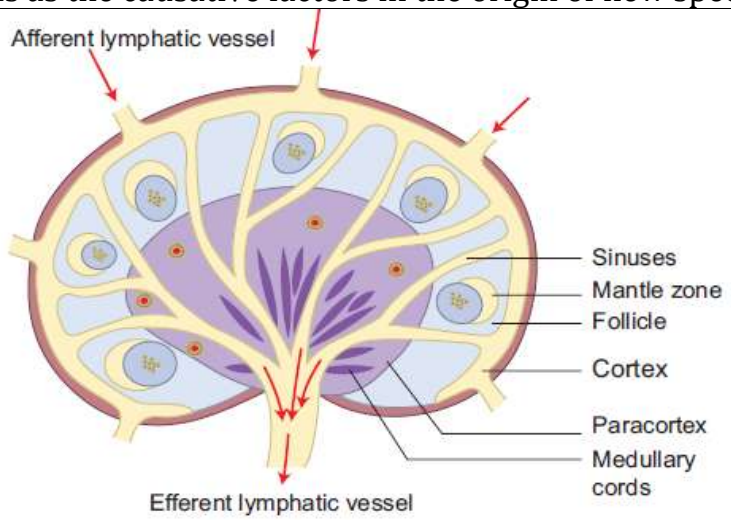


Diagram - 1

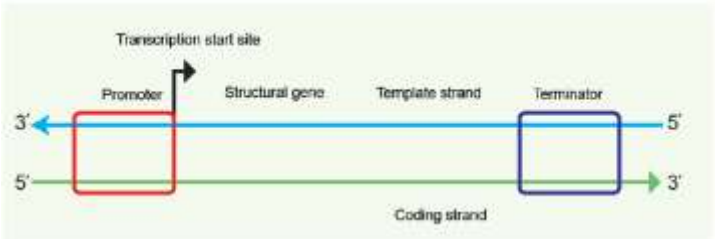
Parts - 1

22

- **Cyanobacteria** (or) blue green algae (BGA) are prokaryotic free-living organisms which can fix nitrogen. *Oscillatoria, Nostoc, Anabaena, Tolypothrix* are well known nitrogen fixing cyanobacteria. Their importance is realized in the water logged paddy fields where Cyanobacteria multiply and fix molecular nitrogen.
- **Cyanobacteria** secrete growth promoting substances like indole-3-acetic acid, indole-3- butyric acid, naphthalene acetic acid, amino acids, proteins, vitamins which promotes plant growth and production.

1

1

23	This is the level of exposure of plants to environmental factors that leads to neither injury nor reduction in growth and yield of crops	2
24	(i) Exotic species (non-native; alien) are organisms often introduced unintentionally or deliberately for commercial purpose, as biological control agents and other uses. They often become invasive and drive away the local species and is considered as the second major cause for extinction of species. Exotic species have proved harmful to both aquatic and terrestrial ecosystems. (ii) Maximum protection of biodiversity hotspots regions with very high levels of species richness. Although all the biodiversity hotspots together cover less than 2 percent of the earth land area, the number of species they harbour is extremely high and protection of these hotspots could reduce the ongoing mass.	1 1
	PART - III Answer any 6 of the following questions. Questions No.33 is compulsory.	6x3=18
25	Development of an egg into a complete individual without fertilization is known as parthenogenesis. e.g. Honey bees, Solenobia	3
26	• POCSO Act (Prevention of children from sexual offences), Sexual harassment at workplace (Prevention, prohibition and redressal) Act • The changes in the Criminal law based on the recommendations of Justice Verma Committee. • 2013 aims at creating a safe and secure environment for both females and males.	1 1 1
27	• Haemophilia is commonly known asbleeder's disease, which is more common in men than women. This hereditary disease was first reported by John Cotto in 1803. • Haemophilia is caused by a recessive X-linked gene. A person with a recessive gene for haemophilia lacks a normal clotting substance (thromboplastin) in blood, hence minor injuries cause continuous bleeding, leading to death. • The females are carriers of the disease and would transmit the disease to 50% of their sons even if the male parent is normal. Haemophilia follows the characteristic criss - cross pattern of inheritance.	1 1 1
28		Diagram - 2 Parts - 1
29	The main goals of Human Genome Project are as follows • Identify all the genes (approximately 30000) in human DNA. Determine the sequence of the three bi million chemical base pairs that makeup the human DNA. • To store this information in databases. Improve tools for data analysis. • Transfer related technologies to other sectors, such as industries. Address the ethical, egal and soci all issues (ELSI) that may arise from the project.	1 1 1

30	• Cold is caused by a group of viruses called Rhino viruses. • There are about 160 strains of these viruses. • It is difficult to produce a vaccine which can act against so many strains of viruses. The therefore it is difficult to produce a vaccine for cold.	1 1 1
31	• An immunogen is a substance capable of initiating an immune response. • Haptens are substance that are non-immunogenic • but can react with the products of a specific immune response.	1 1 1
32	• Cyclosporin A, an immunosuppressant used in organ transplantation. • It is produced from the fungus *Trichoderma polysporum.* • It is also used for its anti-inflammatory, anti-fungal and anti-parasiticproperties	1 1 1
33	• Stem cells are undifferentiated cells found in most of the multi cellular animals. These cells maintain their undifferentiated state even after undergoing numerous mitotic divisions. Stem cell research has the potential to revolutionize the future of medicine with the ability to regenerate damaged and diseased organs. Stem cells are capable of self renewal and exhibit 'cellular potency'. Stem cells can differentiate into all types of cells that are derived from any of the three germ layers ectoderm, endoderm and mesoderm. • ES cells are immortal i.e., they can proliferate in a sterile culture medium and maintain their undifferentiated state Adult stem cells are found in various tissues of children as well as adults. An adult stem cell or somatic stem cell can divide and create another cell similar to it. Most of the adult stem cells are multipotent and can act as a repair system of the body, replenishing adult tissues.The red bone marrow is a rich source of adult stem cells. The most important and potential application of human stem cells is the generation of cells and tissues that could be used for cell based therapies. Human stem cells could be used to test new drugs.	1½ 1½
	PART - IV Answer all the questions	5x5=25
34	a) • **Parturition** is the completion of pregnancy and giving birth to the baby. The series of events that expels the infant from the uterus is collectively called "labour". Throughout pregnancy the uterus undergoes periodic episodes of weak and strong contractions. These contractions called **Braxter-Hick's contractions** lead to false labour. • As the pregnancy progresses, increase in the oestrogen concentration promotes uterine contractions. These uterine contractions facilitate moulding of the foetus and downward movement of the foetus. The descent of the foetus causes dilation of cervix of the uterus and vaginal canal resulting in a **neurohumoral reflex** called **Foetal ejection reflex** or **Ferguson reflex**. • This initiates the secretion of oxytocin from the neurohypophysis which in turn brings about the powerful contraction of the uterine muscles and leads to the expulsion of the baby through the birth canal. This sequence of events	1

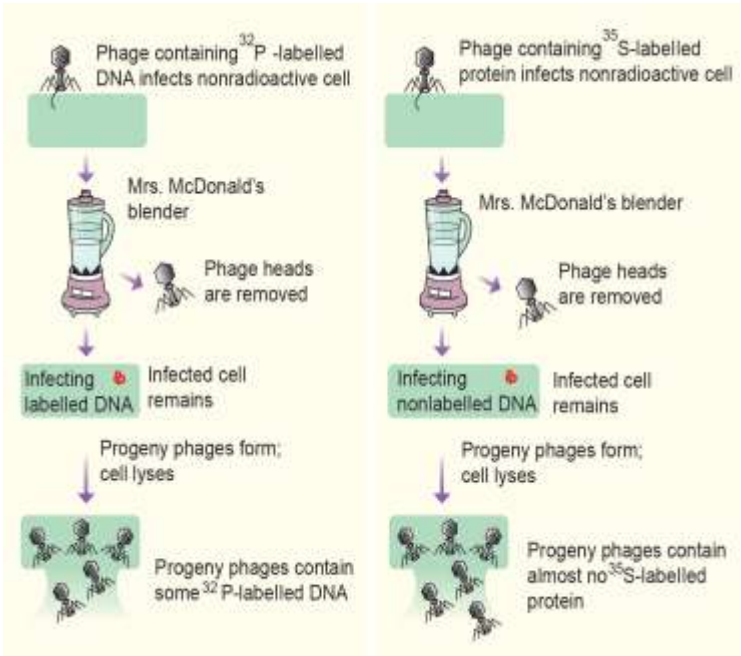
	is called as **parturition** or **childbirth**. • Relaxin is a hormone secreted by the placenta and also found in the corpus luteum. It promotes parturition by relaxing the pelvic joints and by dilatation of the cervix with continued powerful contractions. • The amnion ruptures and the amniotic fluid flows out through the vagina, followed by the foetus. The placenta along with the remains of the umbilical cord called **"after birth"** is expelled out after delivery. • **Lactation** is the production of milk by mammary glands. The mammary glands show changes during every menstrual cycle, during pregnancy and lactation. • Increased level of oestrogens, progesterone and **human Placental Lactogen (hPL)** towards the end of pregnancy stimulate the hypothalamus towards prolactin – releasing factors. The anterior pituitary responds by secreting **prolactin** which plays a major role in lactogenesis. • Oxytocin causes the "**Let-Down" reflex**- the actual ejection of milk from the alveoli of the mammary glands. During lactation, oxytocin also stimulates the recently emptied uterus to contract, helping it to return to pre - pregnancy size. • The mammary glands secrete a yellowish fluid called **colostrum** during the initial few days after parturition. It has less lactose than milk and almost no fat, but it contains more proteins, vitamin A and minerals. • Colostrum is also rich in **IgA** antibodies. This helps to protect the infant's digestive tract against bacterial infection. Breast milk is the ideal food for infants as it contains all the constituents in suitable concentration and is easily digestible. It is fully sufficient till about 6 months of age and all infants must be breast fed by the mother to ensure the growth of a healthy baby.	1 ½ ½ 1 1
	(OR)	
	b) i)Thalassemia • Thalassemia is an autosomal recessive disorder. It is caused by gene mutation resulting in excessive destruction of RBC's due to the formation of abnormal haemoglobin molecules. Normally haemoglobin is composed of four polypeptide chains, two **alpha** and two **beta** globin chains. Thalassemia patients have defects in either the alpha or beta globin chain causing the production of abnormal haemoglobin molecules resulting in anaemia. • Thalassemia is classified into alpha and beta based on which chain of haemoglobin molecule is affected. It is controlled by two closely linked genes HBA1 and HBA2 on chromosome 16. Mutation or deletion of one or more of the four alpha gene alleles causes **Alpha Thalassemia**. In **Beta Thalassemia,** production of beta globin chain is affected. It is controlled by a single gene (HBB) on chromosome 11. • It is the most common type of Thalassemia and is also known as Cooley's anaemia. In this disorder the alpha chain production is increased and damages the membranes of RBC. **ii)Albinism** • Albinism is an inborn error of metabolism, caused due to an autosomal recessive gene. Melanin pigment is responsible for skin colour. Absence of melanin results in a condition called albinism.	1 1 ½ 1

	• A person with the recessive allele lacks the tyrosinase enzyme system, which is required for the conversion of dihydroxyphenyl alanine (DOPA) into melanin pigment inside the melanocytes. In an albino, melanocytes are present in normal numbers in their skin, hair, iris, etc., , but lack melanin pigment. 3, 4 dihydroxy phenylalanine (DOPA) $\xrightarrow{\text{Tyrosinase}}$ Melanin	1 ½
35	a) Barrier methods In these methods, the ovum and sperm are prevented from meeting so that fertilization does not occur. • Chemical barrier Foaming tablets, melting suppositories, jellies and creams are used as chemical agents that inactivate the sperms in the vagina. • Mechanical barrier Condoms are a thin sheath used to cover the penis in male whereas in female it is used to cover vagina and cervix just before coitus so as to prevent the entry of ejaculated semen into the female reproductive tract. This can prevent conception. Condoms should be discarded after a single use. Condom also safeguards the user from AIDS and STDs. Condoms are made of polyurethane, latex and lambskin. Diaphragms, cervical caps and vaults are made of rubber and are inserted into the female reproductive tract to cover the cervix before coitus in order to prevent the sperms from entering the uterus. • Hormonal barrier It prevents the ovaries from releasing the ova and thickens the cervical fluid which keeps the sperm away from ovum. i) Oral contraceptives – Pills are used to prevent ovulation by inhibiting the secretion of FSH and LH hormones. A combined pill is the most commonly used birth control pill. It contains synthetic progesterone and estrogen hormones. Saheli, contraceptive pill by Central Drug Research Institute (CDRI) in Lucknow, India contains a non- steroidal preparation called centchroman. • Intrauterine Devices (IUDs) Intrauterine devices are inserted by medical experts in the uterus through the vagina. These devices are available as copper releasing IUDs, hormone releasing IUDs and non-medicated IUDs. IUDs increase phagocytosis of sperm within the uterus. IUDs are the ideal contraceptives for females who want to delay pregnancy. It is one of the popular methods of contraception in India and has a success rate of 95 to 99%. Copper releasing IUDs differ from each other by the amount of copper. Copper IUDs such as Cu T-380 A, Nova T, Cu 7, Cu T 380 Ag, Multiload 375, etc. release free copper and copper salts into the uterus and suppress sperm motility. They can remain in the uterus for five to ten years. ii. Hormone-releasing IUDs such as Progestasert and LNG – 20 are often called as intrauterine systems (IUS). They increase the viscosity of the cervical mucus and thereby prevent sperms from entering the cervix. iii. Non-medicated IUDs are made of plastic or stainless steel. Lippes loop is a double S shaped plastic device.	1 1 1 1 1

(OR)

b)

- Alfred Hershey and Martha Chase (1952) conducted experiments on bacteriophages that infect bacteria. Phage T2 is a virus that infects the bacterium *Escherichia coli*. When phages (virus) are added to bacteria, they adsorb to the outer surface, some material enters the bacterium, and then later each bacterium lyses to release a large number of progeny phage.
- Hershey and Chase wanted to observe whether it was DNA or protein that entered the bacteria. All nucleic acids contain phosphorus, and contain sulphur (in the amino acid cysteine and methionine). Hershey and Chase designed an experiment using radioactive isotopes of Sulphur (35S) and phosphorus (32P) to keep separate track of the viral protein and nucleic acids during the infection process. The phages were allowed to infect bacteria in culture medium which containing the radioactive isotopes 35S or 32P. 1
- The bacteriophage that grew in the presence of 35S had labelled proteins and bacteriophages grown in the presence of 32P had labelled DNA.The differential labelling thus enabled them to identify DNA and proteins of the phage. 1
- Hershey and Chalse mixed the labelled phages with unlabeled *E. coli* and allowed bacteriophages to attack and inject their genetic material. Soon after infection (before lysis of bacteria), the bacterial cells were gently agitated in a blender to loosen the adhering phase particles. 1
- It was observed that only 32P was found associated with bacterial cells and 35S was in the surrounding medium and not in the bacterial cells. When phage progeny was studied for radioactivity, it was found that it carried only 32P and not 35S These results clearly indicate that only DNA and not protein coat entered the bacterial cells. Hershey and Chase thus conclusively proved that it was DNA, not protein, which carries the hereditary information from virus to bacteria. 1



36	a) **Sewell Wright, Fisher, Mayer, Huxley, Dobzhansky, Simpson and Haeckel** explained Natural Selection in the light of Post-Darwinian discoveries. According to this theory gene mutations, chromosomal mutations, genetic recombinations, natural selection and reproductive isolation are the five basic factors involved in the process of organic evolution. **i. Gene mutation** refers to the changes in the structure of the gene. It is also called gene/ point mutation. It alters the phenotype of an organism and produces variations in their offspring. **ii. Chromosomal mutation** refers to the changes in the structure of chromosomes due to deletion, addition, duplication, inversion or translocation. This too alters the phenotype of an organism and produces variations in their offspring. **iii. Genetic recombination** is due to crossing over of genes during meiosis. This brings about genetic variations in the individuals of the same species and leads to heritable variations. **iv. Natural selection** does not produce any genetic variations but once such variations occur it favours some genetic changes while rejecting others (driving force of evolution). **v. Reproductive isolation** helps in preventing interbreeding between related organisms.	1 1 1 1 1
	b) **S. No / Diseases / Causative agent / Site of infection / Mode of transmission / Symptoms** 1 Shigellosis (Bacillary dysentery) — *Shigella sp.* — Intestine — Food and water contaminated by faeces / faecal oral route — Abdominal pain, dehydration, blood and mucus in the stools 2 Bubonic plague (Black death) — *Yersinia pestis* — Lymph nodes — Rat flea vector- *Xenopsylla cheopis* — Fever, headache, and swollen lymph nodes 3 Diphtheria — *Corynebacterium diphtheriae* — Larynx, skin, nasal and genital passage — Droplet infection — Fever, sore throat, hoarseness and difficulty in breathing 4 Cholera — *Vibrio cholerae* — Intestine — Contaminated food and water/ faecal oral route — Severe diarrhoea and dehydration 5 Tetanus (Lock jaw) — *Clostridium tetani* — Spasm of muscles — Through wound infection — Rigidity of jaw muscle, increased heart beat rate and spasm of the muscles of the jaw and face 6 Typhoid (Enteric fever) — *Salmonella typhi* — Intestine — Through contaminated food and water — Headache, abdominal discomfort, fever and diarrhoea 7 Pneumonia — *Streptococcus pneumoniae* — Lungs — Droplet infection — Fever, cough, painful breathing and brown sputum 8 Tuberculosis — *Mycobacterium tuberculosis* — Lungs — Droplet infection — Thick mucopurulant nasal discharge	Any 5 5x1=5
	(OR)	
37	a) (i) Stem cells are undifferentiated cells found in most of the multi cellular animals (ii) Stem cells are capable of self renewal and exhibit 'cellular potency'. (iii) In mammals there are two main types of stem cells – embryonic stem cells (ES cells) and adult stem cells. ES cells are isolated from the epiblast tissue of the inner cell mass of a blastocyst. (iv) ES cells are pluripotent and can produce the three primary germ layers ectoderm, mesoderm and endoderm. Embryonic stem cells are multipotent stem cells that can differentiate into a number of types of cells (v) An adult stem cell or somatic stem cell can divide and create another cell similar	1

to it. Most of the adult stem cells are multipotent and can act as a repair system of the body, replenishing adult tissues.The red bone marrow is a rich source of adult stem cells. 1

Applications : The most important and potential application of human stem cells is the generation of cells and tissues that could be used for cell based therapies. Human stem cells could be used to test new drugs. 1

Stem cell banking:

(i) Extraction, processing and storage of stem cells, so that they may be used for treatment in the future, when required. Amniotic cell bank is a facility that stores stem cells derived from amniotic fluid for future use. 1

(ii) Cord Blood Banking is the extraction of stem cells from the umbilical cord during childbirth the placenta, amniotic sac and amniotic fluid are also rich sources of stem cells. 1

(OR)

b) Any 5

5x1=5

SN. NO.	TYPES OF INTERATION	SPECIES 1	SPECIES 2	GENERAL NATUE OF INTERACTION	EXAMPLES
1	Amensalism	–	0	The most powerful animal or large organisms inhibits the growth of other lower organisms	Cat and Rat
2	Mutualism	+	+	Interaction favorable to both and obligatory	Between crocodile and bird
3	Commensalism	+	0	Population 1, the commensal benefits, while 2 the host is not affected	Sucker fish on shark
4	Competition	–	–	Direct inhibition of each species by the other	Birds compete with squirrels for nuts and seeds.
5	Parasitism	+	–	Population 1, the parasite, generally smaller than 2, the host	*Ascaris* and tapeworm in human digestive tract.
6	Predation	+	–	Population 1, the predator, generally larger than 2, the prey	Lion predatory on deer

38 a) The major causes for biodiversity decline are:

- Habitat loss, fragmentation and destruction (affects about 73% of all species) 1
- Pollution and pollutants (smog, pesticides, herbicides, oil slicks, GHGs) 1
- Climate change
- Introduction of alien/exotic species 1
- Over exploitation of resources (poaching, indiscriminate cutting of trees, over fishing, hunting, mining) 1
- Intensive agriculture and aquacultural practices 1
- Hybridization between native and non-native species and loss of native species
- Natural disasters (Tsunami, forest fire, earth quake, volcanoes)

Industrialization, Urbanization, infrastructure development, Transport – Road and Shipping activity, communication towers, dam construction, unregulated tourism and monoculture are common area of specific threats Co-extinction

	(OR)	
	b) Causes and effects of ozone layer depletion Causes: • Ozone layer depletion mainly occurs by anthropogenic actions. • The excessive release of chlorine and bromine from man-made compounds such as chlorofluorocarbons (CFCs) causes ozone layer depletion. • CFCs, methyl chloroform, carbon tetrachloride, hydrochlorofluorocarbons, hydrobromofluorocarbons and methylbromide are found to have direct impact on the depletion of the ozone layer. These are categorized as ozone-depleting substances (ODS). Effects: • UV rays may penetrate deep into the skin and can lead to premature skin aging and wrinkling of skin; suppression of the immune system, skin cancer (melanoma) and chronic effects leading to eye damage. • DNA damage can result from free radicals and reactive oxygen and photons can damage the DNA itself. *Control:* Ozone layer depletion can be controlled by (1) Phase down or ban the use of CFCs (CFC free refrigerants). (2) Minimizing the use of chemicals such as halons and halocarbons. (3) Creating awareness about ozone depleting agents.	1 1 1 1 1

PART	Book Back Questions	Interior questions	Total No. of Questions	Total Mark
I	3	12	15	15
II	3	6	9	18
III	3	6	9	27
IV	4	6	10	50
Total	13	30	43	110

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