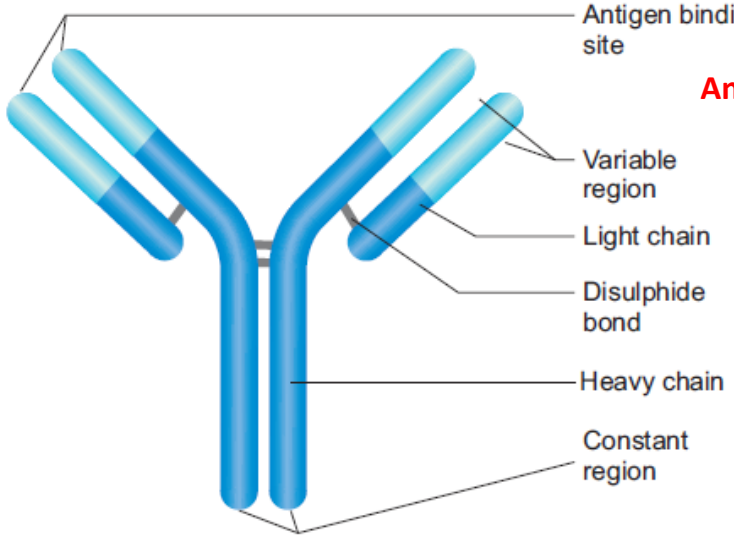
HIGHER SECONDARY PUBLIC EXAMINATION, MARCH – 2022

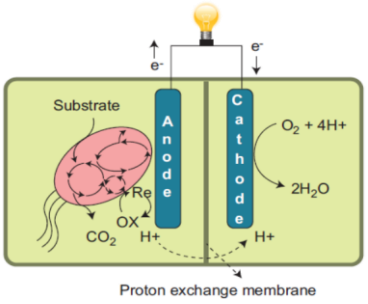
TENTATIVE SCORING KEY

SUBJECT: ZOOLOGY **CLASS: 12**

PART-I					15 x 1 = 15
Q.NO	**A - TYPE**		**Q.NO**	**B - TYPE**	
1	D	A deep geological repository	1	B	Multiple alleles
2	C	Sexual	2	B	Individuals mate selectively
3	C	Amphibians	3	B	LH – Leyidig cells – testosterone – Spermatogenesis.
4	C	Intersex	4	B	Reduce BOD
5	C	3.1 billion	5	C	Antigen
6	D	Inhibition of release of FSH & LH	6	A	Molasses
7	D	Eurytherms	7		
8	C	Antigen	8		
9	A	Molasses	9	D	A deep geological repository
10	B	LH – Leyidig cells – testosterone – Spermatogenesis.	10	C	3.1 billion
11	B	Individuals mate selectively	11	C	Amphibians
12	B	Multiple alleles	12	D	Inhibition of release of FSH & LH
13	A	A toxin from the plasmodium species	13	C	Intersex
14	C	Migration	14	D	Eurytherms
15	B	Reduce BOD	15	C	Migration

	PART-II (Q.NO : 24 Is Compulsory 6 x 2 = 12	
16	**Senescent phase:** **1.** It begins at the end of reproductive phase. -- **1 M** **2.** Degeneration sets in the structure and functioning of the body. -- **1 M**	**2 M**
17	**Composition of Semen:** **1. Semen** or seminal fluid is contains sperms and the seminal plasma -- **1 M** **3.** Secretions of seminal vesicles, prostate gland and the bulbourethral glands. -- **1 M**	**2 M**
18	**POCSO Act** **1.** Prevention of children from sexual offences. -- **1 M** **2. Sexual harassment at workplace -** Prevention, prohibition and redressal Act. -- **1 M**	**2 M**
19	**Transcription**: 1. The process of copying genetic information from one strand of DNA into RNA. -- **1 M**	**2 M**
20	**Gases in primitive earth:** 1. Ammonia, -- **½ M** 2. Methane, -- **½ M** 3. Hydrogen and -- **½ M** 4. Water vapour. -- **½ M**	**2 M**
21	**Amoebiasis:** 1. Infective stage of amoebiasis is parasite is the trophozoite, -- **½ M** 2. **House flies (***Musca domestica***)** acts as a carrier for transmitting the Trophozoite from contaminated faeces and water. -- **1 ½ M**	**2 M**
22	**Zymology:** **1.** It is an applied science which deals with the biochemical process of fermentation and its practical uses. -- **2 M**	**2 M**
23	**Mass extinction:** 1. The earth has experienced quite a few mass extinctions due to environmental catastrophes. -- **1 M** 2. A mass extinction occurred about 225 million years ago during the Permian, where 90% of shallow water marine invertebrates disappeared. -- **1 M**	**2 M**
24 C	**RTPCR technology:** 1. The PCR technique can also be used for amplifications of RNA in which case it is referred to as reverse transcription PCR (RT-PCR). -- **½ M** 2. In this process the corona RNA molecules (mRNA) must be converted to complementary DNA by the enzyme reverse transcriptase. -- **1 M** 3. The cDNA then serves as the template for PCR. -- **½ M**	**2 M**

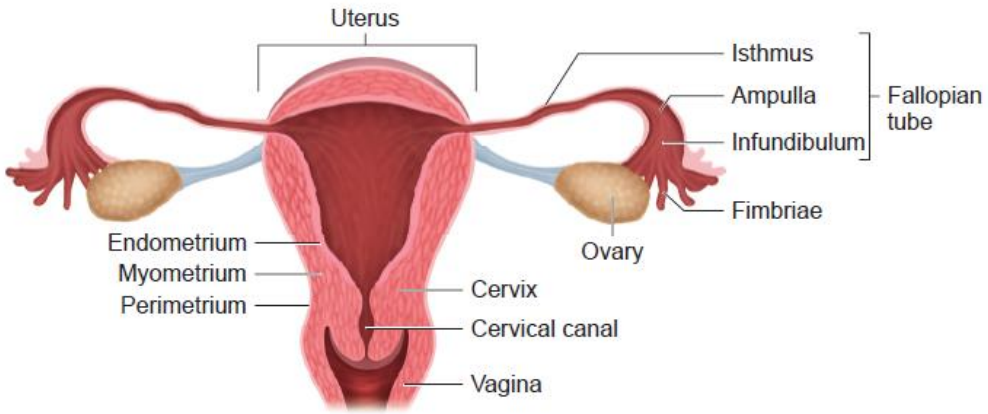
	PART-III - QUESTION NO – 33. IS COMPULSORY 6 X 3 = 18	
25	1. **Female foeticide:** 'aborting the female in the mother's womb' -- 1 ½ M 2. **Female infanticide:** killing the female child after her birth'. -- 1 ½ M	3 M
26	1. If a woman is Rh negative and the man is Rh positive, the foetus may be Rh positive having inherited the factor fromits father. -- ½ M 2. The Rh negative mother becomes sensitized by carrying Rh positive foetus within her body. -- ½ M 3. Due to damage of blood vessels, during child birth, the mother's immune system recognizes the Rh antigens and gets sensitized. -- ½ M 4. Usually no effects are associated with exposure of the mother to Rh positive antigen during the first child birth, -- ½ M 5. Subsequent Rh positive children carried by the same mother, may be exposed to antibodies produced by the mother against Rh antigen, which are carried across the placenta into the foetal blood circulation. -- ½ M 6. This causes haemolysis of foetal RBCs resulting in haemolytic jaundice and anaemia. -- ½ M 7. This condition is known as **Erythoblastosis foetalis or Haemolytic disease of the new born (HDN).**	3 M
27	1. **Malaria vaccine** is used to prevent malaria. -- ½ M 2. The only approved vaccine as of 2015 is RTS,S (Mosquirix). -- ½ M 3. It requires four injections and has relatively low efficacy (26–50%). -- 1 M 4. Due to this low efficacy, WHO does not recommend the use of RTS,S vaccine in babies between 6 and 12 weeks of age. -- 1 M	
28	 Diagram – 2 mark Any four parts – 1 mark Fig. 8.7 Structure of immunoglobulin	3 M

29	**Working of a microbial fuel cell.** **1.** A microbial fuel cell is a bio-electrochemical system that drives an electric current by using bacteria and mimicking bacterial interaction found in nature. **- ½ Mark** **2.** Microbial fuel cells work by allowing bacteria to oxidize and reduce organic molecules. **- ½ Mark** **3.** Bacterial respiration is basically one big redox reaction in which electrons are being moved around. **- ½ Mark** **4.** A MFC consists of an anode and a cathode separated by a proton exchange membrane. **- ½ Mark** **5.** Microbes at the anode oxidize the organic fuel generating protons which pass through the membrane to the cathode and the electrons pass through the anode to the external circuit to generate current. **- ½ Mark** **6.** Diagram **- ½ Mark** 	**3 M**
30	**Eurytherms**: 1. Organisms which can survive a wide range of temperature. **-- 1 M** 2. **Ex**: (cat, dog, tiger, human). **-- ½ M** **Stenotherms:** 3. Organisms which can tolerate only a narrow range of temperature. **-- 1 M** 4. Ex: Fish, Frogs, Lizards and Snakes. **-- ½ M**	**3 M**
31	**Alpha diversity:** **-- 1 M** 1. It is measured by counting the number of taxa (usually species) within a particular area, community or ecosystem. **Beta diversity:** **-- 1 M** 2. It is species diversity between two adjacent ecosystems and is obtaining by comparing the number of species unique to each of the ecosystem. **Gamma diversity:** **-- 1 M** 3. It refers to the diversity of the habitats over the total landscape or geographical area.	**3 M**
32	**Eutrophication can be controlled by.** **Any three valid points** 1. Reducing the use of fertilizers in agricultural lands, 2. Checking the runoff water from fields. 3. Prevent introduction of nutrients such as nitrates and phosphates, which encourage the growth of aquatic organisms. 4. Pollutants should be reduced. 5. Effluents from the industries and homes should be treated. **3 x 1 = 3**	**3 M**
33 C	**Multipotency (multi-Many):** 1. The stem cells that can differentiate into various types of cells that are related. **-- 1 M** 2. Example: blood stem cells can differentiate into lymphocytes, monocytes, neutrophils. **-- ½ M** **Oligopotency (Oligo-Few):** 3. The stem cells that can differentiate into few cell types. **-- 1 M** 4. Example lymphoid or myeloid stem cells can differentiate into B and T cells but not RBC. **-- ½ M**	**3 M**

PART – IV - 5 X 5 = 25

34 .A

1. The uterus or womb is a hollow, thick-walled, muscular, highly vascular and inverted pear shaped structure lying in the pelvic cavity between the urinary bladder and rectum. -- **1 M**
2. The major portion of the uterus is the body and the rounded region superior to it, is the **fundus**. -- **½ M**
3. The uterus opens into the vagina through a narrow **cervix**. -- **½ M**
4. **Perimetrium**: The outermost thin membranous serous layer. -- **½ M**
5. **Myometrium**: The middle thick muscular layer. -- **½ M**
6. **Endometrium**: inner glandular layer. -- **½ M**
7. The endometrium undergoes cyclic changes during the menstrual cycle while myometrium exhibits strong contractions during parturition. -- **½ M**
8. **Diagram :** -- **1 M**



34. B

1. Creating awareness and providing medical assistance to build a healthy society. -- **1 M**
2. Introducing sex education in schools to provide information about adolescence and adolescence related changes. -- **1 M**
3. Educating couples and those in the marriageable age groups about the available birth control methods and family planning norms. -- **1 M**
4. Creating awareness about care for pregnant women, post-natal care of mother and child and the importance of breast feeding. -- **1 M**
5. Encouraging and supporting governmental and non-governmental agencies to identify new methods and/or to improve upon the existing methods of birth control. -- **1 M**

5 M

35. A

Role of translation components in Initiation:

Initiation components: -- **1 M**

- 30S subunits of the ribosome,
- A messenger RNA and
- The charged N-formyl methionine tRNA (fmet – t RNA fmet),
- Three proteinaceous initiation factors (IF1, IF2, IF3),
- GTP(Guanine Tri Phosphate) and Mg 2+.

Functions: **-- 1 M**

1. IF3 binds to the 30S
2. 30S subunit to bind to mRNA.
3. (IF2) then enhances the binding of charged formyl methionine tRNA to the small subunit in response to the AUG triplet.
4. IF3 is released and allows the initiation complex to combine with the 50S ribosomal subunit to form the complete ribosome (70S).

Elongation components: **-- 1 M**

- Aminoacyl site (A site),
- Peptidyl site (P site) and
- Exit site (E site).

Functions: **-- 1 M**

1. The charged initiator tRNA binds to the P site.
2. The covalent bond between the amino acid and tRNA occupying the P site is hydrolyzed (broken).
3. The uncharged tRNA moves through the '**E' site** on the ribosome.

Termination phase of translation: **-- 1 M**

1. The terminal codon signals the action of **GTP – dependent release factor,** which cleaves the polypeptide chain from the terminal tRNA releasing it from the translational complex

OR

35. B

The salient features of genetic code: **any five = 5 x 1 = 5** **5 M**

1. The genetic codon is a **triplet code** and 61 codons code for amino acids and 3 codons do not code for any amino acid and function as **stop codon (**Termination**)**.
2. The genetic code is universal. The mRNA (UUU) codon codes for phenylalanine in all cells of all organisms.
3. A non-overlapping codon means that the same letter is not used for two different codons. For instance, the nucleotide sequence GUU GUC represents only two codons.
4. It is comma less, which means that the message would be read directly from one end to the other i.e., no punctuation are needed between two codes.
5. A degenerate code means that more than one triplet codon could code for a specific amino acid. For example, codons GUU, GUC, GUA and GUG code for valine.
6. Non-ambiguous code means that one codon will code for one amino acid.
7. The code is always read in a fixed direction i.e. from 5'→3' direction called polarity.
8. AUG has dual functions. It acts as a initiator codon and also codes for the amino acid methionine.
9. UAA, UAG and UGA) codons are designated as termination (stop) codons and also are known as "non-sense" codons.

36. A

Hardy weinberg's Law :

1. The allele frequencies in a population are stable and are constant from generation to generation in the absence of gene flow, genetic drift, mutation, recombination and natural selection. **-- 1 M**
2. Evolution is a change in the allele frequencies in a population over time. Hence population in hardy Weinberg is not evolving.

Explanation for the equilibrium:

1. Large populations of beetles appear in two colours dark grey (black) and light grey and their colour is determined by "A" gene. **-- ½ M**
2. "AA" and "Aa" beetles are dark grey and 'aa' beetles are light grey. **-- ½ M**
3. "A" allele has frequency (P) of 0.3 and "a" allele has a frequency (q) of 0.7.
4. **Then p + q = 1.** **-- ½ M**
5. If a population is in hardy Weinberg equilibrium, the genotype frequency can be estimated by Hardy Weinberg equation
6. $(P + q)^2 = P^2 + 2pq + q^2$

p^2 = frequency of AA, 2pq= frequency of Aa, q^2 = frequency of aa. **-- ½ M**

- ✓ p = 0.3, q = 0.7 then,
- ✓ $p^2 = (0.3)^2 = 0.09 = 9$ % AA
- ✓ 2pq = 2(0.3) (0.7) = 0.42 = 42 % Aa **-- 1 M**
- ✓ q^2 = (0.7)2 0.49 = 49 % aa

7. When the beetles in Hardy- Weinberg equilibrium reproduce, the allele and genotype frequency in the next generation would be the same, and then there would be no variation in the progeny. **-- ½ M**
8. The genotype frequency of the parent appears in the next generation. (i.e. 9% AA, 42% Aa and 49% aa). **-- ½ M**

5 M

36. B

Bacterial disease:

Diseases	Causative agent	Site of infection & Mode of transmission	Symptoms	
Typhoid (Enteric fever)	*Salmonella typhi*	**Intestine** Through contaminated food and water	Headache, abdominal discomfort, fever and diarrhoea	-- 1 M
Shigellosis (Bacillary dysentery)	*Shigella sp.*	**Intestine** Food and water contaminated by faeces / faecal oral route	Abdominal pain, dehydration, blood and mucus in the stools	-- 1 M
Cholera	*Vibrio cholerae*	**Intestine** Contaminated food and water/ faecal oral route	Severe diarrhoea and dehydration	-- 1 M
Pneumonia	*Streptococcus pneumoniae*	**Lungs** Droplet infection	Fever, cough, painful breathing and brown sputum	-- 1 M
Tuberculosis	*Mycobacterium tuberculosis*	**Lungs** Droplet infection	Thick mucopurulant nasal discharge	-- 1 M

Name of the disease and causative agent - ½ Mark
Symptoms – Any two and mode of transmission - ½ Mark

37.A

Innate immunity :

Type of innate immunity	Mechanism	
1. Anatomical barriers		
Skin	✓ Prevents the entry of microbes. ✓ Its acidic environment (pH 3-5) retards the growth of microbes.	-- ½ M
Mucus membrane	✓ Mucus entraps foreign microorganisms and competes with microbes for attachment.	-- ½ M
2. Physiological barriers		
Temperature	✓ Normal body temperature inhibits the growth of pathogens. ✓ Fever also inhibits the growth of pathogens.	-- ½ M
Low pH	✓ Acidity of gastric secretions (HCl) kills most ingested microbes.	-- ½ M
Chemical mediators	✓ Lysozyme acts as antibacterial agent and cleaves the bacterial cell wall. ✓ Interferons induce antiviral state in the uninfected cells. ✓ Complementary substances produced from leucocytes lyse the pathogenic microbes or facilitate phagocytosis.	-- 1 M
3. Phagocytic barriers	✓ Specialized cells (Monocytes, neutrophils, tissue macrophages) phagocytose, and digest whole microorganisms.	-- 1 M
4. Inflammatory barriers	✓ Tissue damage and infection induce leakage of vascular fluid, containing chemotactic signals like serotonin, histamine and prostaglandins. ✓ They influx the phagocytic cells into the affected area. This phenomenon is called diapedesis.	-- 1 M

37.B — **5 M**

Sprocess in PCR:

Denaturation: -- 1 ½ M

1. The double-stranded DNA of interest is denatured to separate into two individual strands by high temperature. This is called denaturation.
2. Each strand is allowed to hybridize with a primer (renaturation or primer annealing). The primer-template is used to synthesize DNA by using Taq – DNA polymerase.
3. During denaturation, the reaction mixture is heated to 95 °C for a short time to denature the target DNA into single strands that will act as a template for DNA synthesis.

Annealing: -- 1 M

4. Annealing is done by rapid cooling of the mixture, allowing the primers to bind to the sequences on each of the two strands flanking the target DNA.
5. During primer extension or synthesis the temperature of the mixture is increased to 75°C for a sufficient period of time to allow Taq DNA polymerase to extend each primer by copying the single-stranded template.

DNA amplification: **-- 1 ½ M**

6. At the end of incubation, both single template strands will be made partially double-stranded.
7. The new strand of each double-stranded DNA extends to a variable distance downstream.
8. These steps are repeated again and again to generate multiple forms of the desired DNA. This process is also called DNA amplification.
9. Diagram **-- 1 M**

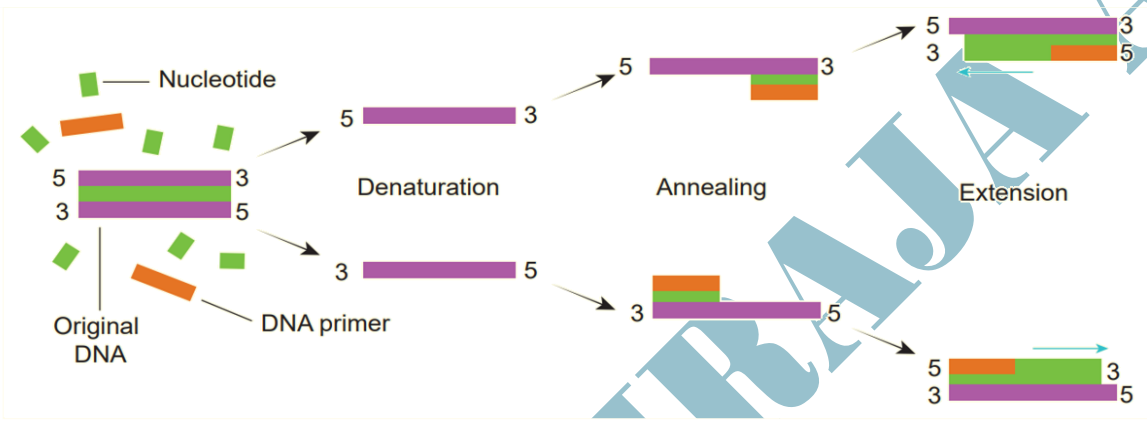


Fig. 9.6 Steps involved in PCR

38.A

Essential properties of water **Any five : 1 x 5 = 5** **5 M**

1. Water is one of the main agents in Pedogenesis (soil formation).
2. It is the medium for several different ecosystems.
3. It is present as moisture in the atmosphere and the outer layers of the lithosphere and is uneven in distribution on the earth.
4. Water is heavier than air and imparts greater buoyancy to the aquatic medium. This enables organism to float at variable levels.
5. Water has high heat capacity and latent heat, due to which it can withhold large amountsof heat. Thus, oceans and lakes tend to maintain a relatively constant temperature, and the biosphere is relatively thermostable.
6. Water is physically unique because it is less dense as a solid (ice) than as a liquid.
7. When water freezes (0^{o}C), it contracts. The maximum density of liquid water occurs at 4oC. Below that, it expands markedly. This enables ice to float on the top of water bodies.
8. Water is considered as the Universal solvent. It is the main medium by which chemical constituents are transported from abiotic components to the living components of an ecosystem.
9. Water has high surface tension. This allows pollen, dust, and even water striders to remain at the surface of a water body even though they are denser than the water.

	Management of biomedical waste. **2 ½ Mark** 1. Any kind of waste that contains infectious material generated by hospitals, laboratories, medical research centers, Pharmaceutical companies and Veterinary clinics are called medical wastes. 2. Medical wastes contain body fluids like blood, urine, body parts and other contaminants, culture dishes, glasswares, bandages, gloves, discarded needles, scalpels, swabs and tissues. 3. **Management:** The safe and sustainable management of biomedical waste is the social and legal responsibilities of people working in healthcare centers. 4. **Waste disposal:** Involved by incineration, chemical disinfection, autoclaving, encapsulation, microwave irradiation are methods of waste disposals. Final disposal includes landfill and burying as per norms inside premises.	
38.B	**E – waste** **2 ½ Mark** **1.** Electronic waste or e-waste describes discarded electrical electronic devices as well as any refuse created by discarded electronic devices and components and substances involved in their manufacture or use. **2.** Their disposal is a growing problem because electronic equipment frequently contains hazardous substances. **3.** In a personal computer, for example, there may be lead (Pb) in the cathode ray tube (CRT) and soldering compound, mercury (Hg) in switches and housing, and cobalt (Co) in steel components, among other equally toxic substances. **4.** E-wastes are basically PCB (Polychlorinated biphenyl) based, which are non-degradable.	**5 M**

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