

V Rengarajan GHSS Nallamanaickerpatti

Virudhunagar District

STD XII

Quarterly Exam September 2024

BIOLOGY

Marks : 70

Time: 3 Hrs

Marks: 35

Part – I Bio – Botany

Section – A

Answer All the Questions:

8 x 1 = 8

1. a. Microspore
2. b. Four
3. b. Alfred H Sturtevant
4. c. GAATTC
5. c. Biosafety
6. a. i only
7. c. 1-iii, 2-i, 3-iv, 4-ii
8. b. Dominant epistasis

Section – B

Answer any Four of the following:

4 x 2 = 8

9. *Spirulina* can be grown easily on materials like waste water from potato processing plants (containing starch), straw, molasses, animal manure and even sewage, to produce large quantities. ----- 2 Marks
10. Phytoremediation - use of plants to bring about remediation of environmental pollutants. ----- 2 Marks
11. Test Cross: Test cross is crossing an individual of dominant phenotype but unknown genotype with a homozygous recessive. Or
If the F1 hybrid is crossed with the recessive parent individuals of both the phenotypes appear in equal proportion and this cross is specified as test cross----- 2 Marks
12. Pollination by bees is called mellitophily ----- 2 Marks
13. Types of Synapsis:
 1. **Procentric synapsis:** Pairing starts from middle of the chromosome.
 2. **Proterminal synapsis:** Pairing starts from the telomeres.
 3. **Random synapsis:** Pairing may start from anywhere. ----- 2 Marks
14. The fusion product of protoplasts without nucleus of different cells is called a cybrid.-2 Marks

Section – C

Answer any Three of the following: Q. No. 19 is compulsory. 3 x 3 = 9

15. Scientists who rediscovered Mendel's work are **Hugo de Vries** of Holland, **Carl Correns** of Germany and **Erich von Tschermak** of Austria. ----- 3 Marks
16. pBR 322 plasmid is a reconstructed plasmid and most widely used as cloning vector.
 - It contains 4361 base pairs. In pBR, **p** denotes plasmid, **B** and **R** respectively the names of scientist **Boliver** and **Rodriguez** who developed this plasmid.
 - The number **322** is the number of plasmid developed from their laboratory.
 - It contains ampR and tetR two different antibiotic resistance genes and recognition sites for several restriction enzymes. (*Hind III*, *EcoRI*, *BamH I*, *Sal I*, *Pvu II*, *Pst I*, *Cla I*), ori and antibiotic resistance genes.
 - Rop codes for the proteins involved in the replication of the plasmid. ----- 3 Marks

17.

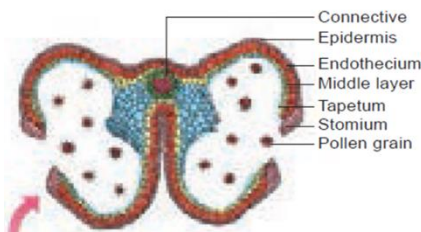


Diagram – 2 Marks Parts ---- 1 Mark

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18. Cryopreservation, also known as Cryo conservation, is a process by which Protoplasts, cells, tissues, organelles, organs, extracellular matrix, enzymes or any other biological materials are subjected to preservation by cooling to very low temperature of -196°C using liquid nitrogen.

At this extreme low temperature any enzymatic or chemical activity of the biological material will be totally stopped and this leads to preservation of material in dormant status. Later these materials can be activated by bringing to room temperature slowly for any experimental work.

Protective agents like dimethyl sulphoxide, glycerol or sucrose are added before cryopreservation process. These protective agents are called cryoprotectants, since they protect the cells, or tissues from the stress of freezing temperature.

----- 3 Marks

19.. A- $n=2x=14$; B – Triploidy chromosome doubling by colchicine $2n=6x=42$ Triticale

----- 3 Marks

Section – D

Answer All the Questions:

20. a In the summer squash the fruit colour locus has a dominant allele 'W' for white colour and a recessive allele 'w' for coloured fruit. 'W' allele is dominant that masks the expression of any colour. In another locus hypostatic allele 'G' is for yellow fruit and its recessive allele 'g' for green fruit. In the first locus the white is dominant to colour where as in the second locus yellow is dominant to green.

When the white fruit with genotype WWgg is crossed with yellow fruit with genotype wwGG, the F₁ plants have white fruit and are heterozygous (WwGg). When F₁ heterozygous plants are crossed they give rise to F₂ with the phenotypic ratio of 12 white : 3 yellow

Or

b. Structure of Ovule: Structure of ovule diagram with parts - 2 marks Explanation – 3 marks

Ovule is also called megasporangium . The stalk of the ovule is called as **funiculus** (also called funicle and it attaches the ovule to the placenta.

The point of attachment of funicle to the body of the ovule is known as **hilum**.

. The body of the ovule is made up of a central mass of parenchymatous tissue called **nucellus** which has large reserve food materials. ----- 1 Mark

The nucellus is enveloped by one or two protective coverings called **integuments**.

The integuments leave a opening one end is called as **micropyle**. The basal region of the body of the ovule where the nucellus, the integument and the funicle meet or merge is called as **chalaza**.

There is a large oval, sac-like structure in the nucellus toward the micropylar end called **embryo sac** or female gametophyte. It develops from the functional megaspore formed within the nucellus.

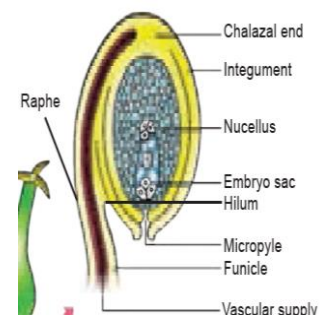
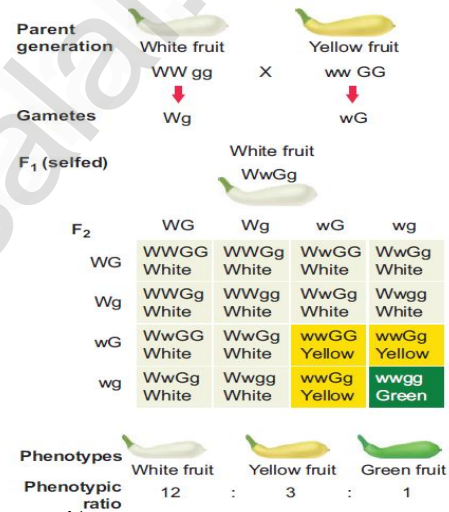
----- 1

(The embryo sac contains 8 nuclei , three nuclei near the chalazal end are called antipodals. Two nuclei in the middle are called as polar nuclei which fuse to form secondary nucleus. Three nuclei near the micropylar end.

----- 1 Mark

21.a. Single cell proteins are dried cells of microorganism that are used as protein supplement in human foods or animal feeds.

$$2 \times 5 = 10$$



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Although single cell protein has high nutritive value due to their higher protein, vitamin, essential amino acids and lipid content, there are doubts on whether it could replace conventional protein sources due to its high nucleic acid content and slower in digestibility. ----- 1 Mark

Microorganisms used for the production of Single Cell Protein are as follows:

- Bacteria - *Methylophilus methylophilus*, *Cellulomonas*, *Alcaligenes*
- Fungi - *Agaricus campestris*, *Saccharomyces cerevisiae* (yeast), *Candida utilis*
- Algae - *Spirulina*, *Chlorella*, *Chlamydomonas*

----- 2 Marks

Applications of Single-Cell Protein

----- 2 Marks

- It is used as protein supplement
- It is used in cosmetics products for healthy hair and skin
- It is used as the excellent source of protein for feeding cattle, birds, fishes etc.
- It is used in food industry as aroma carriers, vitamin carrier, emulsifying agents to improve the nutritive value of baked products, in soups, in ready-to-serve-meals, in diet recipes
- It is used in industries like paper processing, leather processing as foam stabilizers.

Or

b. Basic concepts of Tissue Culture

Totipotency : The property of live plant cells that they have the genetic potential when cultured in nutrient medium to give rise to a complete individual plant. ----- 1 Mark

Differentiation : The process of biochemical and structural changes by which cells become specialized in form and function . ----- 1 Mark

Redifferentiation : The further differentiation of already differentiated cell into another type of cell. For example, when the component cells of callus have the ability to form a whole plant in a nutrient medium, the phenomenon is called redifferentiation. ----- 1 ½ Marks

Dedifferentiation : The phenomenon of the reversion of mature cells to the meristematic state leading to the formation of callus is called dedifferentiation.

These two phenomena of redifferentiation and dedifferentiation are the inherent capacities of living plant cells or tissue. This is described as totipotency. ----- 1 ½ Marks

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Part – II Bio – Zoology

Marks: 35

Section – A

Answer All the Questions:

8 x 1 = 8

1. a. Arrhenotoky
2. b. Leydig cells
3. b. inhibiting release of FSH and LH
4. b. O, AB
5. d. 3.1. billion
6. a. Charles Darwin
7. d. 1400 cc
8. a. Ig E

Section – B

Answer any Four of the following:

4 x 2 = 8

9. The offsprings of asexual reproduction show “uniparental inheritance” without any genetic variation. So they are called as clones. ----- 2 Marks
10. . F S H – Follicle Stimulating Hormone ----- 1 Mark
h C G – Human Chorionic Gonodotrophin ----- 1 Mark
11. Normally STD are transmitted from person to person during intimate sexual contact with an infected partner. Infections like Hepatitis-B and HIV are transmitted sexually as well as by sharing of infusion needles, surgical instruments, etc with infected people, blood transfusion or from infected mother to baby. ----- 2 Marks
12. In humans the genes present in the differential region of Y chromosome are called Y-linked or holandric genes. ----- 2 Marks
- 13.

Template Strand	Coding strand
DNA dependent RNA polymerase catalyses the polymerization in only one direction, the strand that has the polarity 3' 5' acts as a template, and is called the template strand .	The other strand which has the polarity 5' 3' has a sequence same as RNA (except thymine instead of uracil) and is displaced during transcription. This strand is called coding strand

14. The primitive earth had no proper atmosphere, but consisted of ammonia, methane, hydrogen and water vapour. ----- 2 Marks

Section – C

Answer any Three of the following: Q. No. 19 is compulsory. 3 x 3 = 9

15.

Binary fission in Amoeba	Multiple fission in Plasmodium
Simple irregular binary fission is seen in irregular shaped organisms like <i>Amoeba</i> .	In multiple fission the parent body divides into many similar daughter cells simultaneously. First, the nucleus divides repeatedly, later the cytoplasm divides into as many parts as that of nuclei. Each cytoplasmic part encircles one daughter nucleus.
Two unequal daughter cells are formed.	This results in the formation of many smaller individuals from a single parent organism

16. **Sertoli cells** also secrete **inhibin**, a hormone which is involved in the negative feedback control of sperm production. ----- 2 Marks
17. Female foeticide refers to ‘aborting the female in the mother’s womb’; whereas female infanticide is ‘killing the female child after her birth’. ----- 3 Marks

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18. The main goals of Human Genome Project are as follows: ----- 3 Marks
- Identify all the genes (approximately 30000) in human DNA.
Determine the sequence of the three billion 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, legal and social issues (ELSI) that may arise from the project.
19. A vaccine is a **biological preparation that provides active acquired immunity** to a particular disease. Vaccine initiates the immunization process. ----- 2 Marks
The vaccines are classified as first, second and third generation vaccines. -----1 Mark

Section -IV

Answer All the Questions:

2 x 5 = 10

20.a Parthenogenesis: Development of an egg into a complete individual without fertilization is known as parthenogenesis. ----- 1 Mark

Parthenogenesis is of two main types namely, Natural Parthenogenesis and Artificial Parthenogenesis.

Natural parthenogenesis may be of two types, viz., complete and incomplete.

Complete parthenogenesis is the only form of reproduction in certain animals and there is no biparental sexual reproduction. There are no male organisms and so, such individuals are represented by females only.

Incomplete parthenogenesis is found in some animals in which both sexual reproduction and parthenogenesis occurs. e.g. In honeybees; fertilized eggs (zygotes) develop into queen and workers, whereas unfertilized eggs develop into drones (male). ----- 2 Marks

In paedogenetic parthenogenesis (paedogenesis) the larvae produce a new generation of larvae by parthenogenesis. It occurs in the sporocysts and Redia larvae of liver fluke. It is also seen in the larvae of some insects. e.g. Gall fly. ----- 1 Mark

In artificial parthenogenesis, the unfertilized egg (ovum) is induced to develop into a complete individual by physical or chemical stimuli. e.g., Annelid and sea urchin eggs. 1 Mark

b. Menstrual cycle comprises of the following phases

1. Menstrual phase : The cycle starts with the menstrual phase when menstrual flow occurs and lasts for 3-5 days. Menstrual flow is due to the breakdown of endometrial lining of the uterus, and its blood vessels due to decline in the level of progesterone and oestrogen. Menstruation occurs only if the released ovum is not fertilized.

2. Follicular Phase: The follicular phase extends from the 5 th day of the cycle until the time of ovulation.

During this phase, the primary follicle in the ovary grows to become a fully mature Graafian follicle and simultaneously, the endometrium regenerates through proliferation.

These changes in the ovary and the uterus are induced by the secretion of gonadotropins like FSH and LH, which increase gradually during the follicular phase. It stimulates follicular development and secretion of oestrogen by the follicle cells.

3. Ovulatory phase : Both LH and FSH attain peak level in the middle of the cycle (about the 14 th day). Maximum secretion of LH during the mid cycle called LH surge induces the rupture of the Graafian follicle and the release of the ovum (secondary oocyte) from the ovary wall into the peritoneal cavity. This process is called as ovulation.

V Rengarajan GHSS Nallamanaickerpatti

4. Luteal or secretory phase : During luteal phase, the remaining part of the Graafian follicle is transformed into a transitory endocrine gland called corpus luteum. The corpus luteum secretes large amount of progesterone which is essential for the maintenance of the endometrium. If Fertilization takes place, it paves way for the implantation of the fertilized ovum. This phase is also called as secretory phase.

20 a. Prevention of STDs

----- 5 Marks

- a. Avoid sex with unknown partner/multiple partners.
- b. Use condoms.
- c. In case of doubt, consult a doctor for diagnosis and get complete treatment.

20. b. Fisher and Race hypothesis

Rh factor involves three different pairs of alleles located on three different closely linked loci on the chromosome pair. This system is more commonly in use today, and uses the 'Cde' nomenclature.

----- 1 Mark

Three pairs of Rh alleles (Cc, Dd and Ee) occur at 3 different loci on homologous chromosome pair. The possible genotypes will be one C or c, one D or d, one E or e from each chromosome. For e.g. CDE/ cde; CdE/cDe; cde/cde; CDe/CdE etc., All genotypes carrying a dominant 'D' allele will produce Rh positive phenotype and double recessive genotype 'dd' will give rise to Rh negative phenotype.

----- 2 Marks

Wiener Hypothesis

----- 2 Marks

Wiener proposed the existence of eight alleles (R₁, R₂, R₀, R_z, r₁, r₁₁, r_y) at a single Rh locus. All genotypes carrying a dominant 'R allele' (R₁, R₂, R₀, R_z) will produce Rh positive phenotype and double recessive genotypes (rr, r₁ r₁, r₁₁ r₁₁, r_y r_y) will give rise to Rh negative phenotype.

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