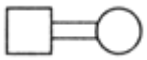
CANARA VIKAAS PRE-UNIVERSITY COLLEGE, MANGALORE

SECOND PUC BOARD EXAMINATION – MARCH 2025

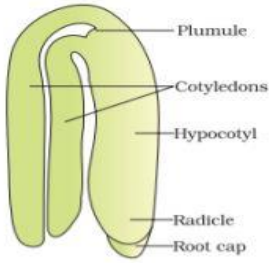
BIOLOGY (36)

ANSWER KEY

Time: 3 Hours **Max. Marks: 70**

PART A **I**	
1.	Both statement I and II are correct
2.	Spermiogenesis
3.	Progesterone
4.	Increase in the number of people in reproducible age
5.	Coitus interruptus
6.	IUI
7.	
8.	DNA → mRNA → Proteins
9.	Genetic drift
10.	Widal test
11.	Streptokinase
12.	Biolistics
13.	Biopiracy
14.	Mineralisation
15.	Cryopreservation
II	
16.	Apomixis
17.	Saltation
18.	Oxytocin
19.	Glomus
20.	Elution
PART B **III**	

21.



Dicot embryo

22.

Linkage	Recombination
It is the physical association of two or more genes on a chromosome. They do not show independent assortment.	It is the generation of non-parental gene combinations. It occurs due to independent assortment or crossing over.

23. AUG has dual functions.
- It codes for Methionine (met) and acts as initiator codon.
- In eukaryotes, methionine is the first amino acid and formyl methionine in prokaryotes.

24. A - *Homo habilis*
B – *Homo erectus*

25. Morphine.
It is a sedative and painkiller, and useful for surgery.

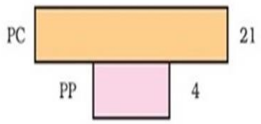
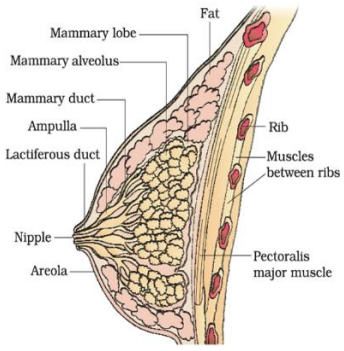
26. Meristem
Tissue culture (Meristem culture)

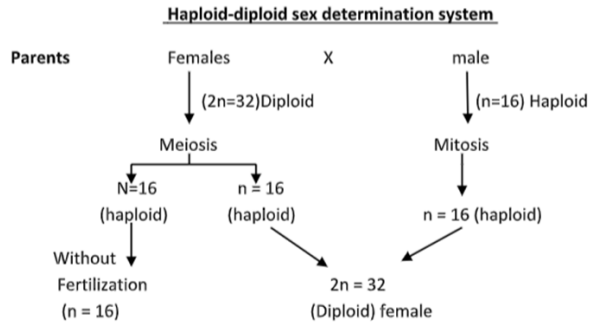
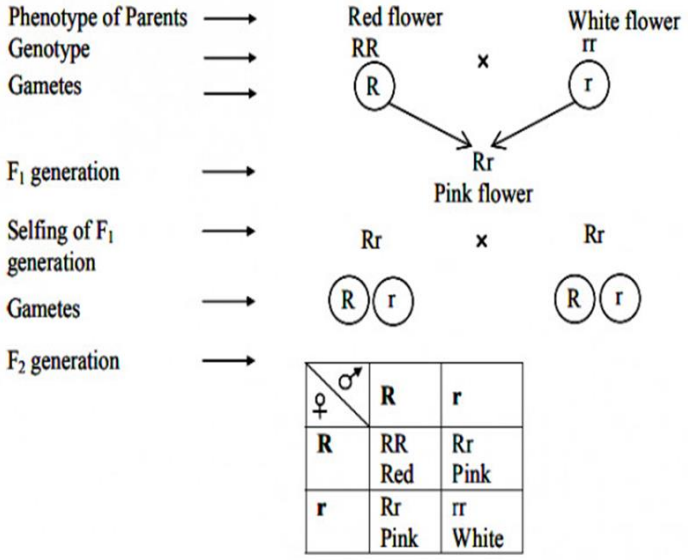
27.
a. Tropics had more evolutionary time
b. Relatively constant environment (less seasonal)
c. They receive more solar energy which contributes to greater productivity.

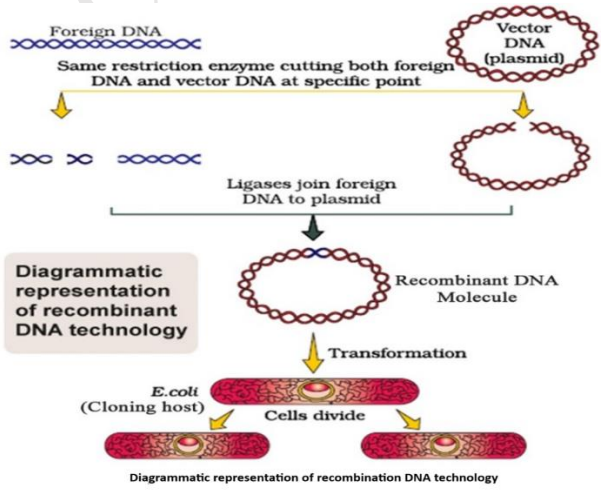
PART C
IV

28.
- The pollen grains are light and non-sticky
- The flower produces enormous amount of pollen.
- They often possess well-exposed stamens
- They have large often – feathery stigma to easily trap air-borne pollen grain.
- Wind pollinated flowers often have a single ovule in each ovary and numerous flowers packed into an inflorescence.

29.
- Paired seminal vesicles
- Prostrate
- Bulbourethral gland

30.	IUDs increase the phagocytosis of sperm in uterus and copper reduce the motility and fertility capacity of sperms. The hormone releasing IUDs make the uterus unsuitable for implantation and the cervix hostile to the sperms.
31.	a) Industrial melanism and Excess use of herbicides, pesticides, antibiotics or drugs etc. resulted in selection of resistant varieties. b) The allele frequencies in a population are stable and constant from generation to generation in the absence of other evolutionary influences.
32.	Agents responsible for causing cancer is called Carcinogens. Physical carcinogens - Ionizing radiations like X-rays and gamma rays and non-ionizing radiations like UV. Biological carcinogens - oncogenic viruses, cellular oncogenes (*c-onc* or proto-oncogenes)
33.	• It makes crops more tolerant to abiotic stresses (cold, drought, salt, heat etc). • Pest-resistant crops reduce the use of chemical pesticides. • It helps to reduce post-harvest losses. • It increases efficiency of mineral usage by plants (this prevents early exhaustion of fertility of soil). • It enhances nutritional value of food. E.g. Vitamin 'A' enriched rice (Golden Rice). • GM is used to create tailor-made plants to supply alternative resources to industries, in the form of starches, fuels and pharmaceuticals.
34.	Inverted pyramid: 
PART D **V**	
35.	

36.	a) Pleiotropy: A single gene affects multiple traits. Phenylketonuria (PKU) is a genetic disorder caused by defective gene coding for the enzyme phenylalanine hydroxylase. b) Sex determination in Honey bee: 
37.	It is an inheritance in which heterozygous offspring shows intermediate character b/w two parental characteristics. E.g. Flower colour in snapdragon (dog flower or *Antirrhinum* sp.) and *Mirabilis jalapa* (4'O clock plant).  Here, phenotypic and genotypic ratios are same. Phenotypic ratio= 1 Red: 2 Pink: 1 Genotypic ratio= 1 (RR): 2 (Rr): 1(rr)
38.	• Human genome contains 3164.7 million nucleotide bases. • Total number of genes= about 30,000. • Average gene consists of 3000 bases, but sizes vary. Largest known human gene (dystrophin on X- chromosome) contains 2.4 million bases. • 99.9% nucleotide bases are identical in all people. Only 0.1% difference makes every individual unique. • Functions of over 50% of discovered genes are unknown. • Chromosome I has most genes (2968) and Y has the fewest (231). • Less than 2% of the genome codes for proteins.

	• Repeated sequences make up very large portion of human genome. Repetitive sequences are stretches of DNA sequences that are repeated many times. They have no direct coding functions. They shed light on chromosome structure, dynamics and evolution. • About 1.4 million locations where single-base DNA differences (SNPs-Single nucleotide polymorphism or 'snips') occur in humans.
39.	a) Biocontrol agent for aphids – Ladybird beetle Biocontrol agent for mosquitoes – Gambusia fish b) Bt cotton: • Some strains of Bacillus thuringiensis have proteins that kill insects like coleopterans (beetles) lepidopterans (tobacco budworm, armyworm) & dipterans (flies, mosquitoes). • *B. thuringiensis* forms a toxic insecticidal protein (Bt toxin) crystal during a particular phase of their growth. It does not kill the Bacillus as it exists as inactive protoxins. • When an insect ingest the inactive toxin, it is converted into active toxin due to the alkaline pH of the gut which solubilize the crystals. The toxin binds to the surface of midgut epithelial cells and creates pores. It causes cell swelling and lysis and death of the insect. • Bt toxin genes were isolated from B. thuringiensis and incorporated into crop plants such as cotton. • Most Bt toxins are insect-group specific. The toxin is coded by a gene named cry. E.g. the proteins encoded by the genes cryIAc and cryIIAb control the cotton bollworms that of cryIAb controls corn borer.
40.	 Diagrammatic representation of recombination DNA technology
41.	a) Sexual deceit b) Resource partitioning c) Brood parasitism d) Commensalism e) Ammensalism
PART D **VI**	
42.	a) Artificial hybridisation or controlled pollination

	b) In this method, it is essential to ensure that the right kinds of pollen grains are used, and the stigma is protected from unwanted pollen grains. It is achieved by: i. **Emasculation** − The anther is removed from the bud if the female parent bears bisexual flowers. ii. **Bagging** − The emasculated flower is covered by a bag so as not to allow contamination of the stigma by unwanted pollen grains. When the stigma of the bagged flower becomes receptive, the collected pollen grains are dusted onto the stigma, and then the flower is rebagged. If the female parent is unisexual, emasculation is not necessary. In this case, the female bud is directly bagged, and when the stigma turns receptive, suitable pollen grains are dusted onto it to allow germination.
43.	a) Name the parts A and B A – Coding strand B – Terminator b) The promoter **c) UAC GUG CUG**
44.	1. **Physical barriers**: E.g. Skin (Prevent entry of foreign bodies), Mucous coating of the respiratory, gastro-intestinal and urino-genital tracts to trap microbes. 2. **Physiological barriers**: E.g. gastric HCl, saliva, tear etc. 3. **Cellular barriers**: Phagocytes like WBC (e.g. neutrophils or Polymorphonuclear leukocytes (PMNL), monocytes and natural killer lymphocytes], macrophages etc. 4. **Cytokine barriers**: Virus infected cells secrete proteins called interferon which protect non-infected cells from further viral infection.

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