2023-24 II PUC ANNUAL EXAMINATION

BIOLOGY

PART – A

I. Select the correct alternative from the choices given below: (15 × 1 = 15)

1. The function of Tapetum in microsporangium is

   A) It nourishes the developing pollen grains

   B) Helps in dehiscence of anther to releasing the pollen

   C) Helps in protection

   D) Helps in division

Ans: A) It nourishes the developing pollen grain **(NCERT PG. NO – 5)**

2. Which pollination brings genetically different types of pollen grains to the stigma?

   A) Geitonogamy B) Xenogamy C) Autogamy D) Both A) and B)

Ans: B) Xenogamy **(NCERT PG. NO – 12)**

3. The corpus luteum secrets large amounts of progesterone, which is essential for maintenance of

   A) Perimetrium B) Myometrium C) Endometrium D) Cervical canal

Ans: C) Endometrium **(NCERT PG. NO – 35)**

4. The secondary spermatocytes undergo the second meiotic division to product four equal, haploid

   A) Spermatogonium B) spermatids

   C) Primary spermatocyte D) Secondary spermatocyte

Ans: B) Spermatid **(NCERT PG. NO – 31)**

5. In female sterilization ____A___ is removed or tied. This process is called ___B___

   A) A- Cervix B- Vasectomy

   B) A- Fallopian tube B- Tubectomy

   C) A-Cervix B- Tubectomy

   D) A- Fallopian tube B- Vasectomy

Ans: B) A -fallopian tube, B – tubectomy **(NCERT PG. NO – 46)**

6. Statement -I: Progestogens alone or in combination with estrogen can also be used by females as injections or implants under the skin.

   Statement -II: Mode of action of injections or implants is similar to that of pills and their effective periods are much longer.

   A) Both statement I and II are correct

   B) Statement I is correct and statement II is incorrect

   C) Statement I is incorrect and Statement II is correct

   D) Both statement I and II are incorrect

Ans: A) Both statements I and II are correct **(NCERT PG. NO – 45)**

7. In human males XY types of sex determination is

   A) Homogametic B) Heterogametic

   C) C) Both A) and B) D) Isogametic

Ans: B) Heterogametic **(NCERT PG. NO – 71)**

8. In Griffith's experiment, mice infected with the ____A____ die from pneumonia infection, but mice infected with ___B____ don't develop pneumonia.

   A) A → S- Strain; B→ S-Strain

   B) A → S- Strain; B→ R-Strain

   C) A → R- Strain; B→ S-Strain

   D) A → R- Strain; B→ R-Strain

Ans: B) A- 'S' strain – B – 'R' strain **(NCERT PG. NO – 84)**

9. Which is the correct statement regarding Founder effect?

   A) Named after the scientist John founder

   B) No large change in frequency

   C) The original drifted population become founders

   D) Formation of no species

Ans: C) The original drifted population become founders **(NCERT PG. NO – 121)**

10. Large group of Lymphoid tissue in respiratory, digestive and urogenital tract are collectively called.

    A) MALT B) Peyer's Patches C) Lymph nodes D) Alpha globulins

Ans: A) MALT **(NCERT PG. NO – 138)**

11. Which micro- organism is useful in production of critic acid?

    A) *Acetobacter aceti* B) *Penicillium notatum*

    C) *Aspergillus niger* D) *Clostridium butylicum*

Ans: C) *Aspergillus niger* **(NCERT PG. NO – 153)**

12. Which of the following statements are correct for the enzyme Taq polymerase?

    I. Taq polymerase is thermally unstable

    II. It requires for carrying out the process of polymerization

    III. Taq polymerase is thermally stable

    Choose the correct option

    A) I and II B) I and III C) II and III D) I, II and III

    Ans: C) II and III **(NCERT PG. NO – 173)**

13. Population density increases as

    A) Natality and Emigration increases B) Mortality and Emigration increases

    C) Natality and immigration decreases D) Natality and immigration increase

    Ans: D) Natality and immigration increase **(NCERT PG. NO – 193)**

14. Net Primary Productivity (NPP) is equal to

A) GPP B) GPP+R C) $\frac{GPP}{R}$ D) GPP-R

Ans: D) GPP – R **(NCERT PG. NO – 207)**

15. The species confined to a particular region and not found anywhere else are called as

A) Sacred species B) Endemic C) extinct D) Vulnerable

Ans: B) Endemic **(NCERT PG. NO – 224)**

II. Fill in the blanks by choosing the appropriate word/words from those given below: (5 × 1 = 5)

(Oxytocin, Lichen, Ectoparasite, Polyembryony, Honey bee, Endoparasite)

16. If more than one embryo occurs in a seed then it is known as _____.

Ans: Polyembryony **(NCERT PG. NO – 23)**

17. The hormone which helps in Parturition is _____.

Ans: Oxytocin **(NCERT PG. NO – 38)**

18. Haploid-diploid sex determination system is seen in _____.

Ans: Honeybee **(NCERT PG. NO – 71)**

19. Natural indicator of Industrial Pollution is _____.

Ans: Lichens **(NCERT PG. NO – 116)**

20. Parasite that feed on the external surface of the host organism are called _____.

Ans: Ectoparasite **(NCERT PG. NO – 200)**

PART – B

III. Answer any five of the following questions in 3 – 5 sentences wherever applicable: (5 × 1 = 5)

21. What is Amniocentesis? Write any one significance.

Ans: (NCERT PG. NO – 42)

- In amniocentesis some of the amniotic fluid of the developing foetus is taken to analyse the foetal cell and dissolved substance.
- Significance: Amniocentesis is used to test for the presence of certain genetic disorders such as Down's syndrome, Haemophilia, Sickle cell anaemia, etc

22. Write the karyotype and symptoms of Klinefelter's syndrome

Ans: (NCERT PG. NO – 76)

- Karyotype – 47, XXY

Symptoms:

- Overall masculine development
- Gynecomastia (Development of breast)
- Sterile individual

23. When does medical termination of pregnancy become essential?

Ans: (NCERT PG. NO – 46)

MTP is necessary;

- To get rid of unwanted pregnancies either due to casual unprotected intercourse or failure of contraceptive used during coitus or rapes.
- In certain case where continuation of the pregnancy could be harmful or even fatal either to the mother or to the foetus or both.

24. List the characteristics of Neanderthal man.

Ans: (NCERT PG. NO – 125)

Characteristics of the Neanderthal Man

- With a brain size of 1400cc lived in near east and central Asia between 1,00,000-40,000
- They used hides to protect their body and buried their dead.

25. Name of the two chemicals secreted by Mast cells allergic reactions in the body.

Ans: (NCERT PG. NO – 137)

- Histamine and Serotonin

26. Define BOD. Mention its significance.

Ans: (NCERT PG. NO – 154)

- BOD refers to the amount of the oxygen that would be consumed if all the organic matter in one litre of water were oxidised by bacteria.
- Significance: BOD test measures the rate of uptake of oxygen by microorganism in a sample of water and thus indirectly BOD is a measure of the organic matter presence in the water. Greater the BOD of waste water more is its polluting potential.

27. Difference between Exonuclease and Endonuclease.

Ans: (NCERT PG. NO – 166)

Exonuclease	Endonuclease
It removes nucleotides from the ends of the DNA.	It makes cuts at specific positions within the DNA.

28. What is meant by Decomposition and Detritus?

Ans: (NCERT PG. NO – 207)

- Decomposition – Breakdown of complex organic matter into inorganic substance like CO_2, water and nutrients.
- Detritus – The raw material for decomposition.

PART – C

IV. Answer any five of the following questions in 40 – 80 words each, wherever applicable (5 × 3 = 15)

29. a) Differentiate between false fruit and true fruit.

Ans: (NCERT PG. NO – 20)

False fruit	True fruit
The thalamus contributes to fruit formation and is called false fruit. e.g., strawberry, cashew, apple	The fruits which develop only from the ovary are called true fruits. e.g., mango, plum

b) What is meant by Parthenocarpic fruit?

Ans:

- Fruits which develop without fertilization are called parthenocarpic fruits. e.g., Banana

30. What is Placenta? Mention any four hormones secreted by Placenta.

Ans: (NCERT PG. NO – 37)

- The chorionic villi and uterine tissue become interdigitated with each other and jointly form a structural and functional unit between developing embryo and maternal body called placenta.
- Placental hormones are human chorionic gonadotropin(hCG), human placental lactogen(hPL), estrogens, progestogens, etc.

31. Write any three criteria that a molecule has to fulfil to act as a genetic material.

Ans: (NCERT PG. NO – 87)

- It should be able to generate its replica.
- It should chemically and structurally be stable.
- It should provide the scope for slow changes that are required for evolution.
- It should be able to express itself in the form of 'Mendelian characters.

32. List the difference between Homologous and Analogous organs. Write one example for each animal.

Ans: (NCERT PG. NO – 114)

Sl.no.	Homologous organs	Analogous organ
1.	In animals, the same structure developed along different directions due to adaptations to different needs	In animals, anatomically different structures evolving for the same function and hence having similarity
2.	Homologous structures are a result of divergent evolution	Analogous structures are a result of convergent evolution
3	Bones of forelimbs of whales, bats, cheetah and human	Wings of butterfly and birds

33. Mention any three uses of genetically modified plants.

Ans: (any three) (NCERT PG. NO – 179)

- It made crops more tolerant to abiotic stresses.
- Reduced reliance on chemical pesticides.
- Helped to reduce post-harvest losses.
- Enhanced nutritional value of food e.g., vitamin A enriched rice
- Increased efficiency of mineral usage by plants.

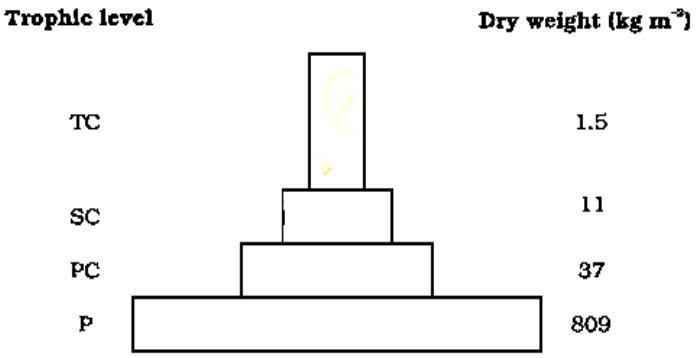
34. Write the three critical research areas of Biotechnology.

Ans:

- Providing the best catalyst in the form of improved organism usually a microbe or pure enzyme.
- Creating optimal conditions through engineering for a catalyst to act
- Downstream processing technologies to purify the protein/organic compounds. Page no.177

35. Construct an upright pyramid of biomass.

Ans: (NCERT PG. NO – 212)



36. What is Alien species invasion? Give two examples.

Ans: (NCERT PG. NO – 223)

- Introduction of alien species unintentionally or deliberately for whatever purpose, some of them turn invasive and cause decline or extinction of indigenous species is known as alien species invasion.
- Eg: 1) The Nile perch introduced into Lake Victoria in east Africa led eventually to the extinction of an ecologically unique assemblage of more than 200 species of cichlid fish in the lake.
  2) Carrot grass, Lantana and water hyacinth are invasive weed species that cause threat to native species.

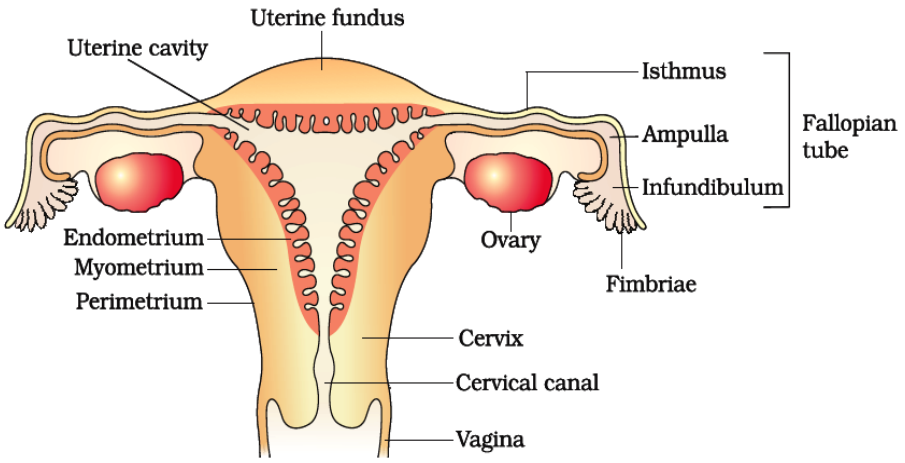
PART – D

SECTION – 1

V. Answer any four of the following questions in about 200 – 250 words each, wherever applicable:

37. Draw a neat labelled diagram of Human female reproductive system.

Ans: NCERT Pg. No – 29

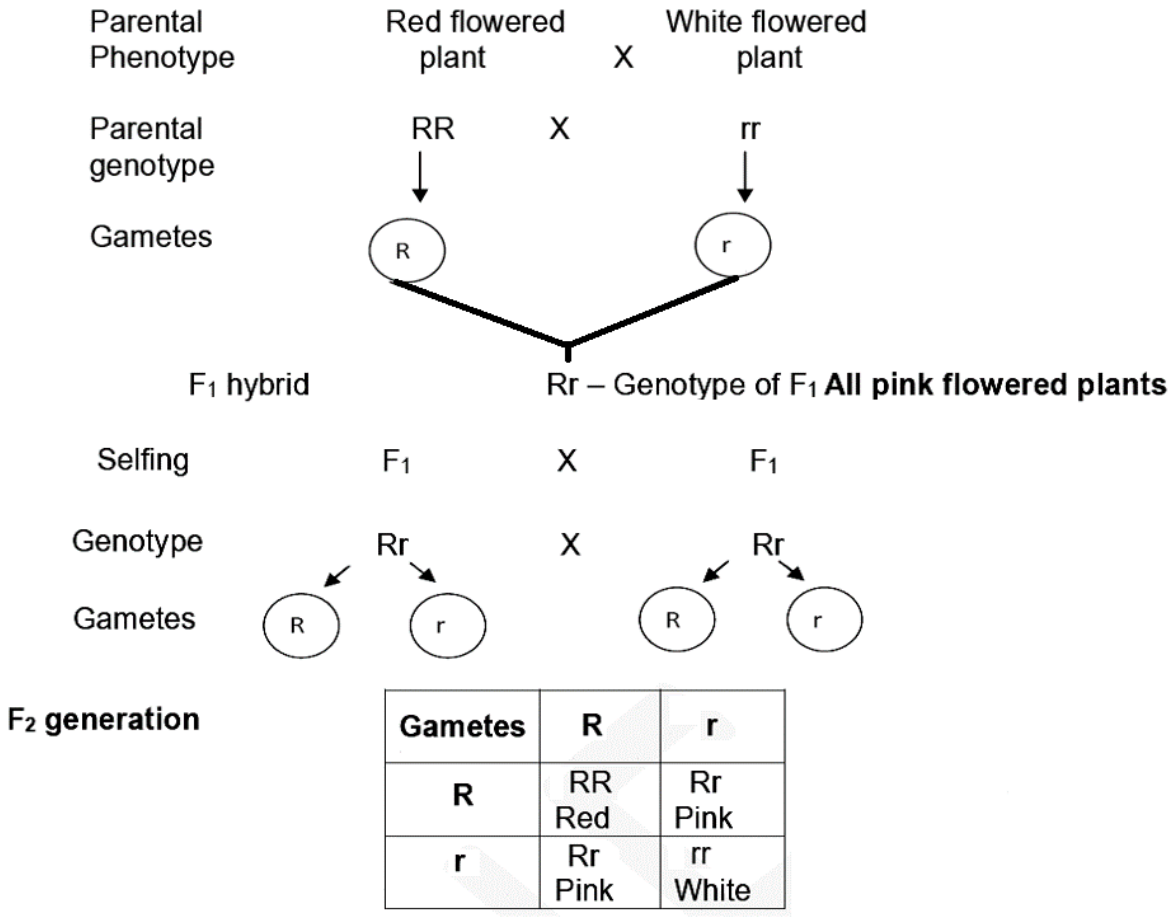


Diagrammatic sectional view of the female reproductive system

38. What is incomplete dominance? Mention one example, write the schematic representation of the same

Ans: NCERT Pg. No – 60

- A phenomenon where both the alleles of a character express incompletely producing a new intermediate phenotype in the heterozygous condition is called incomplete or partial dominance or blended inheritance.
- Eg: Flower colour in Dog flower or snapdragon (*Antirrhinum sp*)



F_2 generation

Gametes	R	r
R	RR Red	Rr Pink
r	Rr Pink	rr White

- From the above checker board we can observe that both F_2 phenotypic & genotypic ratio in incomplete dominance are same i.e.,

1	:	2	:	1
Homozygous		Heterozygous		Homozygous
Red		Pink		White

39. Write the scientific name of the organism responsible to cause following diseases.

a) Typhoid

b) Pneumonia

c) Common cold

d) Malaria

e) Amoebiasis

Ans: NCERT Pg. No – 130, 131, 132

a) Typhoid: *Salmonella typhi*

b) Pneumonia: *Streptococcus pneumoniae, Haemophilus influenzae*

c) Common cold: Rhinoviruses

d) Malaria: *Plasmodium vivax, Plasmodium falciparum, Plasmodium malaria*

e) Amoebiasis: *Entamoeba histolytica*

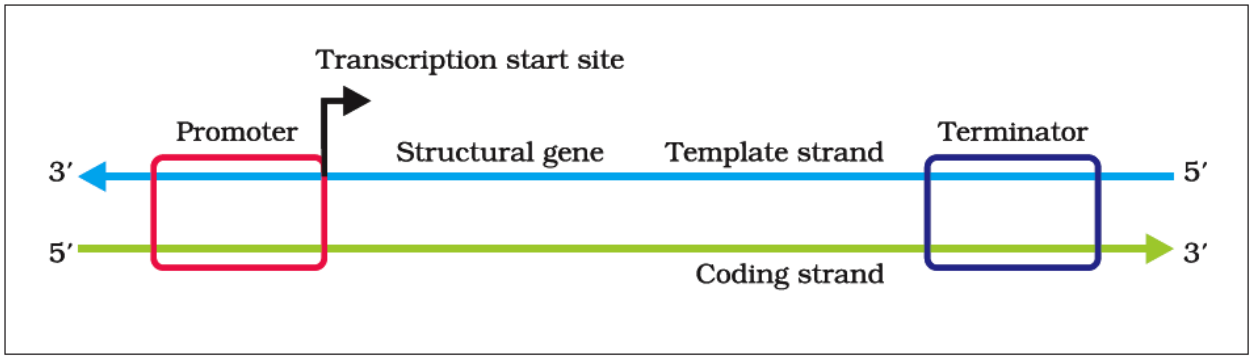
40. List any five salient features of Human Genome Project. (It should be Human genome

Ans: (Any five) NCERT Pg. No – 104

- The human genome contains 3164.7 million nucleotide bases.
- The average gene consists of 3000 bases, but sizes vary greatly, with the largest known human gene being dystrophin at 2.4 million bases.
- The total number of genes is estimated at 30,000–much lower than previous estimates of 80,000 to1,40,000 genes. Almost all (99.9 per cent) nucleotide bases are exactly the same in all people.
- The functions are unknown for over 50 per cent of the discovered genes.
- Less than 2 per cent of the genome codes for proteins.
- Repeated sequences make up very large portion of the human genome.
- Repetitive sequences are stretches of DNA sequences that are repeated many times, sometimes hundred to thousand times. They are thought to have no direct coding functions, but they shed light on chromosome structure, dynamics and evolution.
- Chromosome 1 has most genes (2968), and the Y has the fewest (231).
- Scientists have identified about 1.4 million locations where single base DNA differences (SNPs – single nucleotide polymorphism, pronounced as 'snips') occur in humans.
- This information promises to revolutionize the processes of finding chromosomal locations for disease-associated sequences and tracing human history.

41. a) Draw the schematic structure of a transcription unit. **(3)**

Ans: Schematic structure of a transcription unit NCERT Pg. No – 92



Schematic structure of a transcription unit

b) Write the difference between point mutation and frame shift mutation. **(2)**

Ans: NCERT Pg. No – 72 or 97, 98

Point mutation	Frame shift mutation
Point mutation is a change of single base pair in the gene.	Insertion or deletion of one or two bases changes the reading frame from the point of insertion or deletion.

42. Describe the 'Role of Microbes as Biofertilizers'.

Ans: NCERT Pg. No – 158

- The nodules on the roots of leguminous plants formed by the symbiotic association of *Rhizobium*. These bacteria fix atmospheric nitrogen into organic forms, which is used by the plant as nutrient.
- Other bacteria can fix atmospheric nitrogen while free-living in the soil (examples *Azospirillum* and *Azotobacter*), thus enriching the nitrogen content of the soil.
- Fungi are also known to form symbiotic associations with plants (mycorrhiza). Many members of the genus ***Glomus*** form mycorrhiza. The fungal symbiont in these associations absorbs phosphorus from soil and passes it to the plant. Plants having such associations show other benefits also, such as resistance to root-borne pathogens, tolerance to salinity and drought, and an overall increase in plant growth and development.
- Cyanobacteria are autotrophic microbes widely distributed in aquatic and terrestrial environments many of which can fix atmospheric nitrogen, e.g. *Anabaena*, *Nostoc*, *Oscillatoria*, etc.
- In paddy fields, cyanobacteria serve as an important biofertiliser. Blue green algae also add organic matter to the soil and increase its fertility.

43. Read the following statement and write one appropriate term for each.

a) Autonomously replicating circular extrachromosomal DNA.

b) Method of introduce recombinant DNA in animal cells.

c) Method to introduce recombinant DNA in plant cells.

d) Specific DNA sequence responsible for initiating replication.

e) Enzyme used to join the DNA fragment.

Ans: NCERT Pg. No – 164, 171, 171, 90/169, 90

a) Plasmid

b) Micro injection

c) Gene gun/ Biolistic method

d) origin/ ori site

e) DNA ligase

44. What is Mutualism? Mention any four examples of Mutualism.

Ans: NCERT Pg. No – 201-202

- The interaction in which **b**oth the interacting species are benefited is known as mutualism.

Examples:

- **Lichens** represent an intimate mutualistic relationship between a fungus and photosynthesizing algae or cyanobacteria.
- Similarly, the **mycorrhizae** are associations between fungi and the roots of higher plants. The fungi help the plant in the absorption of essential nutrients from the soil while the plant in turn provides the fungi with energy-yielding carbohydrates.
- The most spectacular and evolutionarily fascinating examples of mutualism are found in **plant-animal** relationships. Plants need the help of animals for pollinating their flowers and dispersing their seeds. Animals obviously have to be paid 'fees' for the services that plants expect from them. Plants offer rewards or fees in the form of pollen and nectar for pollinators and juicy and nutritious fruits for seed dispersers.
- Fig species can be pollinated only by its 'partner' wasp species and no other species. The female wasp uses the fruit not only as an oviposition (egg-laying) site but uses the developing seeds within the fruit for nourishing its larvae. The wasp pollinates the fig inflorescence while searching for suitable egg-laying sites. In return for the favour of pollination the fig offers the wasp some of its developing seeds, as food for the developing wasp larvae.

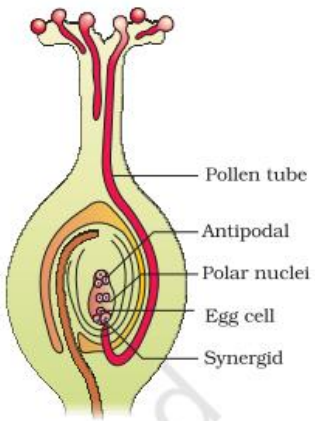
Section – II

VI. Answer any one of the following questions in about 200 – 250 words each, whenever applicable. (1×5=5)

45. Pollen-Pistil interaction is a dynamic process involving pollen recognition followed by promotion or inhibition. Explain.

Ans: NCERT Pg. No- 15 to 16

- Pollen-pistil interaction is a dynamic process involving pollen recognition followed by promotion or inhibition of the pollen.



Longitudinal section of a flower showing growth of pollen tube

- The ability of the pistil to recognize the pollen followed by its acceptance or rejection is the result of a continuous dialogue between pollen grain and the pistil. This dialogue is mediated by chemical components of the pollen interacting with those of the pistil.
- Following compatible pollination, the pollen grain germinates on the stigma to produce a pollen tube through one of the germ pores.
- The contents of the pollen grain move into the pollen tube.
- Pollen tube grows through the tissues of the stigma and style and reaches the ovary.
- In some plants, pollen grains are shed at two-celled condition (a vegetative cell and a generative cell). In such plants, the generative cell divides and forms the two male gametes during the growth of pollen tube in the stigma.
- In plants which shed pollen in the three-celled condition, pollen tubes carry the two male gametes from the beginning.
- Pollen tube, after reaching the ovary, enters the ovule through the micropyle and then enters one of the synergids through the filiform apparatus.
- Filiform apparatus present at the micropylar part of the synergids guides the entry of pollen tube.
- All these events–from pollen deposition on the stigma until pollen tubes enter the ovule–are together referred to as pollen-pistil interaction.

46. Name the genetic disorder in which clotting of blood is affected. Write the features of this genetic disorder.

Ans: NCERT Pg. No- 47

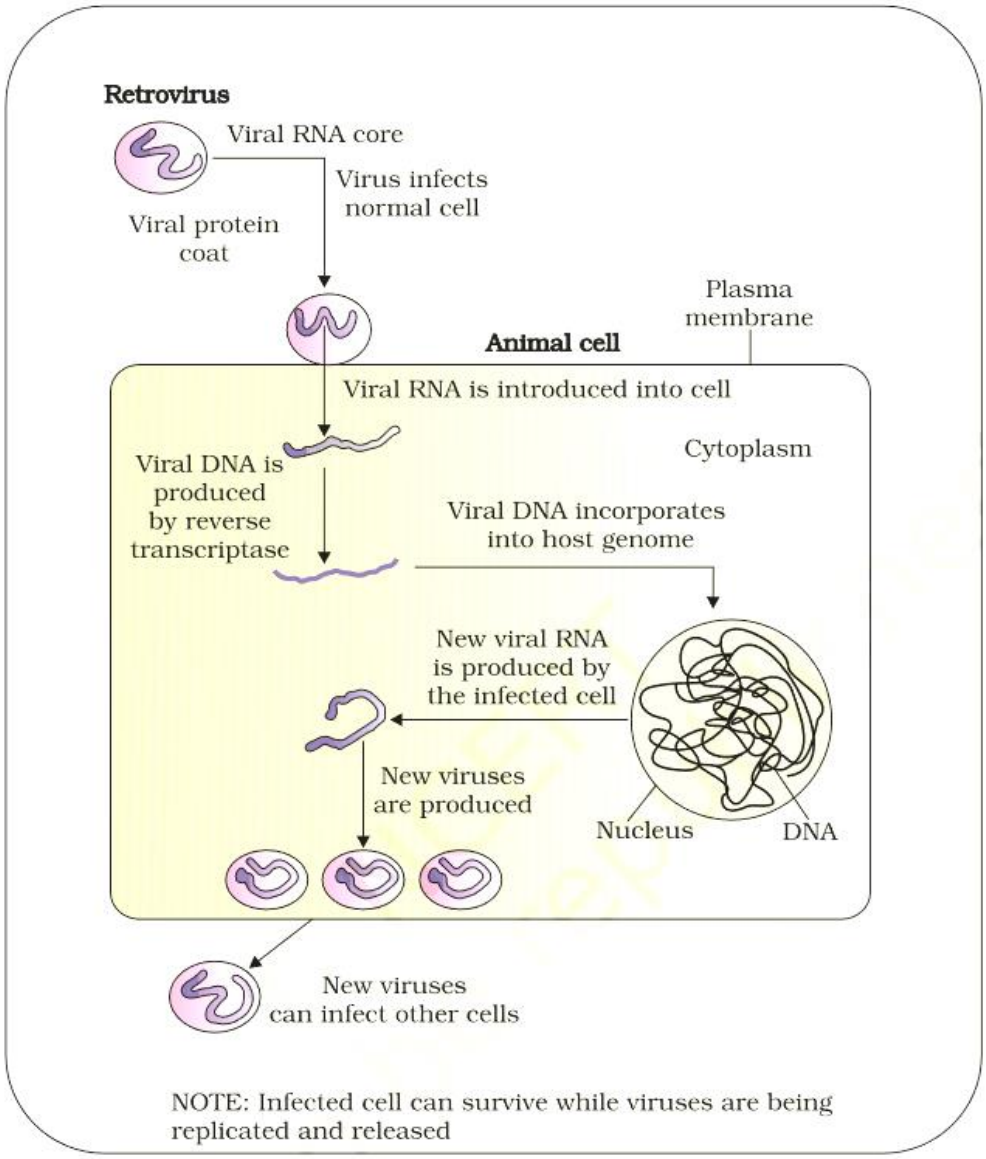
- Name of the genetic disorder is Haemophilia.

Features of this genetic disorder:

- This sex-linked recessive disease, which shows its transmission from unaffected carrier female to some of the male progeny.
- In this disease, a single protein that is a part of the cascade of proteins involved in the clotting of blood is affected. Due to this, in an affected individual a simple cut will result in non-stop bleeding.
- The heterozygous female (carrier) for haemophilia may transmit the disease to sons.
- The possibility of a female becoming a haemophilic is extremely rare because mother of such a female has to be at least carrier and the father should be haemophilic (unviable in the later stage of life).

47. With the help of schematic, representation illustrate how an infected animal cell can survive while viruses are bring replicated and released.

Ans: NCERT Pg. No- 139



Replication of retrovirus

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