महाराष्ट्र राज्य माध्यमिक व उच्च माध्यमिक शिक्षण मंडळ
पुणे विभागीय मंडळ, पुणे
शिवाजीनगर, पुणे ४११००४
Shivajinagar, Pune - 411005
FAX - 420/22228771
E-inair. saabucxde@gmail.com
Website: www.sabouritgune.in

इ. 12वी प्रात्यक्षिक परीक्षा पूर्वतयारी

उच्च माध्यमिक प्रमाणपत्र परीक्षा (इ. १२ वी), फेबु.-मार्च २०२६-२७ साठी मार्गदर्शक ऑनलाईन सत्र

मा. श्री. औदुंबर उकिरडे
विभागीय अध्यक्ष

मा. डॉ. मिनाक्षी राऊत
विभागीय सचिव

सदर मार्गदर्शन व्हिडिओ कॉन्फरन्सिंग (V.C.) द्वारे
सर्व संबंधित प्राचार्यासाठी आणि विषय शिक्षकांसाठी अनिवार्य

महाराष्ट्र राज्य माध्यमिक व उच्च माध्यमिक शिक्षण मंडळ
पुणे विभागीय मंडळ, पुणे
शिवाजीनगर, पुणे ४११००४
Shivajinagar, Pune - 411005
FAX - 420/22228771
E-inail: saabucxde@gmail.com
Website: www.sabouritgune.in



इ. 12वी प्रात्यक्षिक परीक्षा पूर्वतयारी

उच्च माध्यमिक प्रमाणपत्र परीक्षा (इ. १२ वी), फेबु.-मार्च २०२६-२७ साठी मार्गदर्शक ऑनलाईन सत्र

विषय : जीवशास्त्र (56)

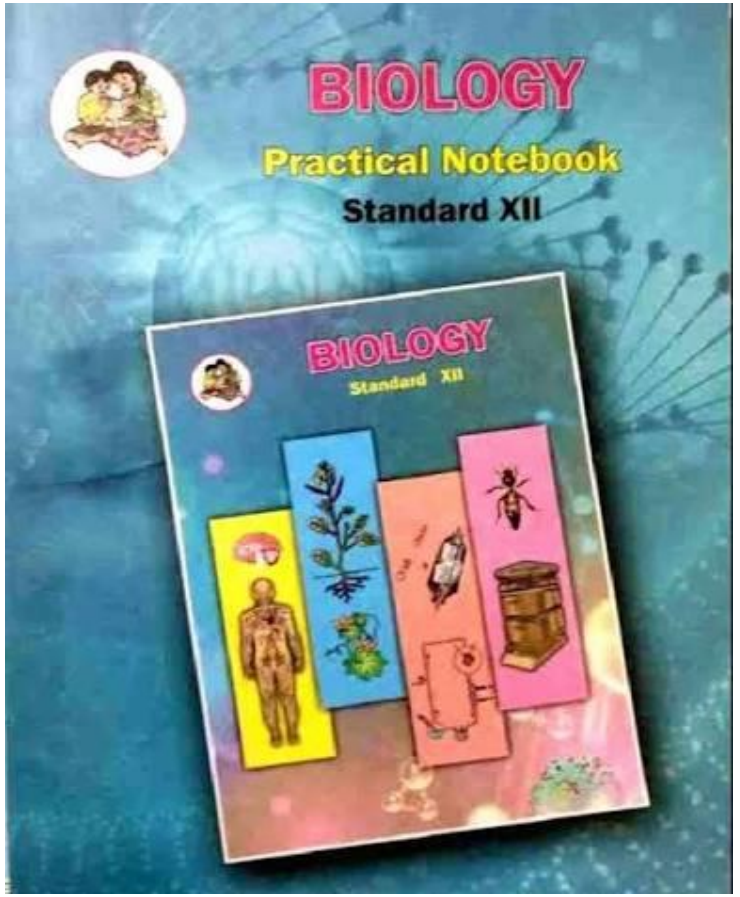
मार्गदर्शक तज्ञ :

श्रीम. श्वेता लड्ढा
श्रीम. पूजा नाशिककर

सदर मार्गदर्शन व्हिडिओ कॉन्फरन्सिंग (V.C.) द्वारे
सर्व संबंधित प्राचार्यासाठी आणि विषय शिक्षकांसाठी अनिवार्य

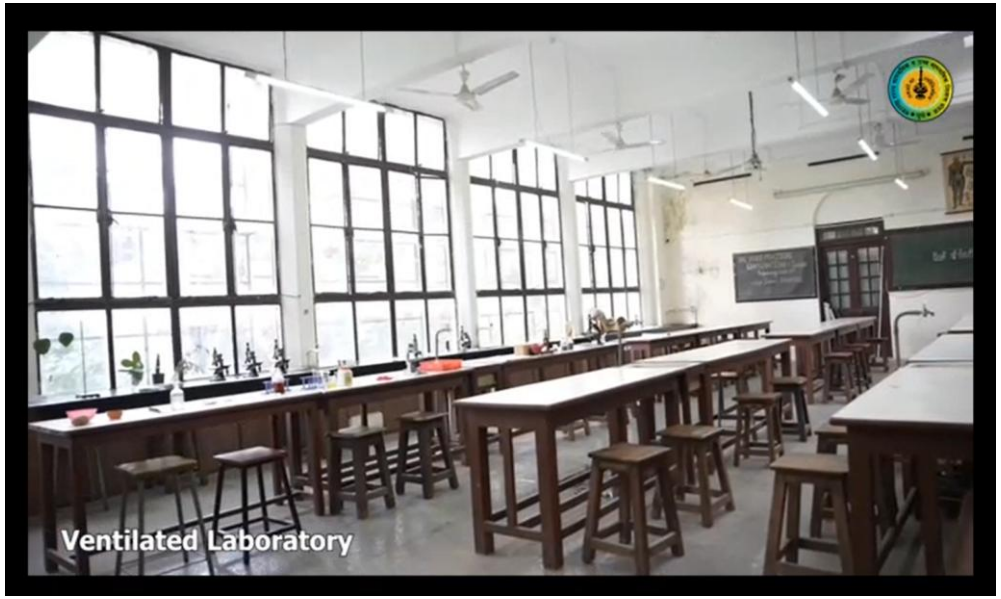
Instructions to students for the Practical Examination

- Please carry your Id- card, Hall ticket, Journal, Dissection Kit, and plain paper for the exam.
- Lab coat is mandatory.
- Reach the lab 30 minutes prior to your examination schedule.
- Please carry your certified Journal.



Preparation by teachers for the Practical Examination

- Batch size should be 20- 30, as per the capacity of the college lab.
- Display a proper timetable to the students prior to the exam.
- Keep the following printouts ready:
  i. Printout of the practical question paper.
  ii. Batch-wise attendance of students.
  iii. Batch-wise mark list with all sub-questions Q.1-7.
- Two board supplements per student –one for table work and one for spotting, which can be stapled afterwards.
- Lab should be ready one day before the practical examination with all required materials.



Board writing

H.SC.BOARD PRACTICAL EXAMINATION

IN

BIOLOGY

COLLEGE INDEX CODE-

J 11.11.001

Paper pattern:30 Marks, Time:3 hours

- Part A- 10 marks
- Part B- 10 marks
- Part C- 10 marks

Part A

Major Experiment:

- **Q.1-- 4 Marks**

Minor Experiment:

- **Q.2 -- 3 Marks**
- **Q.3 --3 Marks**

Total 10 marks

Q.1: Major experiment

Marks 4

Q.1: Make a temporary potato osmoscope to study osmosis. Sketch & label the diagram showing the change in the water level.

- **Preparation of potato osmoscope: 2 Marks.**
- **Observation/ Conclusion :1 Mark**
- **Diagram of Osmoscope: 1 Mark**

Total 4 Marks

Requirements: -A fresh potato, scalpel, peeler, glass beaker, pins, conc. Sugar solution, water, etc.



Q.1: Make a temporary potato osmoscope to study osmosis. Sketch & label the diagram showing the change in the water level.

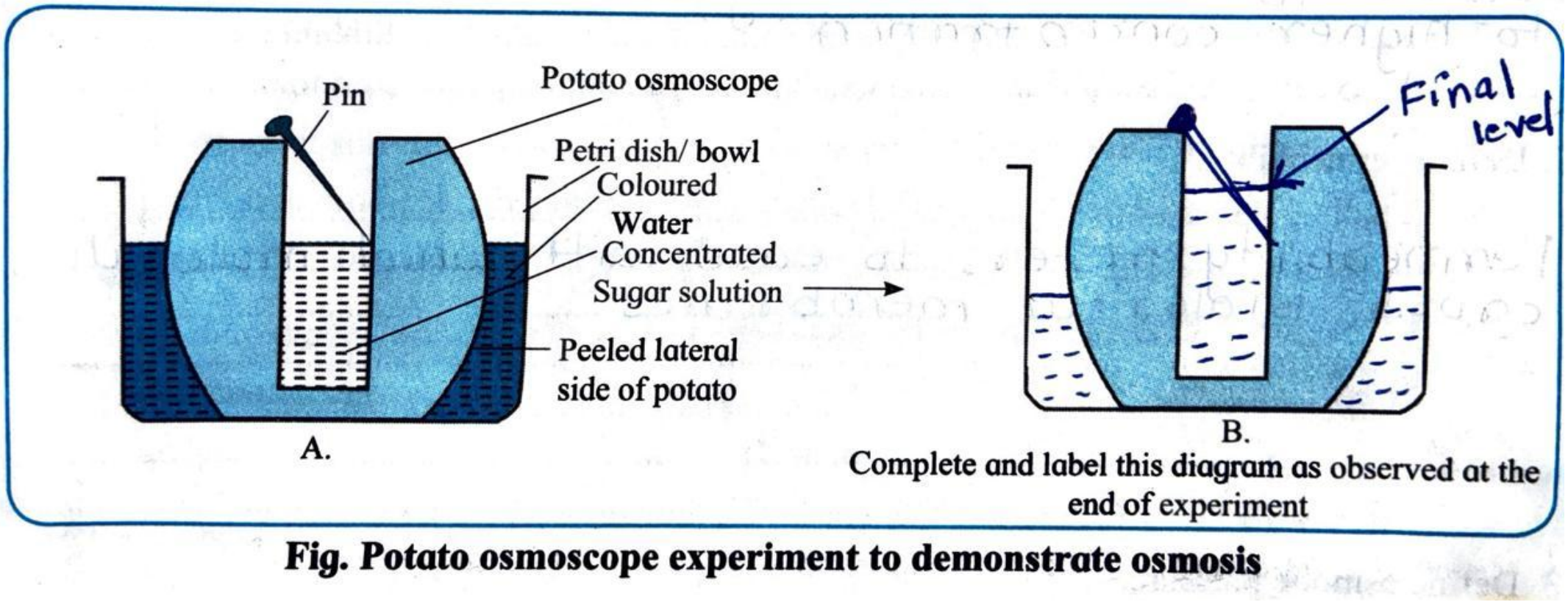


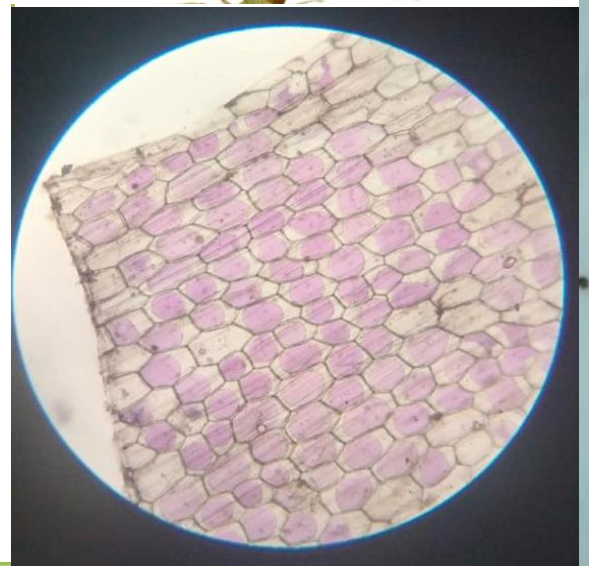
Fig. Potato osmoscope experiment to demonstrate osmosis

Q.1: Make a temporary slide to study plasmolysis. Sketch & label the diagram.

- **Preparation of slide - 2 marks.**
- **Observation Diagram of a plasmolysed cell - 1 Mark.**
- **Conclusion- 1 mark.**
- **Total- 4 Marks**

Requirements: Fresh leaf of *Tradescantia*, conc. Sugar solution, distilled water, slides, cover slips, watch glass, blades, etc.



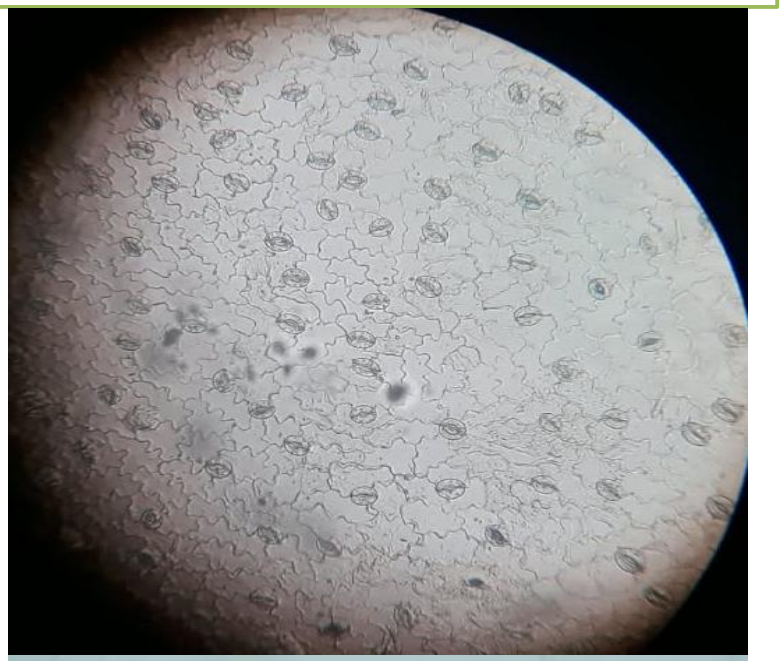




Q.1: Make a temporary mount of leaf epidermis to study the structure & distribution of stomata. Sketch & label the structure of the stomatal apparatus.

- **Preparation of slide - 2 Marks.**
- **Observation Diagram of stomata - 1 Mark**
- **Conclusion - 1 Mark.**
- **Total - 4 Marks**

Requirements: Fresh leaves of *Hibiscus* / Maize, slides, cover slips, watch glass, blades, glycerin.





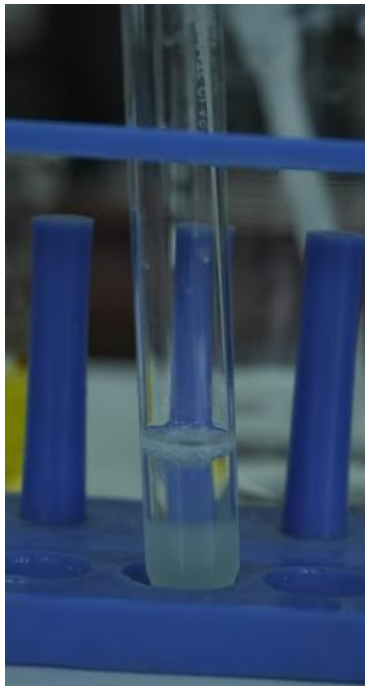
Q.1: Perform the experiment to isolate DNA from the given sample. Show your result to the examiner.

- **Procedure for DNA extraction - 3 marks.**
- **Observation - 1 mark.**
- **Total - 4 Marks**

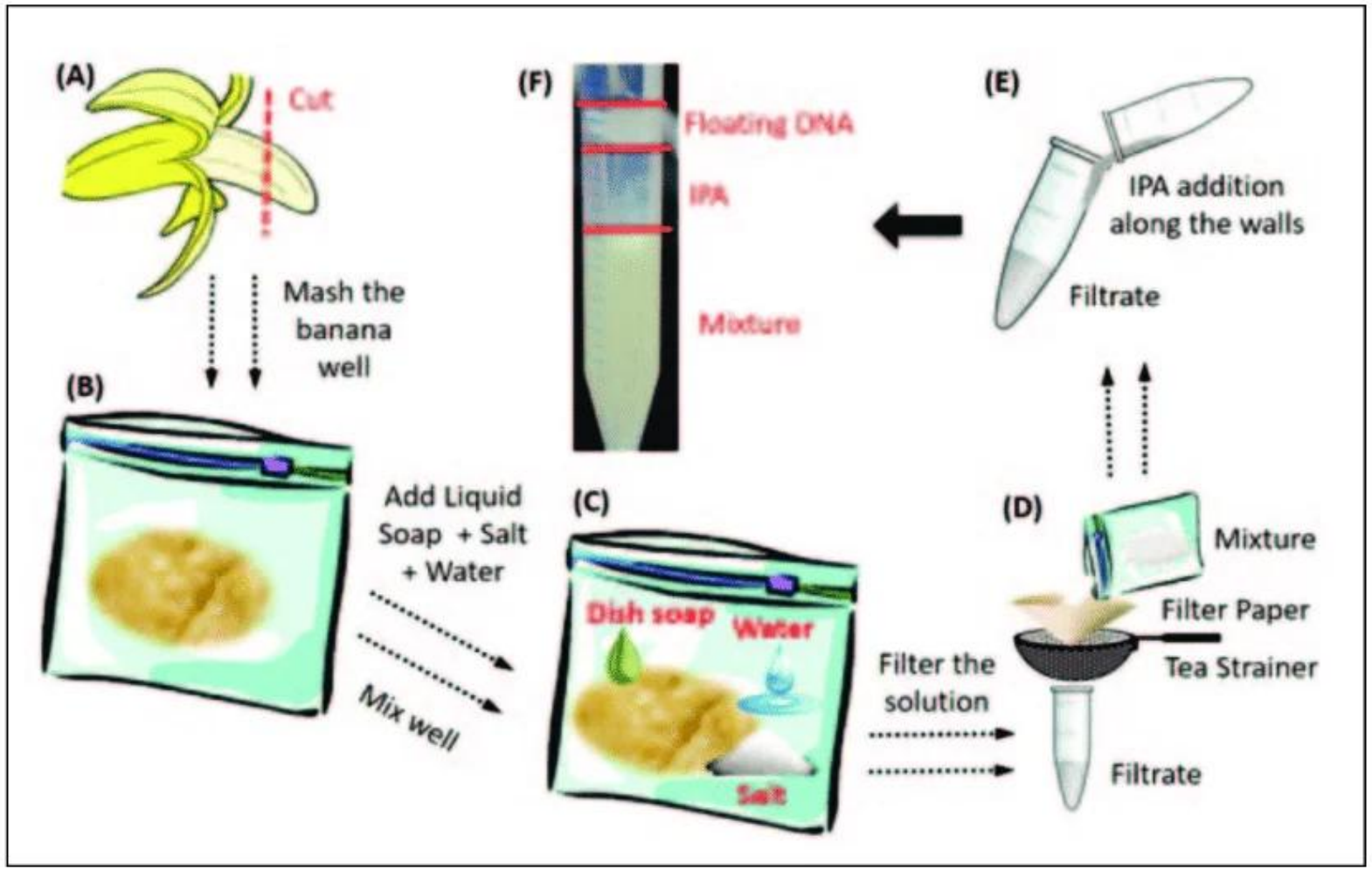
Requirements:

Fleshy berry fruits like bananas, liquid soap, distilled water, salt, ice, cold isopropyl alcohol, measuring spoons, glass stirring rod, test tubes, glass beakers, plastic cups, strainer or coffee filter, funnel, etc.



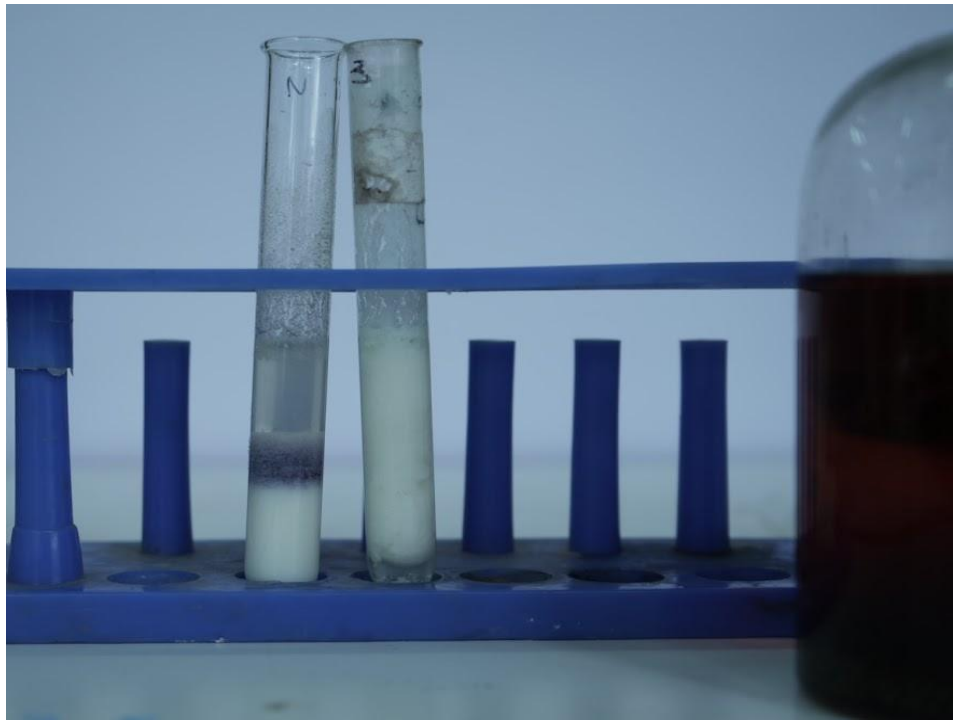


Q.1: Perform the experiment to isolate DNA from the given sample. Show your result to the examiner.



Q.1: Find out the adulteration in the given milk sample. Show your result to the examiner.

- **Procedure to detect the presence of water/ starch: 2 marks**
- **Observation Table and conclusion to detect the adulterant: 2 marks**
- **Total: 4 marks**
- **Requirements: Milk samples, lactometer, starch, 1% iodine solution, measuring cylinders, test tubes, test tube stands.**



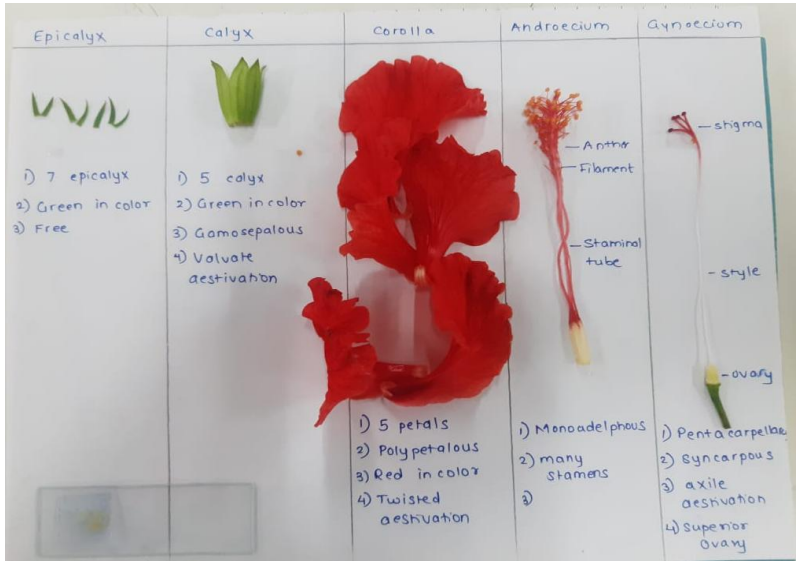
Q.2: Minor experiment

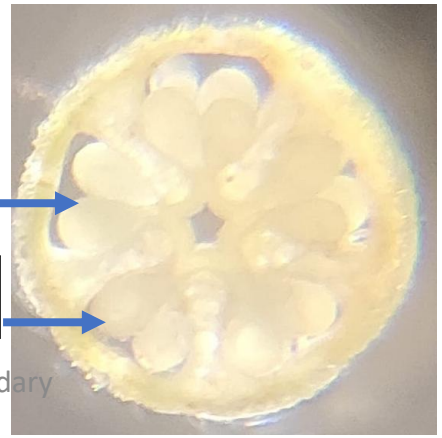
Marks 3

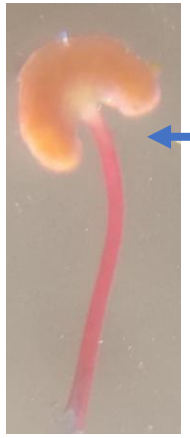
Q.2: Dissect the given flower to display the floral whorls. Take a T.S. or V.S. of the ovary to show the number of chambers (locules). Sketch and label the diagram.

- **Display of floral whorls - 1 Mark**
- **T. S. of ovary slide preparation - 1 Mark.**
- **Diagram of T.S. of ovary - 1 Mark**
- **Total - 3 Marks.**

Requirements:
Flower of *Hibiscus*, forceps, razor blade, slides, cover slips, two needles, dissecting microscope, paper, etc.





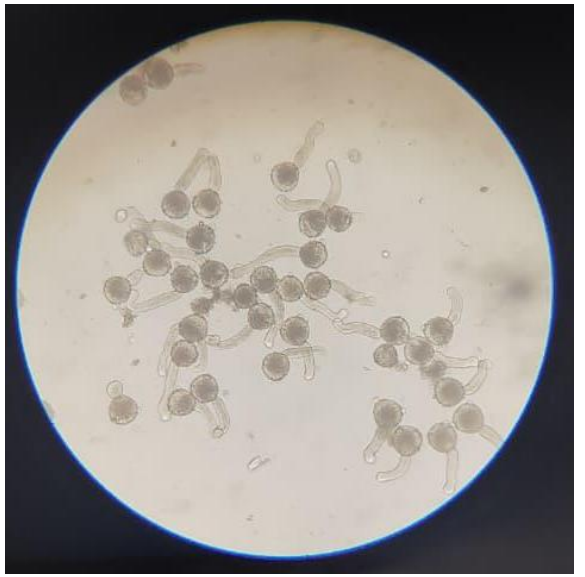


Q. 2. Make a temporary preparation to show pollen germination. Draw a neat and labelled diagram of the same.

- **Preparation (pollen germination slide) - 2 Marks**
- **Diagram of a pollen grain showing pollen germination - 1 Mark.**
- **Total: 3 Marks**

Requirements:

Flower of *Catharanthus*, glass slide, cover slip, compound microscope, sugar solution, etc.





Q. 3 Calculate population density/ frequency of ..... plant species by the quadrat method.

- **Observation table for density/frequency - 2 Marks.**
- **Formula for density / frequency -1 Mark**
- **Total: 3 Marks**

[Either density or frequency of any one species will be asked in examination]

Requirements:
Meter scale, string, nails, paper, pencil, etc.

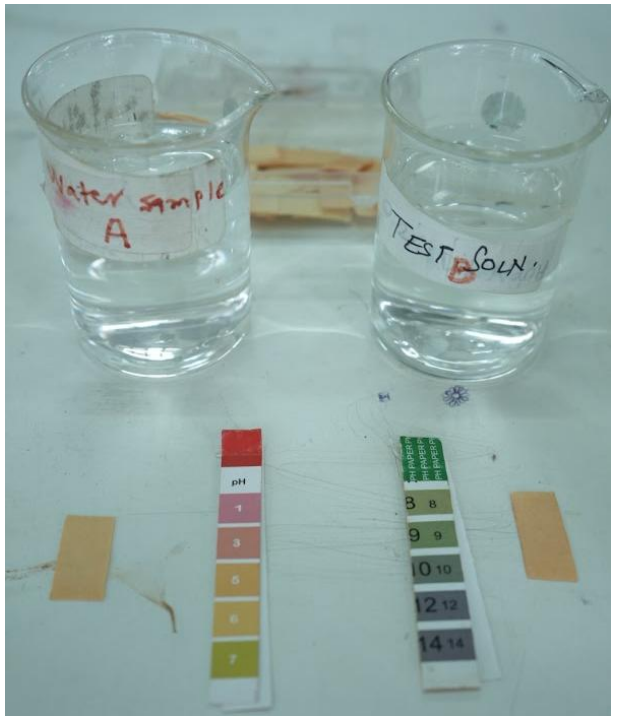


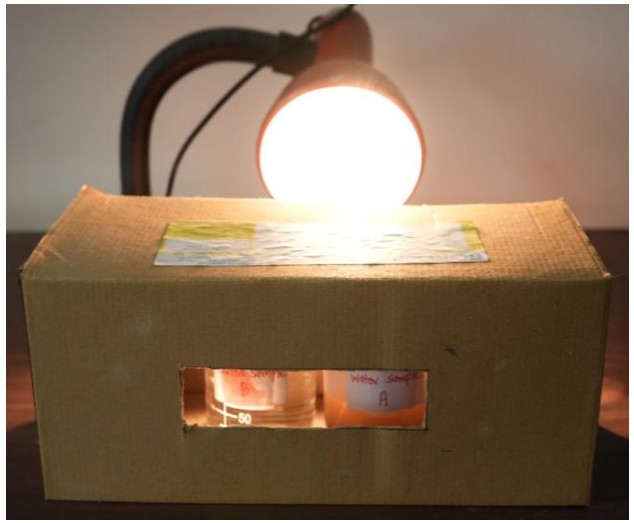
Q.3: Minor experiment

Marks 3

Q. 3. Perform the suitable tests to compare the given water sample(s) for its/ their pH and clarity. Make a note of its/ their pH and clarity.

- pH and nature of two water samples ---2 Marks
- Observation about the clarity of two water samples--1 Mark.
- **Total-- 3 Marks**
- **Requirements:**
- Different water samples, sample bottle with cap, pH papers of different ranges/ universal indicator, 1000ml beakers, cardboard box, torch, etc.





Clarity

Q. 3 Perform suitable tests to compare the given soil samples for their pH and type. Make a note of their pH and soil type.

- **Identification of the type of two soil samples- 2 Marks**
- **pH of two soil samples-1 Mark**
- **Total: 3 Marks.**

- **Requirements:**
- **Digger, polythene bags, lens, meshes of different pore sizes for soil samples, clean glass jar with a tight-fitting lid, measuring cylinder, distilled water, etc**



Q.3: Perform a suitable test to compare the given leaf samples for the presence of particulate matter. Make a note of the same.

- **Washed leaf observation table - 1 Mark**
- **Unwashed leaf observation table - 1 Mark**
- **Inference - 1 Mark**
- **Total: 3 Marks**

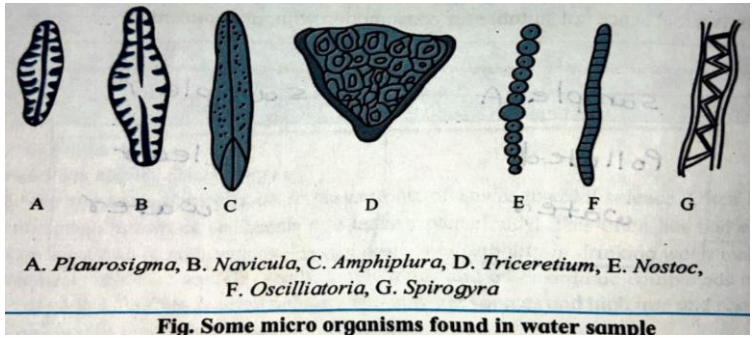
Requirements:
Slides, coverslips, ear buds, microscope, leaves of roadside plants, glycerin, etc.



Q. 3. Make a temporary mount of the given water sample. Observe and prepare a report on the presence of different plankton in it.

- **Observation table showing the names of any four microorganisms observed in water: 2 Marks**
- **Inference: 1 Mark**
- **Total: 3 Marks**

- **Requirements:**
- **Water samples, microscope, slides, dropper, methylene blue, spirit lamp, etc.**



A. *Plaurosigma*, B. *Navicula*, C. *Amphiplura*, D. *Triceretium*, E. *Nostoc*, F. *Oscilliatoria*, G. *Spirogyra*

Fig. Some micro organisms found in water sample

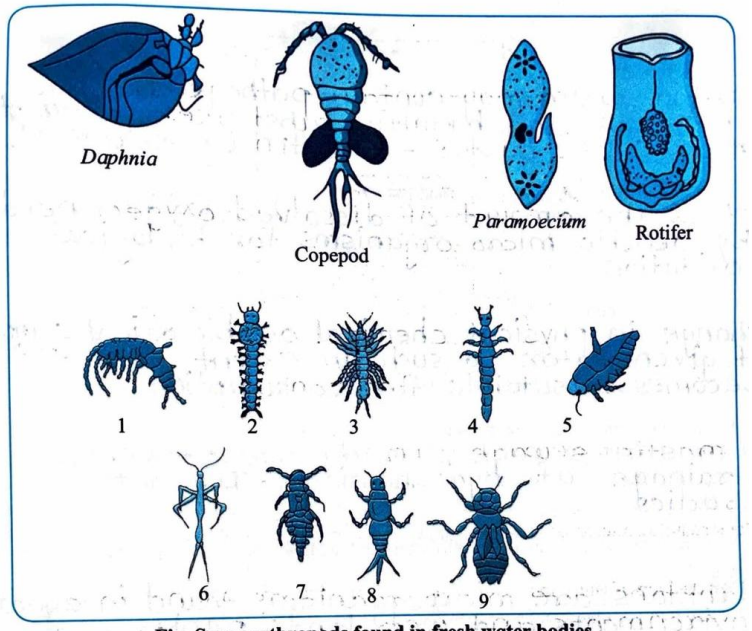


Fig. Some arthropods found in fresh water bodies

PART B

Spotting

Q.4: Spotting - 10 Marks

- **Identify the following 10 spots. 1 Mark for each spot.**
- **Identification of the spot: ½ mark**
- **Any three to four relevant points: ½ mark.**
- **Tentatively, three minutes will be given to each spot.**
- **There can be two blank spots so that students can complete their work.**
- **After every three minutes, the bell should ring, and then the students can move to their right-hand side.**
- **A separate answer sheet should be provided for spotting question no. 4, which is later stapled to the original answer sheet.**
- **No extra supplement to be provided.**

Spot A: Name the plant and write on floral adaptation in the same.

Maize plant (Wind Pollination)

Salvia Flower (Insect Pollination) **OR**







Controlled pollination.

Emasculation.

Bagging

Bagging with tagging



Q.4 Spot (B): Any ONE experiment from plant physiology.

1. **Rate of transpiration by four-leaf experiment.**
2. **Imbibition of seeds/ raisins.**
3. **Separation of plant pigments by paper chromatography.**







Q.4: Spot (C) Identify the plant and comment on its morphological adaptations in aquatic /xeric habitats

Plants in Xeric Habitat

- ***Calotropis procera*** **(Ruee)**



- ***Acacia arabica*** **(Babhool)**



- ***Opuntia dillenii*** **(Nagphani)**



Q.4: Spot (C) Identify the plant and comment on its morphological adaptations in aquatic /xeric habitats

Plants in Aquatic Habitat

- ***Hydrilla***



- ***Eichhornia*** **(Water Hyacinth)**



- ***Typha*** **(Cattail)**



Q.4: Spot D. Identify and describe

Permanent slide of

- **T. S. of Testis**

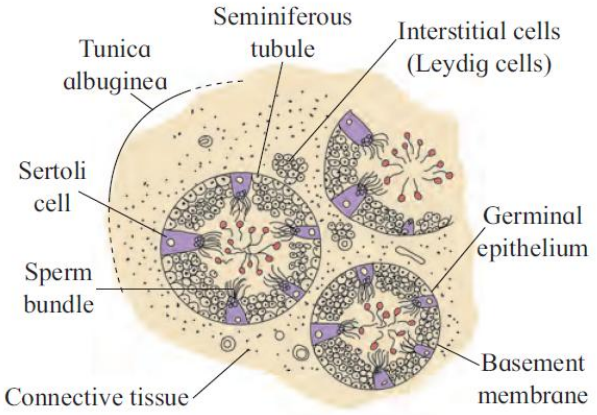
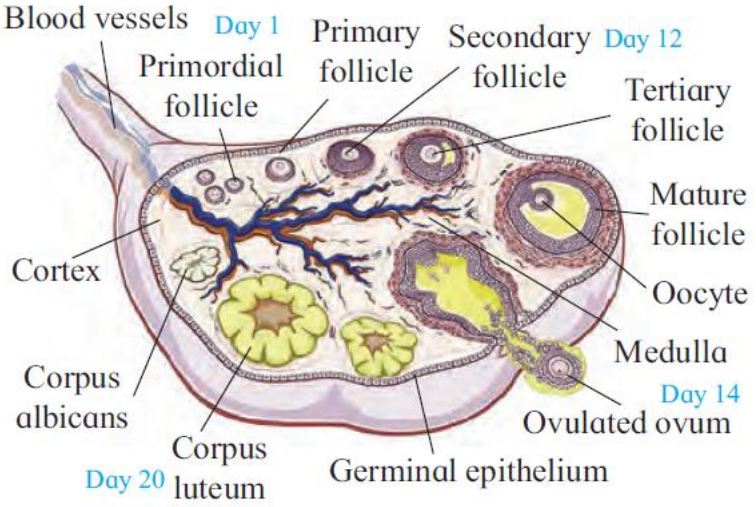
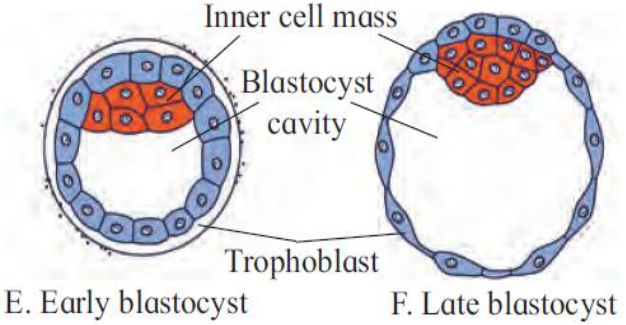


Fig. 2.4 : T. S. of Testis

- **T. S. of Ovary**



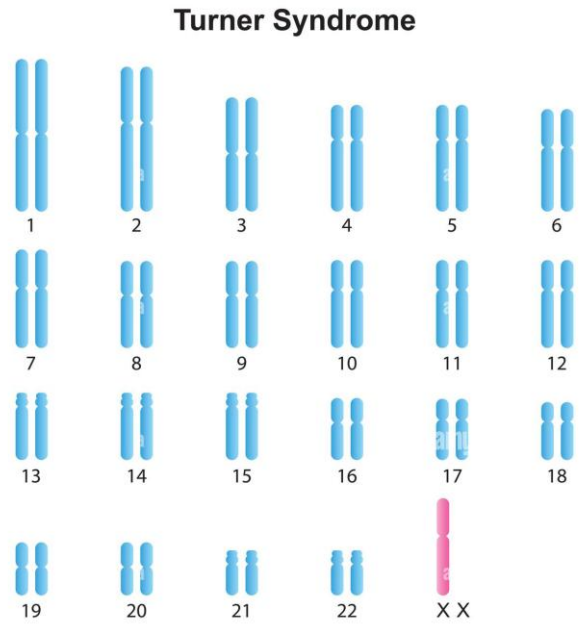
- **V. S. of Blastula**



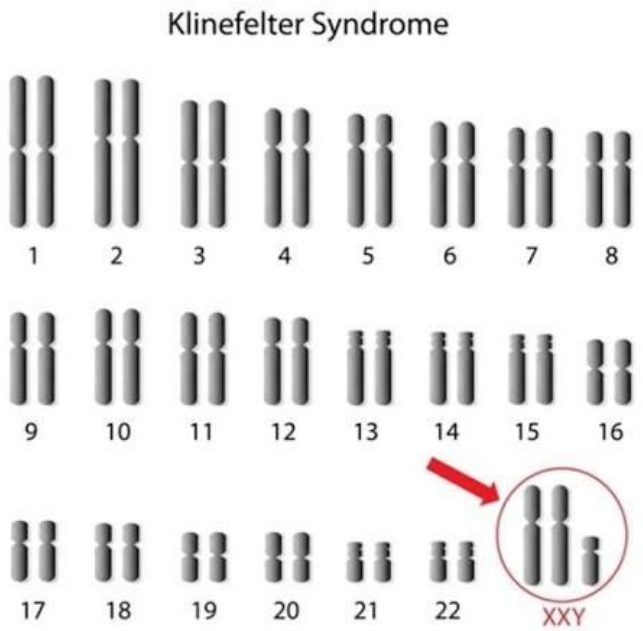
Q.4: Spot E. Identify and comment on the syndrome from the given karyotype.

Chromosomal Disorders:

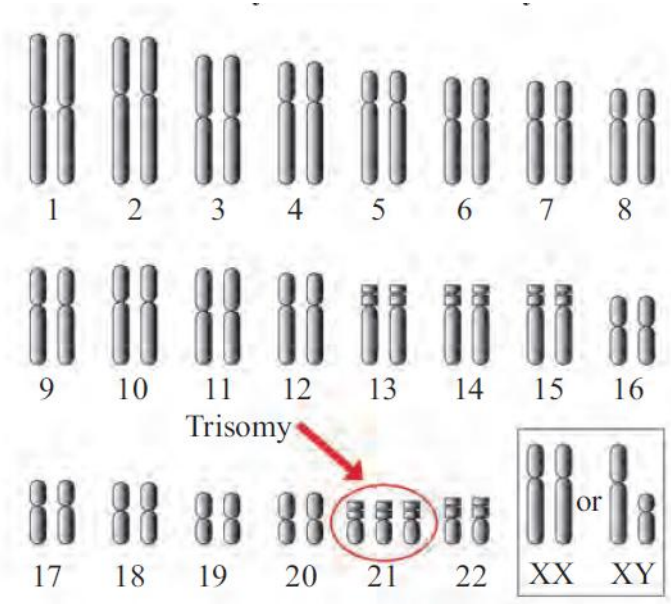
Turner's syndrome



Klinefelter's syndrome



Down's syndrome



Q.4: Spot. F. Identify the disease and comment on control measures.

- **Malaria – *Plasmodium***

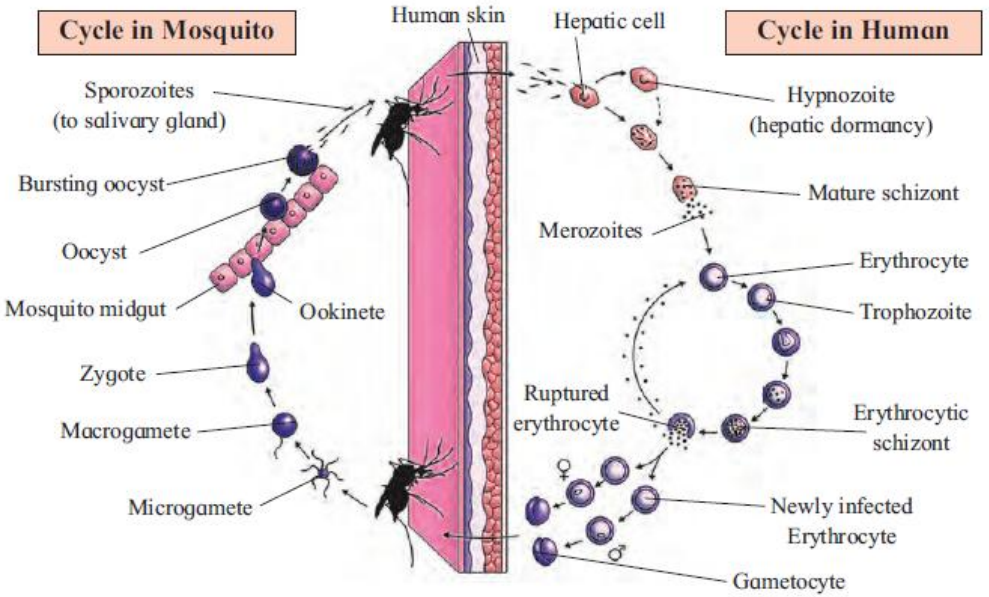
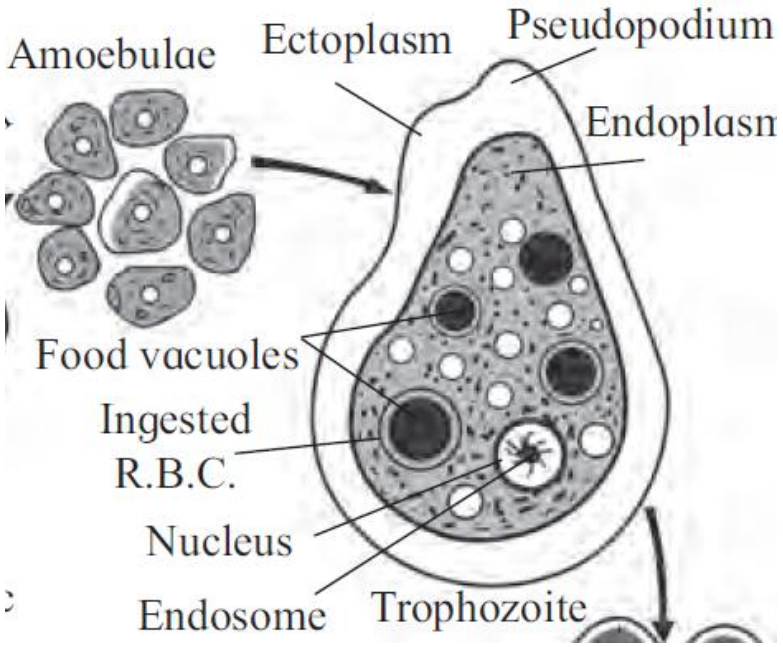


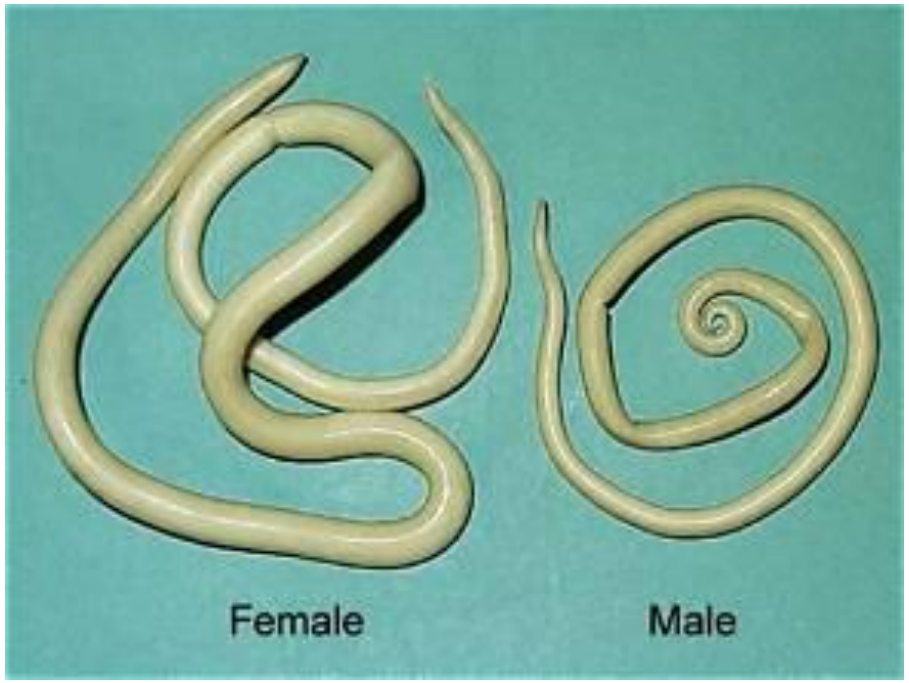
Fig. 10.5 : Stages in the life cycle of *Plasmodium* in mosquito and human

- **Amoebiasis – *Entamoeba histolytica***



Q.4: Spot. F. Identify the disease and comment on control measures

- **Ascariasis – *Ascaris***



- **Ring worm**



Q.4: Spot G. Identify the stage of meiosis in the given slide.

Meiosis – I

- Prophase – I
  - Leptotene
  - Zygotene
  - Pachytene
  - Diplotene
  - Diakinesis
- Metaphase – I
- Anaphase – I
- Telophase I

Meiosis –II

- Prophase – II
- Metaphase II
- Anaphase II
- Telophase II

Q.4: Spot G. Identify the stage of meiosis in the given slide.

- **Meiosis – I, Prophase – I**

Interphase

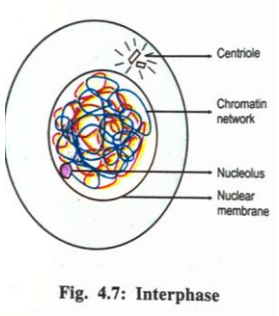
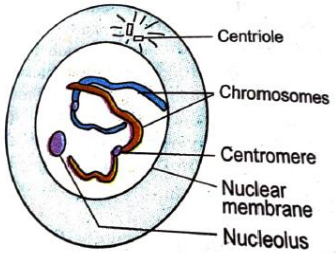
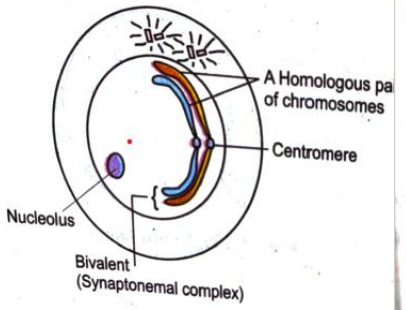


Fig. 4.7: Interphase

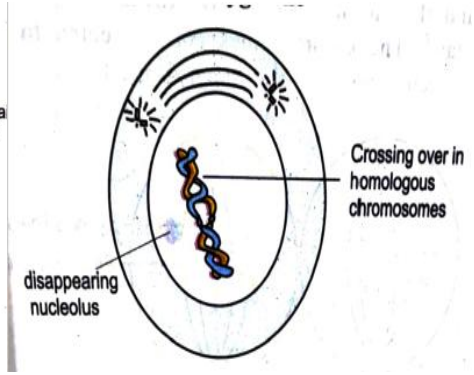
Leptotene



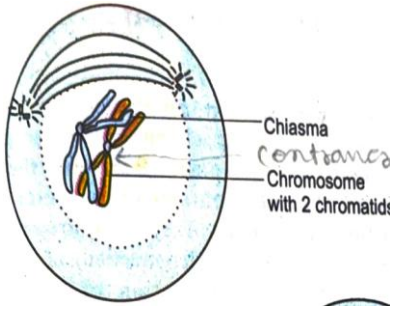
Zygotene



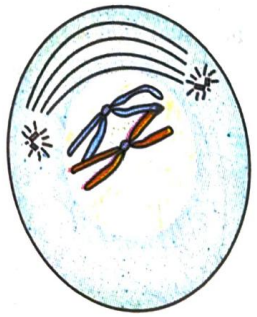
• Pachytene



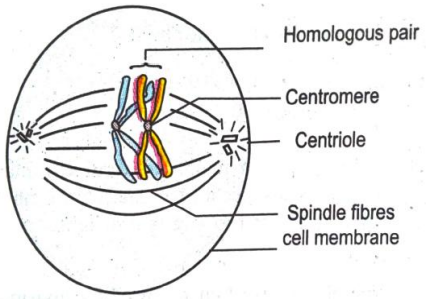
• Diplotene



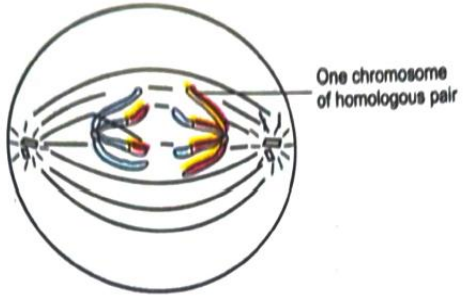
Diakinesi



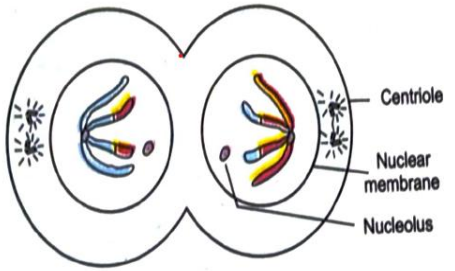
• Metaphase – I



• Anaphase – I



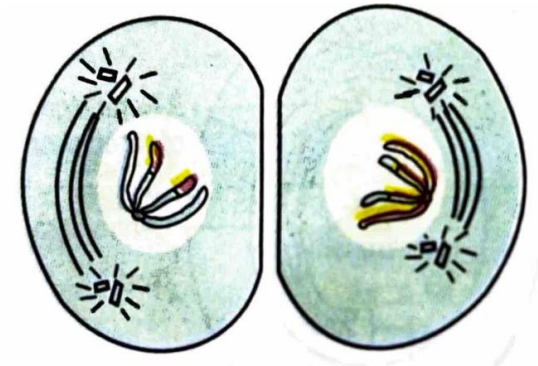
• Telophase - I



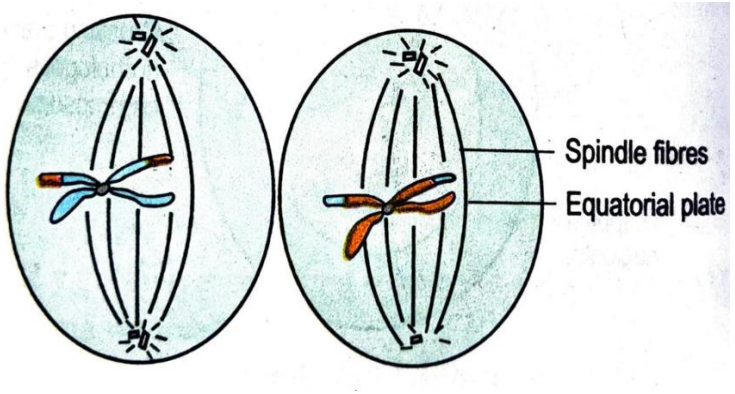
Q.4: Spot G. Identify the stage of meiosis in the given slide.

- **Meiosis – I, Prophase – II**

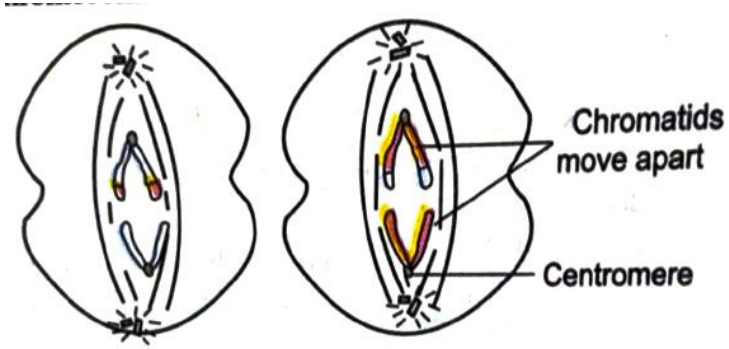
- Prophase – II



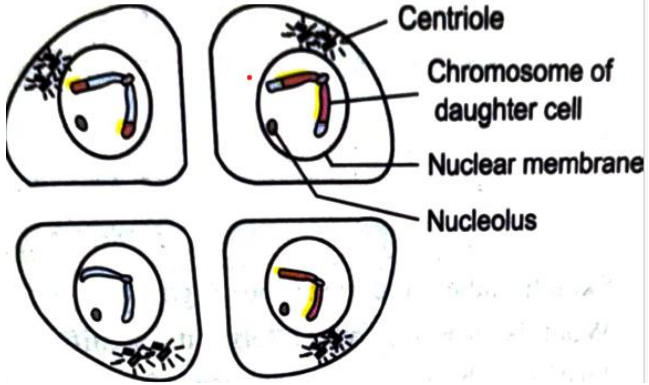
- Metaphase – II



- Anaphase – II



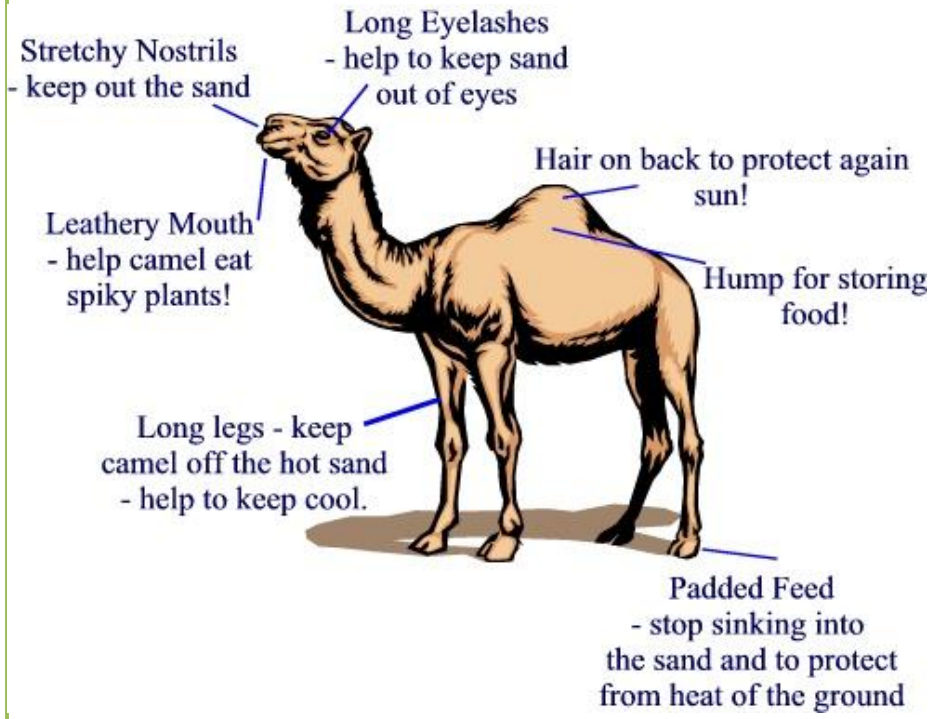
- Telophase II and Cytokinesis



Q.4: Spot H. Identify the animal and comment on its xeric/aquatic adaptations.

Xeric Animals:

Camel (*Camelus* spp.)

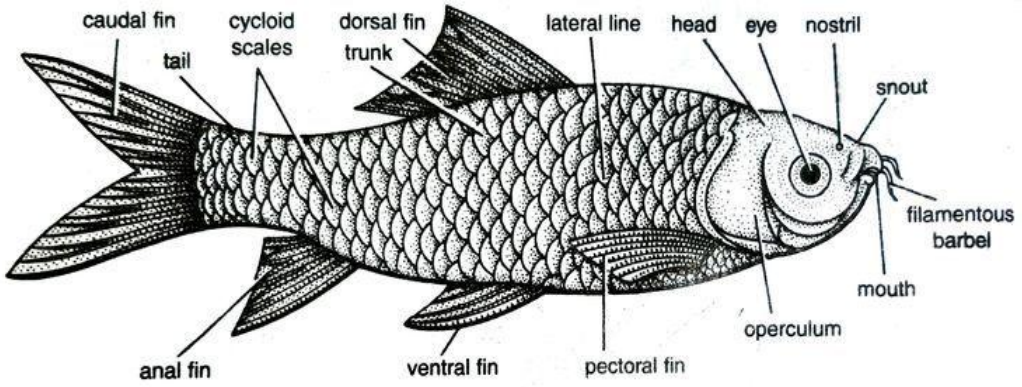


Kangaroo rat (*Dipodomys* spp.)



Q.4: Spot. H. Identify the animal and comment on its xeric / aquatic adaptations.

Aquatic Animals: Freshwater fish Rohu (*Labeo rohita*)



Labeo rohita.

Aquatic Animals: Dolphin (*Delphinus* spp)



Q.4: Spot. I . Name the parts indicated by the marker in the model and enlist their functions.

Anatropous Ovule

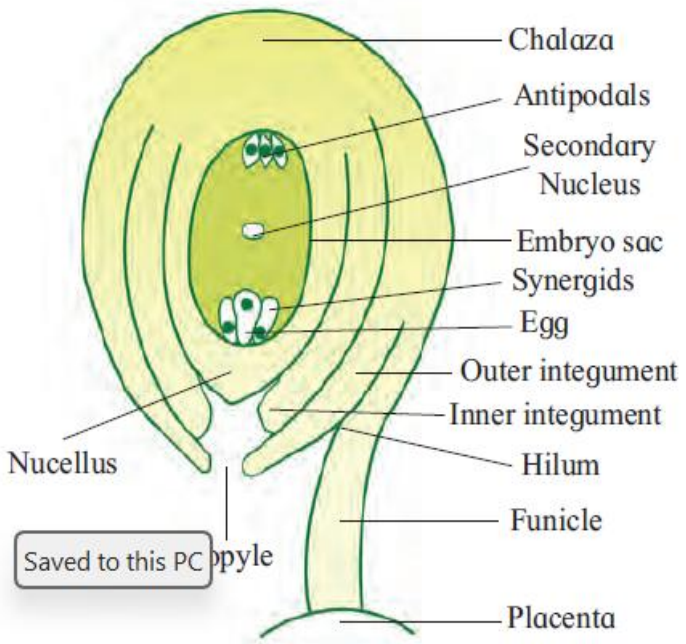
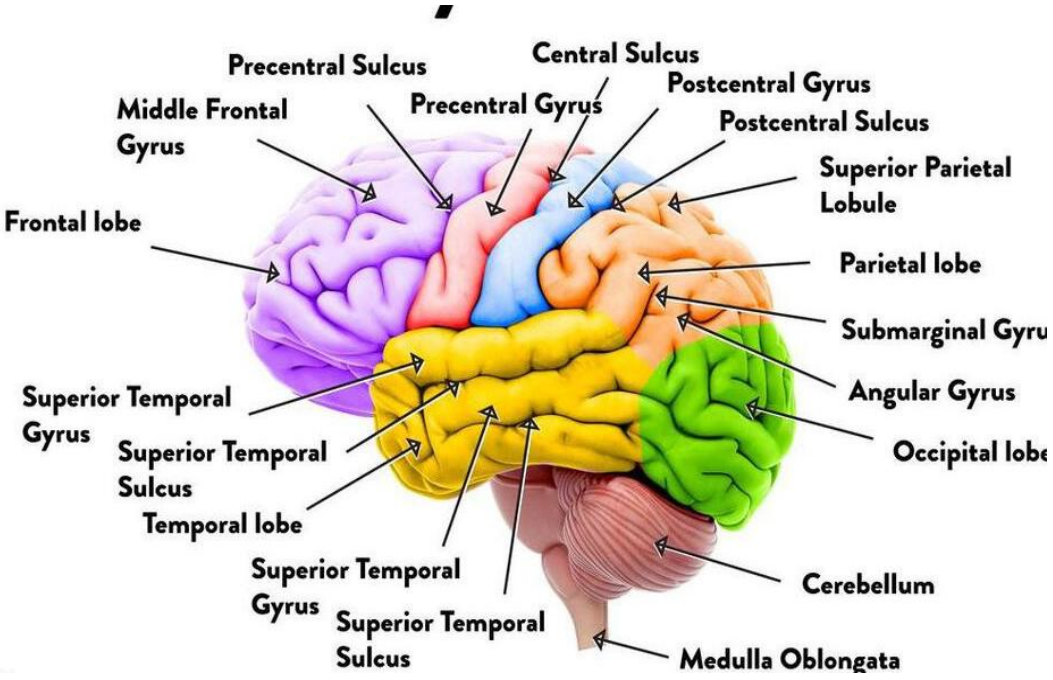


Fig. 1.6 : Anatropous Ovule

Human Brain



Q.4: Spot. I . Name the parts indicated by the marker in the model and enlist their functions.

Human Eye

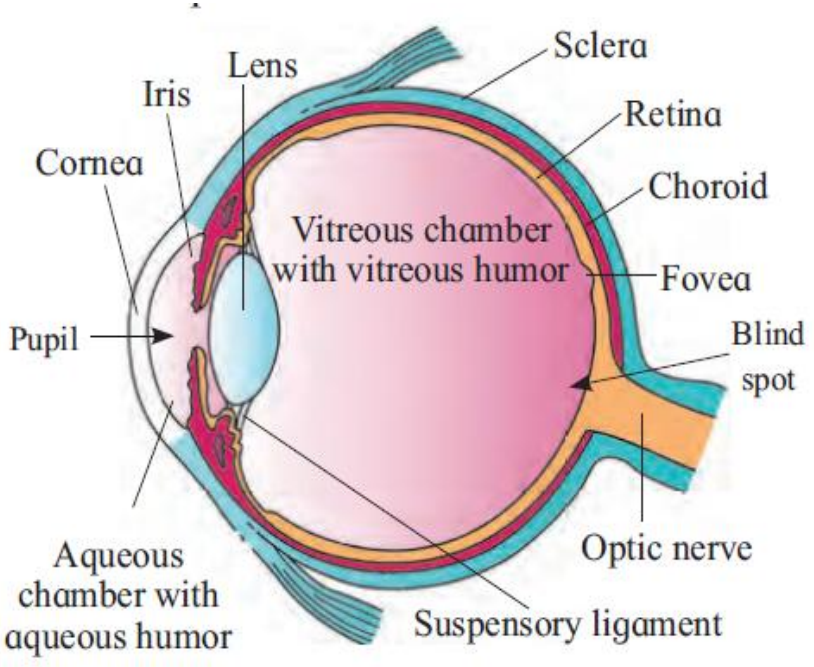


Fig. 9.19 : Eye

Human Ear

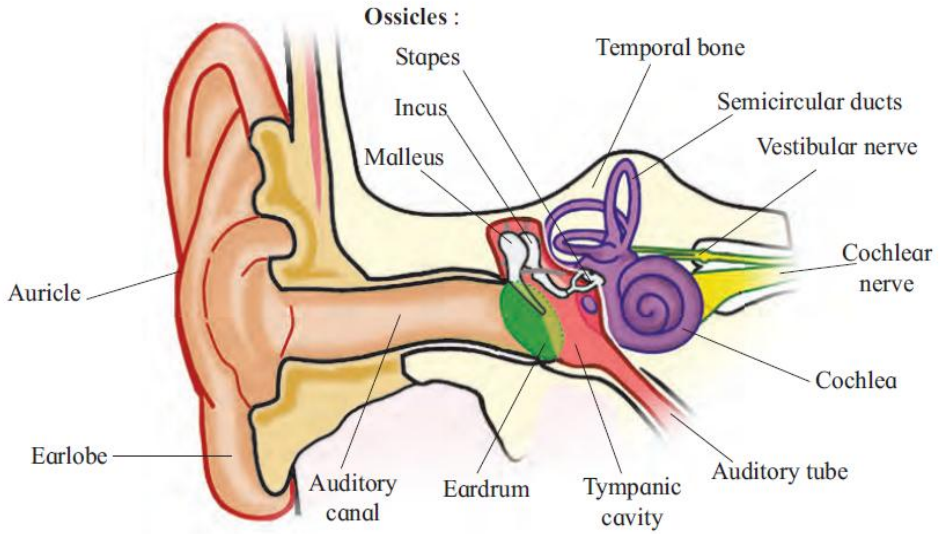
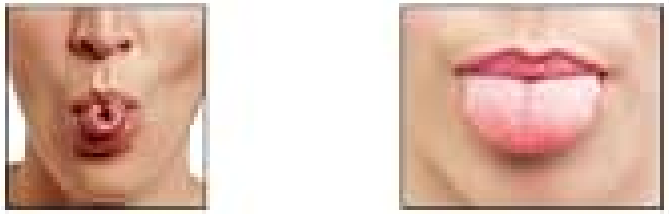
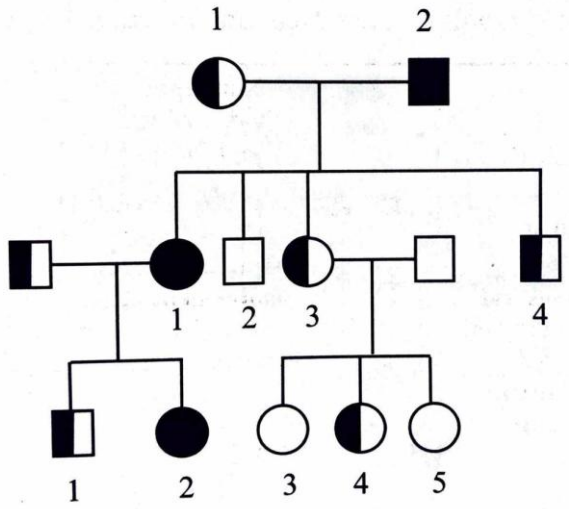


Fig. 9.21 : Structure of human ear

Q.4: Spot J. Comment on the given pedigree chart.

Rolling of tongue

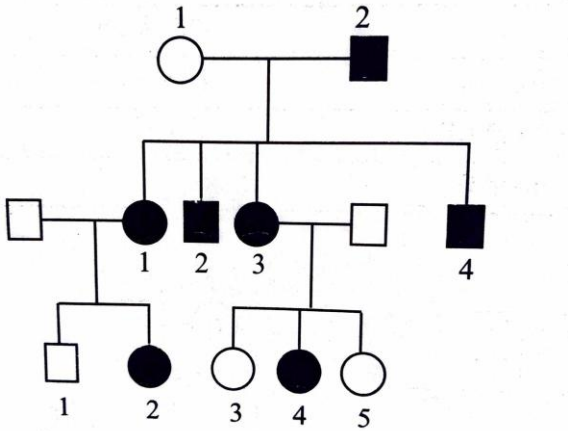




Widow's peak



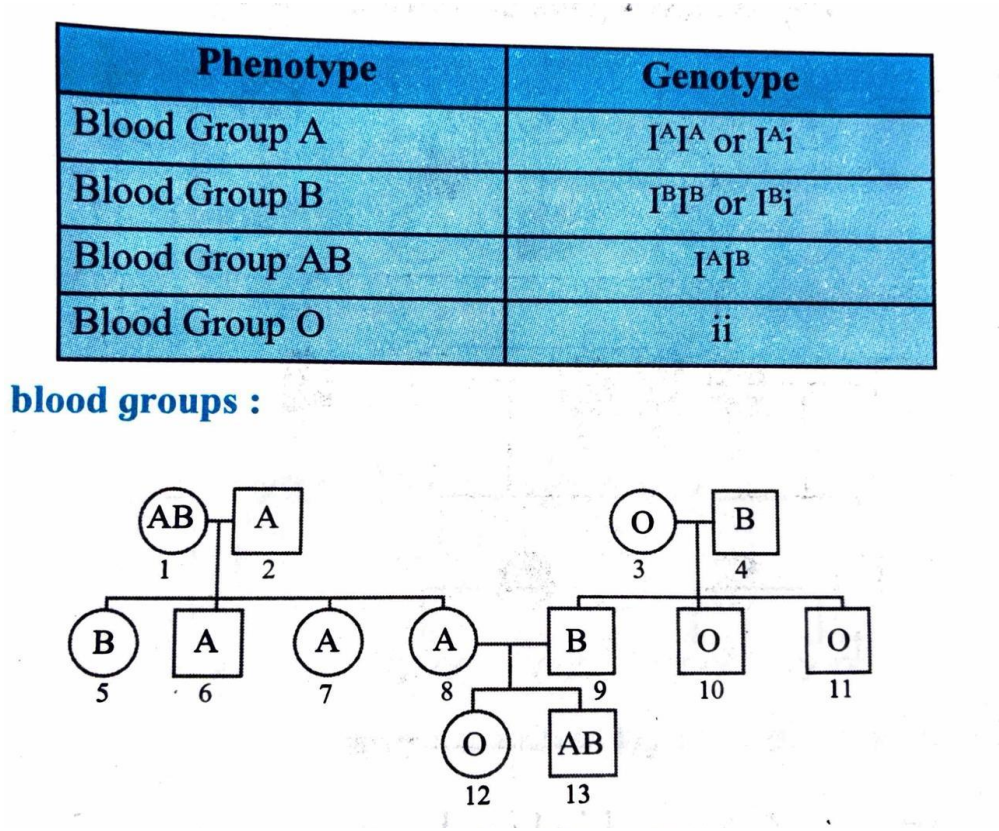
- Dominant = widow's peak
- Recessive = straight hairline



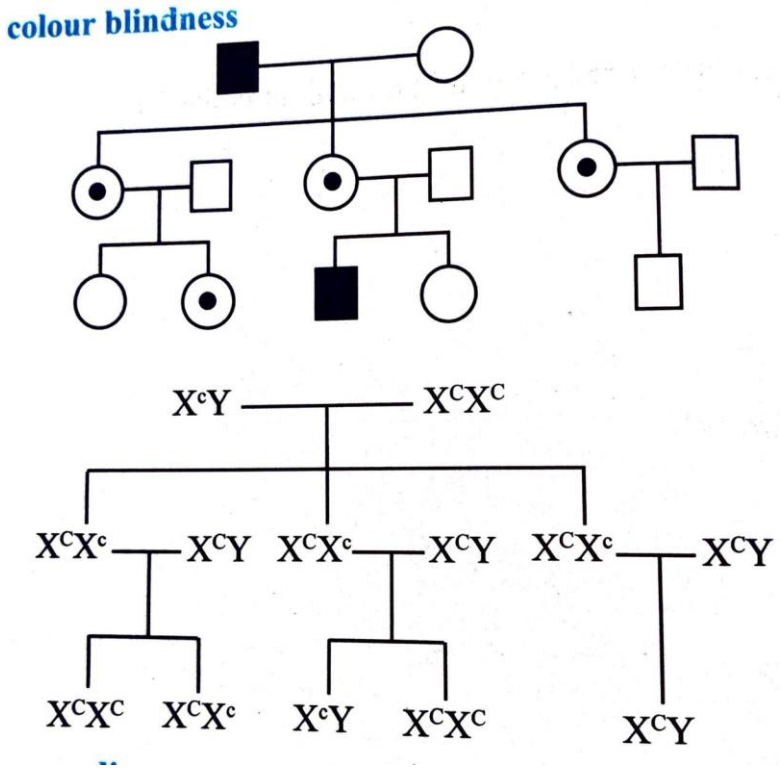
Q.4: Spot J. Comment on the given pedigree chart.

Blood Group

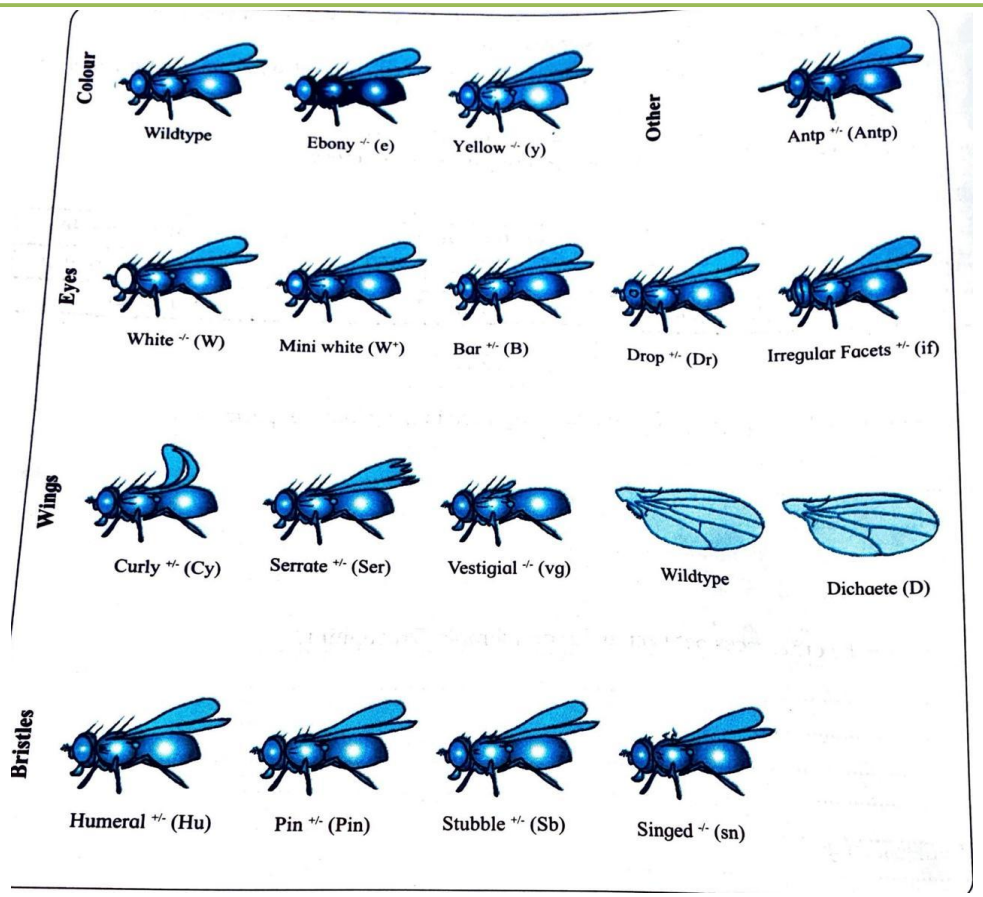
Phenotype	Genotype
Blood Group A	I^AI^A or I^Ai
Blood Group B	I^BI^B or I^Bi
Blood Group AB	I^AI^B
Blood Group O	ii



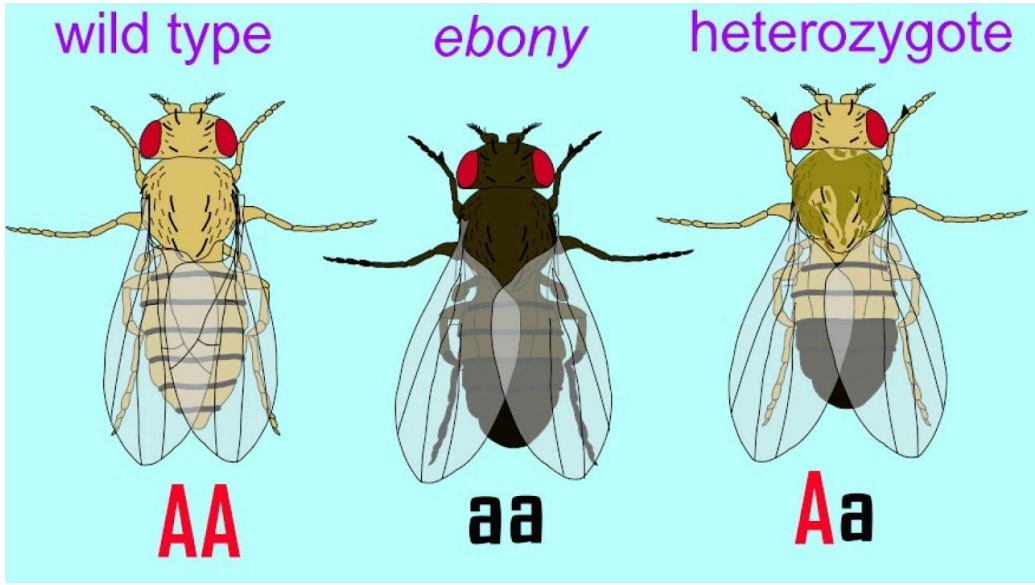
Colour Blindness



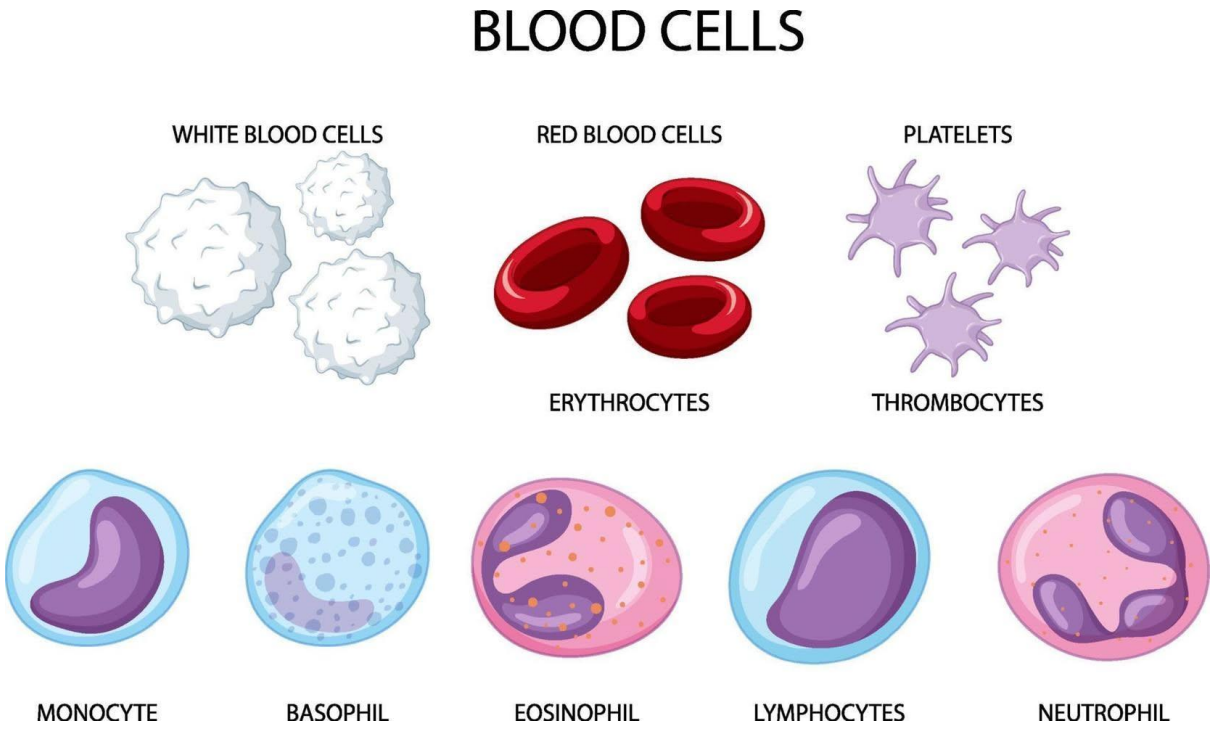
Q.4: J. Comment on the given specimen of Drosophila with respect to eye colour and wing type.

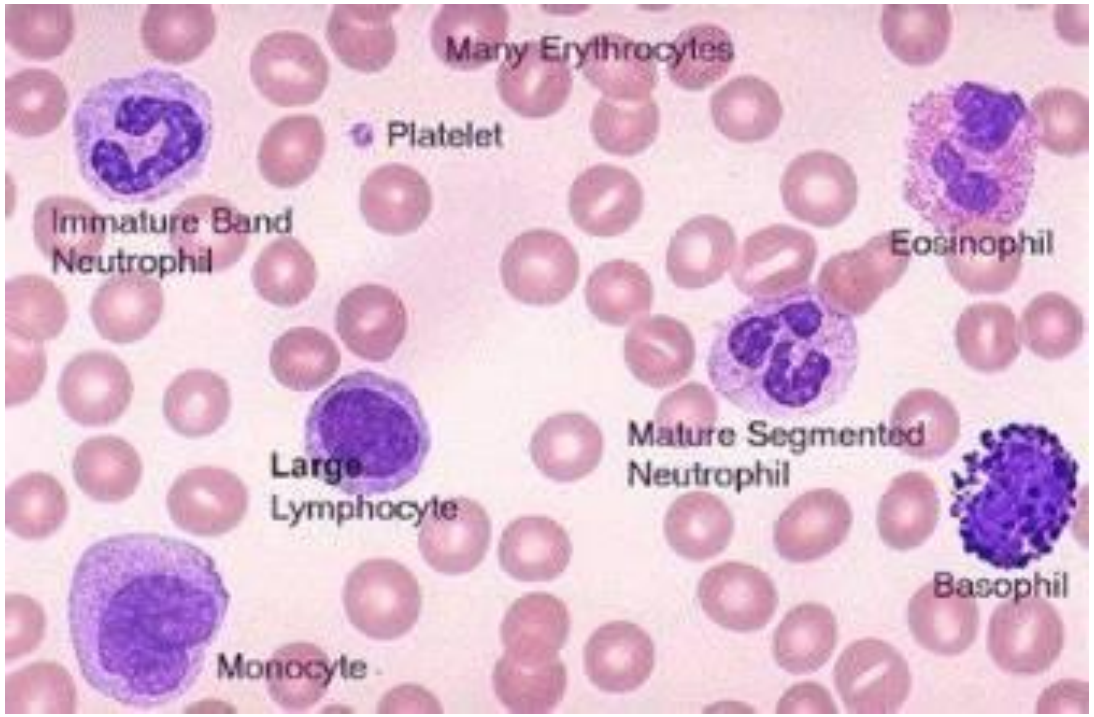


	Eye Color	Pattern of Wing	No. of segments in a leg
Culture 1	Red(wild)	Normal	Nine number of segments
Culture 2	Black (mutant)	Vestigial	Less number



Q.4: J. Identify the type of cell marked and mention its features/functions(Blood profile)





PART C

Q. 5 Project report 5 Marks

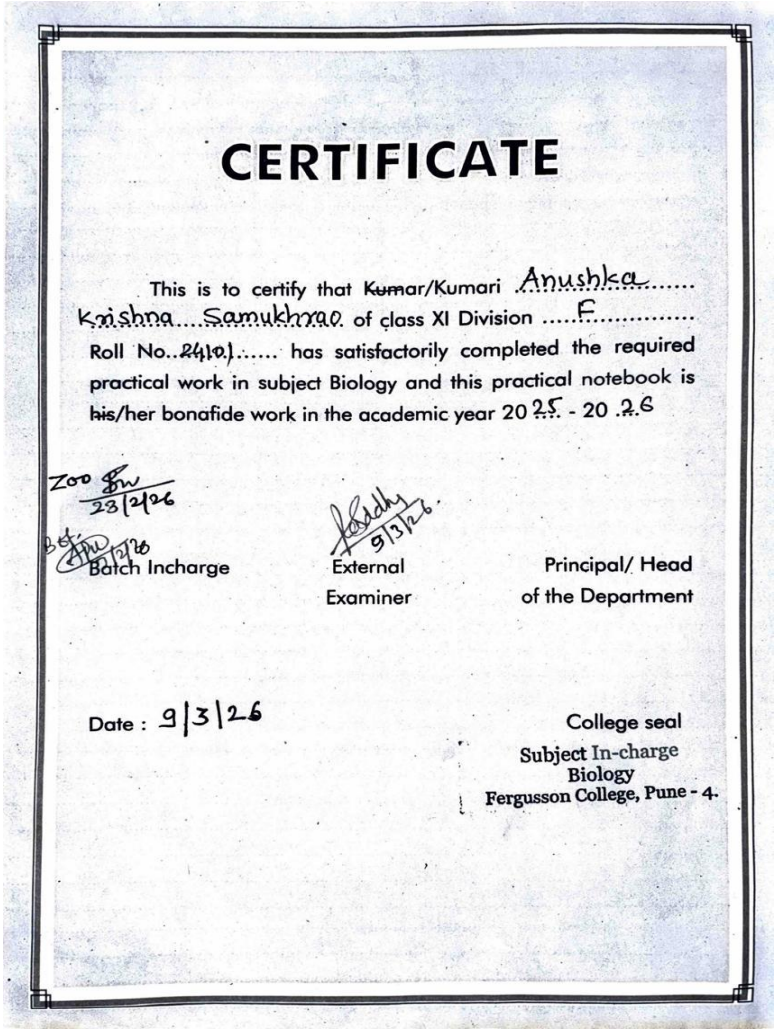
1. Title of the Project
2. Name of the student and concerned details.
3. Acknowledgement.
4. Table of contents.
5. Actual report.

a. Introduction to the topic and need for the project - 1 mark.
b. Description of method used - 1 mark.
c. Data collected and d. Analysis of collected data - 2 marks
d. Conclusion/Inference - 1 mark.
e. Bibliography/references.

PART C

Q. 6 Viva voce (Based on Q. 1 to Q. 3) – 2 Marks

Q. 7 Certified Journal (Practical Notebook) - 3 Marks



CERTIFICATE

This is to certify that ~~Kumar~~/Kumari Anushka Krishna Samukhrao of class XI Division F Roll No. ~~2410~~ has satisfactorily completed the required practical work in subject Biology and this practical notebook is ~~his~~/her bonafide work in the academic year 20 25 - 20 26

Zoo 23/2/26
Batch Incharge

9/3/26
External Examiner

Principal/ Head of the Department

Date : 9/3/26

College seal
Subject In-charge
Biology
Fergusson College, Pune - 4.



महाराष्ट्र राज्य माध्यमिक व उच्च माध्यमिक शिक्षण मंडळ
पुणे विभागीय मंडळ, पुणे
शिवाजीनगर, पुणे ४११००४
Shivajinagar, Pune - 411005
FAX - 420/22228771
E-inair. saabucxde@gmail.com
Website: www.sabountgune.in



इ. 12वी प्रात्यक्षिक परीक्षा पूर्वतयारी

उच्च माध्यमिक प्रमाणपत्र परीक्षा (इ. १२ वी), फेबु.-मार्च २०२६-२७ साठी मार्गदर्शक ऑनलाईन सत्र

धन्यवाद !