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Portion Omitted
from the
Syllabus for the
Year 2020-2021

2021

NAVNEET PRACTICE PAPERS

SCIENCE

STANDARD XII

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2021

NAVNEET PRACTICE PAPERS

SCIENCE

STANDARD XII

Based on
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Updated
as per the
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for the year
2020-21

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BIOLOGY

EVALUATION PLAN

1. (a) Theory/Written examination (3 hours) : **70 marks**
(b) Practical examination (3 hours) : **30 marks**
Total : 100 marks

2. Question paper pattern for the theory/written examination :

Section	Question Type	Question No.	Internal Choice	Total Marks	Marks with Option
A	Multiple Choice Questions (MCQ)	Q. 1. [(i) to (x)]	–	10	10
	Very Short Answer Questions (VSA)	Q. 2. [(i) to (viii)]	–	8	8
B	Short Answer Questions (SA) – I	Q. 3. to Q. 14.	8 out of 12 Qs.	16	24
C	Short Answer Questions (SA) – II	Q. 15. to Q. 26.	8 out of 12 Qs.	24	36
D	Long Answer Questions (LA)	Q. 27. to Q. 31.	3 out of 5 Qs.	12	20
				70	98

3. Chapterwise distribution of marks in the question paper :

Chapter No.	Name of the Chapter	Marks	Marks with Option
1	Reproduction in Lower and Higher Plants	6	8
2	Reproduction in Lower and Higher Animals	6	8
3	Inheritance and Variation	4	6
4	Molecular Basis of Inheritance	4	6
5	Origin and Evolution of Life	4	6
6	Plant Water Relation	5	7
7	Plant Growth and Mineral Nutrition	5	7
8	Respiration and Circulation	7	10
9	Control and Coordination	8	11
10	Human Health and Diseases	3	4
11	Enhancement of Food Production	4	6
12	Biotechnology	5	7
13	Organisms and Population	3	4
14	Ecosystems and Energy Flow	3	4
15	Biodiversity, Conservation and Environmental Issues	3	4
Total		70	98



**NON-EVALUATIVE PORTION FOR THE ACADEMIC YEAR 2020-21
AS DECLARED ON 22-07-2020**

Chapter No. & Name	Non-evaluative portion	
1. Reproduction in Lower and Higher Plants	1.1 : Asexual reproduction	
2. Reproduction in Lower and Higher Animals	2.1 : Asexual reproduction in animals	
3. Inheritance and Variation	No topic is deleted from this chapter	
4. Molecular Basis of Inheritance	No topic is deleted from this chapter	
5. Origin and Evolution of Life	5.1 : Origin of life : (Protobiogenesis)	
	5.2 : Chemical evolution of life	
	5.3 : Organic evolution	
	5.4 : Darwinism	
	5.5 : Mutation theory	
	5.7 : Mechanism of organic evolution	
	5.8 : Hardy-Weinberg's principle	
	5.9 : Adaptive radiation	
	5.10 : Evidences of organic evolution	
	5.11 : Speciation	
	5.12 : Geological time scale	
	6. Plant Water Relation	6.4 : Absorption of water by roots from soil
6.5 : Water potential		
6.6 : Plasmolysis		
6.7 : Path of water across the root		
6.8 : Mechanism of absorption of water		
6.9 : Translocation of water		
6.10 : Transport of mineral ions		
6.11 : Transport of food		
6.12 : Transpiration		
6.13 : Structure of stomatal apparatus		
7. Plant Growth and Mineral Nutrition		7.1 : Plant growth
		7.2 : Phases of growth
	7.3 : Conditions of growth	
	7.4 : Growth rate and types of growth	
	7.5 : Growth curve	
	7.6 : Differentiation, dedifferentiation and redifferentiation	
	7.7 : Development	
	7.8 : Plasticity	
	7.10 : Photoperiodism	
	7.11 : Vernalization	
	7.12 : Mineral nutrition	
	7.13 : Nitrogen cycle	

8. Respiration and Circulation	8.5 : Modified respiratory movements
	Artificial ventilation, ventilator
	Angiography, heart transplant, silent heart attack
9. Control and Coordination	Reflex action and Chart 9.15 Types of reflex actions
	9.7 : Receptors
10. Human Health and Diseases	No topic is deleted from this chapter
11. Enhancement of Food Production	11.2 : Plant breeding
	11.3 : Tissue culture
	11.4 : Single cell protein
	11.6 : Animal husbandry
12. Biotechnology	No topic is deleted from this chapter
13. Organisms and Population	No topic is deleted from this chapter
14. Ecosystems and Energy Flow	14.1 : Ecosystem
	14.2 : Energy flow
	14.3 : Ecological pyramids
	14.4 : Nutrient cycles
	14.6 : Ecosystem services
15. Biodiversity, Conservation and Environmental Issues	15.7 : Environmental issues <ul style="list-style-type: none"> a. Air pollution and control measures b. Noise pollution and control measures c. Water pollution and its control, Thermal pollution, Measures to reduce sewage water, solid waste management
	15.8 : Greenhouse effect and global warming
	15.9 : Ozone depletion
	15.10 : Deforestation



BIOLOGY**Time : 3 Hours]****[Max. Marks : 70****General Instructions :**

1. Question paper consists of **31** questions divided into **FOUR** sections, namely **A, B, C** and **D**.
 - (1) **Section–A** : Q. No. 1 contains **10 multiple choice** type questions carrying **one mark** each.
Q. No. 2 contains **8 very short answer** type questions carrying **one mark** each.
 - (2) **Section–B** : Q. No. 3 to Q. No. 14 are **12 short answer–I** type questions carrying **two marks** each. Attempt any eight questions.
 - (3) **Section–C** : Q. No. 15 to Q. No. 26 are **12 short answer–II** type questions carrying **three marks** each. Attempt any eight questions.
 - (4) **Section–D** : Q. No. 27 to Q. No. 31 are **5 long answer** type questions carrying **four marks** each. Attempt any three questions.
2. Figures to the right indicate full marks.
3. Start each section on new page.
4. For each MCQ, the correct answer must be written along with its alphabet :
e.g., (a) / (b) / (c) / (d), etc.
5. Evaluation of each MCQ would be done for the first attempt only.

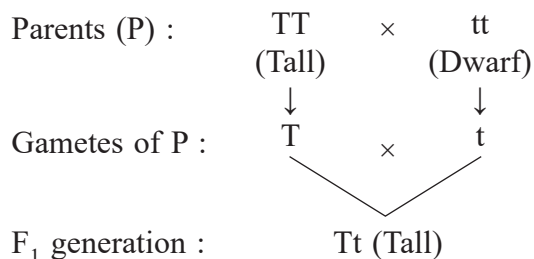
SECTION–A**Q. 1. Select and write the correct answer : [10]**

- (i) Which of the following types require pollination but result is genetically similar to autogamy?
(a) Geitonogamy (b) Xenogamy (c) Apogamy (d) Cleistogamy (1)
- (ii) Test tube baby technique is called
(a) In vivo fertilization (b) In situ fertilization
(c) In Vitro Fertilization (d) Artificial Insemination (1)
- (iii) A colour blind man marries a woman, who is homozygous for normal vision. The probability of their son being colour blind is
(a) 0% (b) 25% (c) 50% (d) 100% (1)
- (iv) Which one of the following pairs correctly matches a hormone with a disease resulting from its deficiency?
(a) Parathormone – Diabetes insipidus
(b) Luteinising hormone – Diabetes mellitus

- (c) Insulin – Hyperglycaemia
- (d) Thyroxine – Tetany (1)
- (v) Abscissic acid controls
- (a) cell division (b) leaf fall and dormancy
- (c) shoot elongation (d) cell elongation and wall formation (1)
- (vi) Diapedesis is performed by
- (a) erythrocytes (b) thrombocytes
- (c) adipocytes (d) leucocytes (1)
- (vii) After landslide which of the following type of succession occurs?
- (a) Primary (b) Secondary (c) Tertiary (d) Climax (1)
- (viii) is in direct contact of brain in humans.
- (a) Cranium (b) Dura mater (c) Arachnoid (d) Pia mater (1)
- (ix) Most commonly used substrate for industrial production of beer is
- (a) barley (b) wheat (c) corn (d) sugar cane molasses (1)
- (x) Choose an incorrect statement :
- (a) The relation between species richness and area for a wide variety of taxa turns out to be a rectangular hyperbola. (R)
- (b) The relation between species richness and area on a logarithmic scale, the relationship is a straight line.
- (c) For the species-area relationships among very large areas like the entire continents, the slope of the line appears to be much steeper.
- (d) Value of Z always keeps on changing for every taxonomic group or the region. (1)

Q. 2. Answer the following questions : [8]

- (i) What is hay fever? (1)
- (ii) Why is the genetic code considered as commaless? (1)
- (iii) Who are the main contributors of modern synthetic theory of evolution? (1)
- (iv) Give expanded forms of IAA and 2-4, D. (1)
- (v) Identify the type of cross given below. Give definition of the same. (1)



- (vi) Give examples of natural physical mutagens. (1)
- (vii) Define bio control. (1)
- (viii) Name the causative agent of the following :
- (a) Typhoid (b) Ringworm (1)

SECTION-B

Attempt any EIGHT of the following questions :

[16]

	Column A	Column B
Q. 3.	(1) Nutritive tissue of embryo (2) Remnants of nucellus in seed (3) Nutritive tissue of developing microspores (4) First photosynthetic organ of embryo	(a) Perisperm (b) Cotyledon (c) Endosperm (d) Tapetum

Q. 4. Classify the following components of semen given below as per Column 'A' and complete the Column 'B'. Select from the given options :

- (i) Acid phosphatase (ii) Prostaglandins (iii) Citric acid
(iv) Fructose (v) Fibrinogen

Column A	Column B
(1) Seminal fluid (2) Prostatic fluid	

Q. 5. Explain central dogma of molecular biology. (2)

Q. 6. Arrange the following stages of the human evolution in the order of their increasing cranial capacity.

- (a) Neanderthal man (b) Cro-Magnon man
(c) *Homo erectus* (d) *Homo habilis*. (2)

Q. 7. Sketch and label the structure of root hair. (2)

Q. 8. Where is water available for absorption by the roots? What is the meaning of combined water? (2)

Q. 9. Give functions of the following :

- (a) Bulbourethral glands (b) Bartholin's glands. (2)

Q. 10. Match the columns : (2)

Column I	Column II
(1) Auxin	(a) Bolting in rosette plants
(2) Cytokinin	(b) Stimulate flowering in SDP
(3) Gibberellins	(c) Promotion of growth of lateral buds
(4) Abscissic acid	(d) Apical dominance

Q. 11. Sketch and label histology of thyroid gland. (2)

Q. 12. Name the type of association seen in the following interactions :

- (1) Humming bird and host flowering plants
(2) Crow feeding the hatchling of koel
(3) Cattle egret with buffalo
(4) Tiger and deer (2)

Q. 13. Name eurythermal and stenothermal animals and plants. (2)

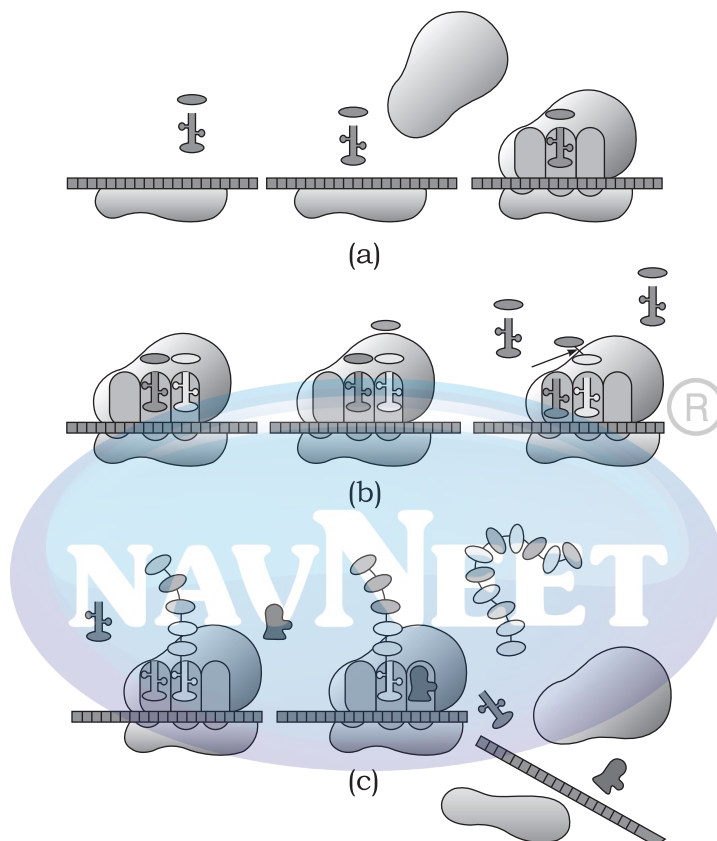
Q. 14. Distinguish between blood and lymph. (2)

SECTION – C

Attempt any EIGHT of the following questions : [24]

Q. 15. Distinguish between Proliferative phase and Secretory phase of menstrual cycle. (3)

Q. 16. Observe the given diagrams (a), (b) and (c) and answer the questions given below :



(1) Which step of protein synthesis is shown in the following diagrams?

(2) During initiation, which subunit of ribosome binds with m-RNA?

(3) What are the three binding sites for t-RNA on ribosomes?

(4) On which site of ribosome second and subsequent t-RNA arrives?

(5) Which link is binding amino acids in diagram (b)?

(6) Which chain is being released from ribosome in diagram (c)? (3)

Q. 17. Write a short note on *Homo habilis*. (3)

Q. 18. Give an account of any six applications of gibberellins. (3)

Q. 19. Name the gastrointestinal hormones and explain function of each in brief. (3)

Q. 20. Give reason : Healthy root nodules appear pink in colour. (3)

Q. 21. What are basic requirements of PCR technique? (3)

Q. 22. Complete the following table : (3)

Organism	Habitat	Respiratory surface/organ
1. Insects	Terrestrial	
2. Amphibian tadpoles of frog, salamanders		
3. Fish	Aquatic	
4. Reptiles, Birds and Mammals		

Q. 23. Give reason : Water is the molecule that connects physical world with biological processes. (3)

Q. 24. Explain the following terms with reference to ecological succession :
 (1) Seral stages (2) Pioneers (3) Hydrosere (3)

Q. 25. How does genetic diversity affect sustenance of species? (3)

Q. 26. Distinguish between inborn immunity and acquired immunity. (3)

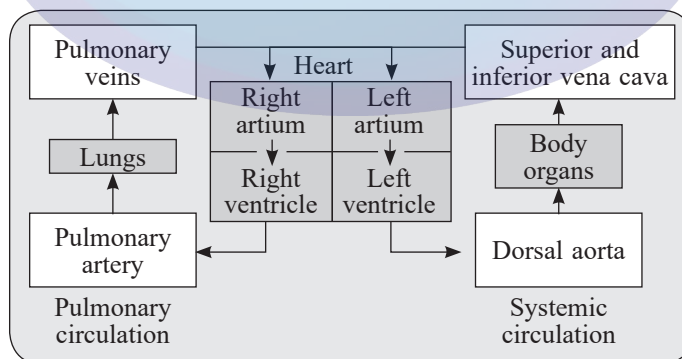
SECTION-D

Attempt any THREE of the following questions : [12]

Q. 27. Describe the structure of a mature anatropous ovule of a typical angiosperm plant with a neat labelled diagram. (4)

Q. 28. What is a dihybrid cross? Explain with suitable example and checker board method. (4)

Q. 29. Observe the diagrammatic representation of double circulation and answer the given questions.



(1) Why is the circulation shown in the above diagram called double circulation?

(2) What are the two main routes of double circulation?

(3) Which blood vessels carry oxygenated blood to heart and deoxygenated blood to lungs?

(4) Which blood vessels carry deoxygenated blood to heart and oxygenated blood to body organs? (4)

Q. 30. Give an account of structure of hindbrain. (4)

Q. 31. Enlist and write in brief about the different biological tools required in r-DNA technology. (4)

SECTION-A

Note : Each sub-question has four options. Select the most appropriate option (answer) to score full marks.

- Q. 1. (i) (a) Geitonogamy
- (ii) (c) In Vitro Fertilization
- (iii) (a) 0%
- (iv) (c) Insulin-Hyperglycaemia
- (v) (b) leaf fall and dormancy
- (vi) (d) Leucocytes
- (vii) (a) Primary
- (viii) (d) Pia mater
- (ix) (a) barley
- (x) (d) Value of Z always keeps on changing for every taxonomic group or the region.

(1 mark each for correct answer)

Note : Question no. 2 consists of very short answer questions and thus answers should be written in very brief or in one sentence only as possible.

Q. 2.

- (i) Hay fever is the allergic symptoms observed in people who are sensitive to pollen grains mainly of anemophilous plants.
- (ii) The triplet codon are arranged one after the other on m-RNA molecule without any gap or space and therefore genetic code is considered as commaless.
- (iii) R. Fischer, J. B. S. Haldane, T. Dobzhansky, Huxley, E. Mayr, Simpson, Stebbins, Fisher, Sewall Wright, Medel, T. H. Morgan, etc. are the main contributors of modern synthetic theory of evolution.
- (iv) IAA : Indole acetic acid.
2-4, D : 2,4-dichlorophenoxy acetic acid
- (v) This is a back cross.
Definition of Back cross : The cross of F_1 progeny with any of the parents, irrespective of being dominant or recessive is called back cross.
- (vi) Natural physical mutagens are high temperature, high concentration of CO_2 , X-rays, UV rays.
- (vii) Biocontrol is the natural method of eliminating and controlling insects, pests and other disease-causing agents by using their natural, biological enemies.
- (viii) (a) Salmonella typhi
(b) Trichophyton

(1 mark each for correct answer)

SECTION-B

Note : Match the columns and enter the answers in pairs.

- Q. 3.
- (1) Nutritive tissue of embryo - (c) Endosperm
 - (2) Remnants of nucellus in seed - (a) Perisperm
 - (3) Nutritive tissue of developing microspores - (d) Tapetum
 - (4) First photosynthetic organ of embryo - (b) Cotyledon

($\frac{1}{2}$ mark for the correct pair)

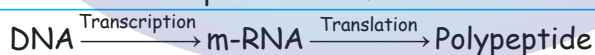
Note : Write the appropriate words to make the column 2.

- Q. 4.
- (1) Seminal fluid - Prostaglandins, Fructose, Fibrinogen
 - (2) Prostatic fluid - Acid phosphatase, Citric acid

(1 mark for each correct classification)

Note : Write what is central dogma, about its discoverers and give its graphic representation.

- Q. 5.
- (1) Central dogma of molecular biology was postulated by F.H.C. Crick in 1958. It is expressed as follows :



- (2) DNA gets transcribed to form m-RNA, m-RNA acts as a messenger and gets translated to form a polypeptide chain (protein) having specific amino acid sequence.
- (3) This unidirectional flow of information from DNA to RNA and from RNA to proteins is referred as central dogma of molecular biology.
- (4) Temin (1970) and Baltimore (1970) : Central dogma in retroviruses.



($\frac{1}{2}$ mark each for correct point)

Note : Arrange the stages of human evolution in proper order with reference to their increasing cranial capacity.

- Q. 6.
- (d) Homo habilis (650-800 cc)
 - (c) Homo erectus (850-1200 cc)
 - (a) Neanderthal man (1400 cc)
 - (b) Cro-Magnon man (1450 cc)

(2 marks for correct sequence)

Note : Sketch and label the diagram to show structure of root hair.

Q. 7.

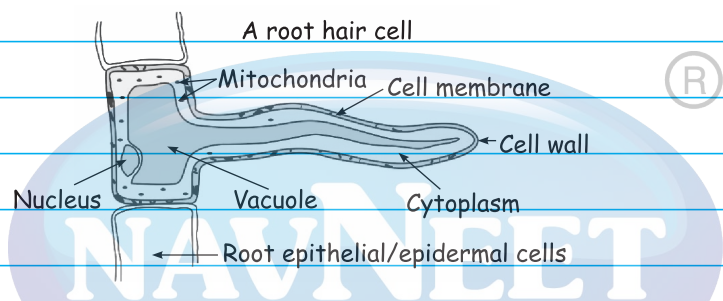


Fig. Structure of root hair

($\frac{1}{2}$ mark for correct drawing; $1 \frac{1}{2}$ marks for any three correct labelling)

Note : Write the correct answers having scientific terms. Add an answer giving meaning of combined water.

- Q. 8.
- (1) Water absorbed by the roots is present in their surrounding environment or rhizosphere.
 - (2) The water present in the form of hydrated oxides of silicon, aluminium, etc. which cannot be absorbed by roots is called combined water.

(1 mark each for the correct answer)

Note : Give one function each of both the glands.

- Q. 9. (a) Bulbourethral glands : Bulbourethral glands secrete alkaline, viscous mucus like fluid which provides lubrication during copulation.
- (b) Bartholin's glands : Bartholin glands secrete lubricating mucus like fluid which is released in vestibule.

(1 mark each for the correct function)

Note : Match the columns properly and rewrite the full answers.

- Q. 10. (1) Auxin - (d) Apical dominance
- (2) Cytokinin - (c) Promotion of growth of lateral buds
- (3) Gibberellins - (a) Bolting in rosette plants
- (4) Abscissic acid - (b) Stimulate flowering in SDP

($\frac{1}{2}$ mark each for the correct pair)

Note : Sketch the transverse section of thyroid gland. Add at least 3 correct labels.

Q. 11.

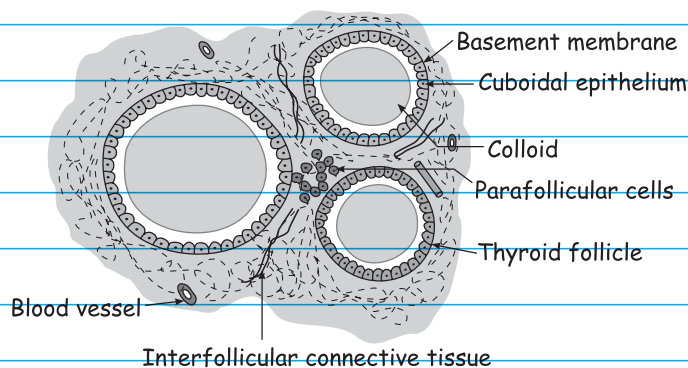


Fig. Histology of thyroid gland

($\frac{1}{2}$ mark for the correctly drawn diagram; $1\frac{1}{2}$ marks for three labels)

Note : Write name of interaction for each example with proper number.

- Q. 12. (1) Mutualism (2) Brood parasitism
(3) Commensalism (4) Predator and prey relationship

($\frac{1}{2}$ mark each for the correct answer)

Note : Write at least two examples of each eurythermal and stenothermal animals and plants.

- Q. 13. (1) Eurythermal animals : Goat, man, cow, crab, bivalves, etc.
(2) Stenothermal animals : Insects, reptiles, snakes, fishes, etc.
(3) Eurythermal plants : Roses, daisies, oak trees, some fruits and vegetables.
(4) Stenothermal plants : Croton, Bougainvillea, Frangipani, vines and orchids, some other fruits and vegetables.

($\frac{1}{2}$ mark each for the correct 2 examples of each category)

Note : Write any four points of distinction between blood and lymph.

Q. 14.	Blood	Lymph
	1. Contains blood plasma with proteins and all three types of blood cells namely RBCs, WBCs and blood platelets.	1. Contains blood plasma without blood proteins, RBCs and platelets and contains lymphocytes.
	2. Red in colour due to presence of RBCs.	2. Light yellow in colour and does not contain RBCs.
	3. Carries oxygen in the body.	3. Does not carry oxygen.
	4. The flow of blood in blood vessels is fast.	4. The flow of lymph in lymph capillaries is slow.
	5. Lymphocytes are present.	5. Lymphocytes are present, more in number than those present in the blood.

(Any 4 correct points of distinction - $\frac{1}{2}$ mark each)

SECTION-C

Note : Write six correct points of distinction between proliferative and secretory phase.

Q. 15.

Proliferative Phase	Secretory Phase
1. Proliferative phase begins with the repair of endometrium.	1. Secretory phase begins with ovulation.
2. Time required for proliferative phase is 5th to 13th day of menstrual cycle.	2. Time required for secretory phase is 15th to 28th day of menstrual cycle.
3. Proliferative phase always ends with ovulation.	3. Secretory phase ends with menstruation if egg is not fertilized. It continues further if egg is fertilized.
4. Proliferative phase is in uterus which coincides with follicular phase in ovary during which there is formation of Graafian follicle.	4. Secretory phase is in uterus which coincides with luteal phase in ovary during which there is formation of corpus luteum.
5. Proliferative phase is controlled by FSH from anterior pituitary.	5. Secretory phase is controlled by LH from anterior pituitary.
6. Hormone estrogen is secreted during this phase. It causes the development of blood vessels and thickening of endometrium of uterus.	6. Hormone progesterone is secreted during this phase. It causes further thickening and secretory activity of the glands of endometrium of uterus.

($\frac{1}{2}$ mark each for correct point)

Note : Write exact and correct answer for each question that is asked.

- Q. 16.
- (1) Translation
 - (2) 30S or 40S
 - (3) P site, A site and E site
 - (4) A site
 - (5) Peptide link
 - (6) Polypeptide chain

($\frac{1}{2}$ mark each for correct answer)

Note : Write any six correct points to describe characters of Homo habilis.

- Q. 17.
- (1) Homo habilis is described as Handy man. His fossils were obtained from Olduvai Gorge in Tanzania, Africa.
 - (2) He existed in late Pliocene or early Pleistocene about 2.5 to 1.4 million years ago.
 - (3) He was lightly built.
 - (4) Fossil of lower jaw was obtained which showed that his dentition was more like modern man with small molars.
 - (5) He walked erect. His cranial capacity was 640 to 800 cc.
 - (6) He did not eat meat and made stone tools.

($\frac{1}{2}$ mark each for correct point)

Note : Write six correct points.

- Q. 18.
- (1) Gibberellins break dormancy of bud, dormancy of seed.
 - (2) They promote seed germination in cereals by activating or synthesising enzyme amylase to produce sugar.
 - (3) Gibberellins induce elongation of the cells in stem hence increase in internode length is noticed.
 - (4) In rosette plants like cabbage it causes 'bolting', that is increase in internode length before flowering.
 - (5) Gibberellins are more effective in inducing parthenocarpy than auxins in plants like tomato, apple and pear.
 - (6) It is also used to increase fruit size and length of bunches in grapes.

($\frac{1}{2}$ mark each for correct point)

Note : Write names of gastrointestinal hormones and their functions

- Q. 19.
- (1) There are scattered endocrine cells in different parts of alimentary canal.
 - (2) These cells secrete four peptide hormones which are gastrin, secretin, cholecystokinin (CCK) and gastric inhibitory peptide (GIP).
 - (3) Gastrin stimulates gastric glands for the secretion of hydrochloric acid and pepsinogen.
 - (4) The secretin acts on exocrine pancreas and stimulates secretion of water and bicarbonate ions to form pancreatic juice.
 - (5) CCK acts on pancreas and gall bladder and stimulates the secretion of pancreatic enzymes and bile juice respectively.
 - (6) GIP inhibit gastric secretion and motility.

($\frac{1}{2}$ mark each for correct point)

Note : Write six correct points.

- Q. 20.
- (1) Rhizobium has symbiotic relationship with roots of leguminous plants.
 - (2) It infects root cortex and form root nodules.
 - (3) Root nodules are the site of nitrogen fixation.
 - (4) Enzyme nitrogenase which catalyzes nitrogen fixation, gets inhibited by oxygen.
 - (5) But root nodule contain a pigment called leghaemoglobin which acts as oxygen scavenger and protects nitrogenase from getting inhibited.
 - (6) Leghaemoglobin is pink in colour. Hence, healthy root nodules are pink in colour.

($\frac{1}{2}$ mark each for correct point)

Note : Write what is PCR technique and give its requirements.

- Q. 21.
- The basic requirements of PCR technique are as follows :
- (1) DNA containing the desired segment to be amplified.
 - (2) Excess of forward and reverse primers which are synthetic oligonucleotides of 17 to 30 nucleotide. They are complementary to the sequences present in DNA.
 - (3) dNTPs which are of four types such as dATP, dGTP, dTTP and dCTP.
 - (4) A thermostable DNA polymerase (e.g. Taq DNA polymerase enzyme) that can withstand a high temperature of 90-98°C.
 - (5) Appropriate quantities of Mg⁺⁺ ions.
 - (6) Thermal cycler, a device required to carry out PCR reactions.

($\frac{1}{2}$ mark each for correct point)

Note : Draw the table and enter all the correct words in it.

Q. 22.

Organism	Habitat	Respiratory surface/organ
1. Insects	Terrestrial	<u>Tracheal tubes and spiracles</u>
2. Amphibian tadpoles of frog, salamanders	<u>Aquatic</u>	<u>External gills</u>
3. Fish	Aquatic	<u>Internal gills</u>
4. Reptiles, Birds and Mammals	<u>Terrestrial</u>	<u>Lungs</u>

($\frac{1}{2}$ mark each for the correct word entered in blank)

Note : Write proper reasoning for the statement.

- Q. 23. (1) Water is an important constituent of cell. About 90 - 95% of protoplasm is water.
- (2) Water in liquid state is best solvent in which various minerals and food molecules are dissolved and transported.
- (3) Water acts as the thermal buffer has high specific heat.
- (4) Water molecules have high adhesive and cohesive forces of attraction.
- (5) It can rise in capillaries due to high surface tension and adhesive forces. e.g. Ascent of sap in plants.
- (6) Due to all these important factors it is a significant molecule connecting physical world with biological processes.

($\frac{1}{2}$ mark each for correct point)

Note : Write meaning of each term separately.

- Q. 24. (1) Seral stages : The developmental stages of the ecological succession are known as seral stages.
- (2) Pioneers : The organisms belonging to first seral stage in the ecological succession are known as pioneers.
- (3) Hydrosere : Hydrosere or hydrarch succession is a type of ecological succession which is determined by the amount of water available during succession. Hydrosere occurs when there is abundant water available in the area where organisms reside.

(1 mark each for correct answer)

Note : Write the correct answer about how the genetic diversity affects the sustenance of the species.

- Q. 25. (1) Genetic diversity develops the capability of the species to adapt to the varying changes in the environment.
- (2) The large variation of the different gene sets allows an individual or the whole population to have the capacity to endure environmental stress in any form.
- (3) Some individuals have, a better capacity to endure the increasing pollution in the environment whereas some do not have it.
- (4) Those that do not have show infertility or even death from the same conditions.
- (5) Those who are able to endure and adapt to this change survive and live in a better way.
- (6) This is called natural selection which leads to a loss of genetic diversity in particular habitats. Thus, genetic diversity, can affect sustenance of some species.

($\frac{1}{2}$ mark each for correct point)

Note : Write any six correct points of distinction between the inborn and acquired immunity.

Q. 26.

Inborn Immunity	Acquired Immunity
1. Inborn immunity or innate immunity is also called natural immunity.	1. Acquired immunity is also called adaptive immunity.
2. Innate immunity is present right from the birth.	2. Acquired immunity is not present at birth, but is acquired during lifetime of the individual.
3. Inborn immunity does not depend upon the previous exposure to a pathogen or foreign substance.	3. Acquired immunity always depends upon the previous exposure to a pathogen or foreign substance.
4. It is non-specific immunity as it can offer resistance to any pathogen.	4. It is specific immunity as it can offer resistance only to a particular pathogen.
5. Innate immunity consists of various types of barriers for defence against the pathogens.	5. Acquired immunity consists of various types of cells which are able to produce antibodies.
6. Inborn immunity shows immediate effect in the body.	6. Acquired immunity requires several days to become activated.
7. Inborn immunity is seen in all animals.	7. Acquired immunity is seen only in vertebrates.
8. Inborn immunity is genetic in nature and is heritable.	8. Acquired immunity is non-genetic in nature and is non-heritable.

(Any six correct points of distinction - $\frac{1}{2}$ mark each)

SECTION-D

Note : Draw structure of angiospermic mature anatropous ovule. Describe in details the structure of ovule.

- Q. 27. (1) The ovule which has a bent axis and downwardly directed micropyle is called anatropous ovule.

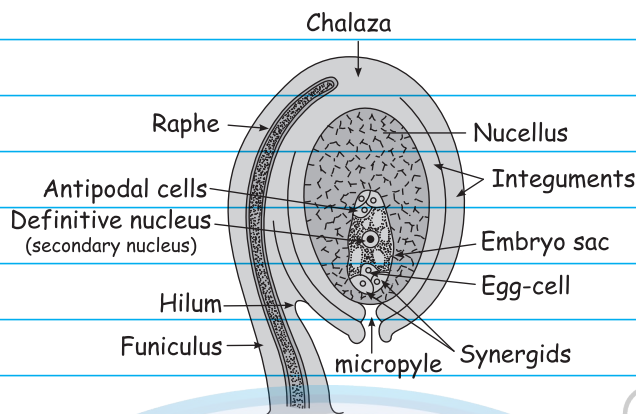


Fig. V.S. of an anatropous ovule

It is the most common type of ovule in angiosperms.

- (2) The matured anatropous ovule consists of two parts, viz., the stalk and the body. The stalk of the ovule is called the funicle or funiculus. The funicle attaches the ovule with the placenta.
- (3) The point at which the funicle is attached to the body of the ovule is called hilum.
- (4) Nucellus : It is made up of diploid parenchymatous cells.
The basal part of the nucellus is called chalaza.
The protective coverings of the nucellus are called integuments.
- (5) Micropyle : The integuments do not completely cover the nucellus. They leave a small opening called micropyle at the tip.
- (6) Embryo sac : In a mature ovule, the nucellus shows an oval-shaped structure towards its micropylar end called embryo sac or female gametophyte.

(Six important points - $\frac{1}{2}$ mark each; $\frac{1}{2}$ mark for the correct diagram; $\frac{1}{2}$ mark for the labelling.)

Note : Write description of dihybrid cross. Sketch the checkerboard and enter the correct details.

- Q. 28. (1) A cross which involves two pairs of alleles is called a dihybrid cross. A phenotypic ratio of 9 : 3 : 3 : 1 obtained in the F₂ generation of a dihybrid cross is called a dihybrid ratio.
- (2) Thus for example, when we cross a true breeding pea plant bearing round and yellow seeds with a true breeding pea plant bearing wrinkled and green seeds we get pea plants bearing round and yellow seeds in the F₁ generation.
- (3) When F₁ plants are selfed, we get a ratio of 9 : 3 : 3 : 1 in the F₂ generation, where 9 plants bear yellow round seeds, 3 plants bear yellow wrinkled seeds, 3 plants bear green round seeds and 1 plant bears green wrinkled seeds.

- (4) Parents (P₁) : RRYy × rryy
 Gametes of P₁ RY and ry
 F₁ generation : RrYy (Yellow round)
 On selfing F₁ : RrYy × RrYy
 Gametes of F₁ : RY, Ry, rY, ry
 P₂ generation :

	RY	Ry	rY	ry
RY	RRYY	RRYy	RrYY	RrYy
Ry	RRYy	RRyy	RrYy	Rryy
rY	RrYY	RrYy	rrYY	rrYy
ry	RrYy	Rryy	rrYy	rryy

Round Yellow : 9 Round green : 3

Wrinkled yellow : 3 Wrinkled green : 1

Phenotypic ratio : 9 : 3 : 3 : 1

Genotypic ratio : 1 : 2 : 1 : 2 : 4 : 2 : 1 : 2 : 1

(2 marks for correct completed checkerboard with appropriate result;

2 marks for description of dihybrid cross)

Note : Observe the diagram carefully and write answers to all the 4 questions.

- Q. 29. (1) During circulation, blood passes twice through the heart, therefore it is called double circulation.
- (2) (a) Pulmonary circulation which is from heart to lungs and back from lungs to heart.
(b) Systemic circulation which is from heart to body and back from all body organs to the heart.
- (3) Oxygenated blood is carried to the heart by pulmonary veins. Deoxygenated blood is carried to the lungs by pulmonary artery.
- (4) Deoxygenated blood is carried to heart by superior and inferior vena cavae. Oxygenated blood is carried to the body organs by systemic or dorsal aorta.

(1 mark each for the correct answer)

Note : Describe structure of hindbrain. Write about its parts and their respective functions.

- Q. 30. Structure of hindbrain :
- (1) Hindbrain includes cerebellum, pons varolii and medulla oblongata.
- (2) Cerebellum is 11% of the total brain and is the second largest part of the brain.
- (3) It has three lobes, median vermis and lateral two cerebral hemispheres. It has outer grey and inner white matter.
- (4) Cerebral cortex shows sulci and gyri. The inner white matter of cerebellar medulla shows arbor vitae or branching tree-like processes.
- (5) Pons is the part that connects the two cerebral hemispheres. It has outer white and inner grey matter. Pons is made up of nerve fibres which form bridges between cerebrum and medulla oblongata.
- (6) Medulla oblongata is the last part of the hindbrain which continues further as a spinal cord. It has outer white and inner grey matter.
- (7) Its roof shows posterior choroid plexus.
- (8) Eight pairs of cranial nerves arise from medulla oblongata.

($\frac{1}{2}$ mark each for correct point)

Note : Enlist three tools of r-DNA technology. Add description of each.

Q. 31. The biological tools used in r-DNA technology are various enzymes, cloning vectors and competent hosts.

(1) Enzymes :

(a) Enzymes like lysozymes, nucleases (exonucleases and endonucleases), DNA ligase, reverse transcriptase, DNA polymerase, alkaline phosphatases, etc. are used in r-DNA technology.

(b) The restriction endonucleases are used as biological or molecular scissors. They are able to cut a DNA molecule at a specific recognition site.

(2) Cloning Vectors :

(a) Cloning vectors are DNA molecules which carry foreign DNA segment and replicate inside the host cell.

(b) They may be plasmids, bacteriophages (M13, lambda virus), cosmid, phagemids, BAC (bacterial artificial chromosome), YAC (yeast artificial chromosome), transposons, baculoviruses and mammalian artificial chromosomes (MACs).

(c) Most commonly used vectors are plasmid vectors (pBR 322, pUC, Ti plasmid) and bacteriophages (lambda phage, M13 phage).

(3) Competent host cells :

(a) They are bacteria like *Bacillus haemophilus*, *Helicobacter pylori* and *E. coli*.

(b) Mostly *E. coli* is used for the transformation with recombinant DNA.

(1 mark for three tools of r-DNA technology;

3 marks for description of each tool)