

# Aryabhata Academy

## Std 12 : Biology

### Unit Test

**Chapters : 1,2**  
**Total Marks : 40**

Date : 24/04/24  
Time : 2 Hours

## Section A

- Choose correct answer from the given options. [Each carries 1 Mark] [14]



Column-I		Column-II	
(P)	Myometrium	(i)	External membrane of uterus
(Q)	Perimetrium	(ii)	Middle layer of uterus
(R)	Endometrium	(iii)	Innermost layer of uterus
(S)	Mons pubis	(iv)	Made up of fatty tissue

- (A) (P - i), (Q - ii), (R - iv), (S - iii)      (B) (P - ii), (Q - i), (R - iii), (S - iv)  
 (C) (P - ii), (Q - iii), (R - iv), (S - i)      (D) (P - iv), (Q - iii), (R - ii), (S - i)

9. Assertion-A : During 10-17 Days of Menstrual cycle couple should avoid sexual intercourse.

Reason-R : During 10-17 days of menstrual cycle there is maximum possibility of fertilization.

- (A) A and R both are true and R is true explanation of a.
- (B) A and R. Both are true but R is not correct explanation of a.
- (C) A is correct but R is wrong.
- (D) A is wrong and R is correct.

10. Match the following and choose the correct options :

Column - I		Column - II
(A) Trophoblast	(i)	Embedding of blastocyst in the endometrium
(B) Cleavage	(ii)	Group of cells that would differentiate as embryo
(C) Inner cell mass	(iii)	Outer layer of blastocyst attached to the endometrium
(D) Implantation	(iv)	Mitotic division of zygote

- (A) (A - ii) (B - i) (C - iii) (D - iv)
- (C) (A - iii) (B - i) (C - ii) (D - iv)

- (B) (A - iii) (B - iv) (C - ii) (D - i)
- (D) (A - ii) (B - iv) (C - iii) (D - i)

11. The membranous cover of the ovum at ovulation is

- (A) Corona radiata
- (B) Zona radiata
- (C) Zona pellucida
- (D) Chorion

12. Spot the odd one out from the following structures with reference to the male reproductive system

- (A) Rete testis
- (B) Epididymis
- (C) Vasa efferentia
- (D) Isthmus

13. Spermiation is the process of the release of sperms from

- (A) Seminiferous tubules
- (B) Vas deferens
- (C) Epididymis
- (D) Prostate gland

14. What is the function of filiform apparatus ?

- (A) Stigma recognizes proper/right pollen grain
- (B) It induces division of germinative cell
- (C) Produces nectar
- (D) It guides entry of pollen tube

### Section B

● Write the answer of the following questions. [Each carries 1 Mark]

[1]

1. Indicate the stages where meiosis and mitosis occur (1, 2 or 3) in the flow chart.

Megaspore mother cell  $\xrightarrow{1}$  Megaspores  $\xrightarrow{2}$  Embryo sac  $\xrightarrow{3}$  Egg

### Section C

● Write the answer of the following questions. [Each carries 2 Marks]

[8]

- 2. Why does the zygote begin to divide only after the division of Primary Endosperm Cell (PEC) ?
- 3. Give information about the structure and location of oviducts.
- 4. Describe the contraceptive techniques which are highly effective but with very poor reversibility.
- 5. In eukaryotes, explain splicing and tailing (figure is not necessary).

**Section D**

- Write the answer of the following questions. [Each carries 3 Marks] [9]
  - 6. Draw the diagram of a microsporangium and label its wall layers. Write briefly about the wall layers ?
  - 7. 'There is a paternity dispute for a child'. Which technique can solve the problem. Discuss the principle involved.
  - 8. Draw a diagrammatic sectional view of a seminiferous tubule in humans and label its parts. Explain it.

**Section E**

- Write the answer of the following questions. [Each carries 4 Marks] [8]
  - 9. Explain the process of spermatogenesis.
  - 10. Describe the structure of Megasporangium with a diagram.

**Aryabhata Academy****Std 12 : Biology****Unit Test**

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**Section [ A ] : 1 Mark MCQ**

No	Ans	Chap	Sec	Que	Universal_Queld
1.	C	Chap 1	S5	2	QP23P11B1214_P1C1S5Q2
2.	B	Chap 1	S5	6	QP23P11B1214_P1C1S5Q6
3.	B	Chap 1	S5	8	QP23P11B1214_P1C1S5Q8
4.	C	Chap 1	S5	9	QP23P11B1214_P1C1S5Q9
5.	A	Chap 1	S5	11	QP23P11B1214_P1C1S5Q11
6.	A	Chap 1	S5	14	QP23P11B1214_P1C1S5Q14
7.	B	Chap 1	S5	15	QP23P11B1214_P1C1S5Q15
8.	B	Board Paper	S1	7	QP23P11B1214_P3C6S1Q7
9.	A	Board Paper	S1	11	QP23P11B1214_P3C6S1Q11
10.	B	PAPER - 2	S1	11	QP23P11B1214_P2C2S1Q11
11.	A	PAPER - 2	S1	12	QP23P11B1214_P2C2S1Q12
12.	D	PAPER - 4	S1	41	QP23P11B1214_P2C4S1Q41
13.	A	PAPER - 4	S1	42	QP23P11B1214_P2C4S1Q42
14.	D	PAPER - 2	S1	4	QP23P11B1214_P2C2S1Q4

**Section [ B ] : 1 Marks Questions**

No	Ans	Chap	Sec	Que	Universal_Queld
1.	-	Chap 1	S6	5	QP23P11B1214_P1C1S6Q5

**Section [ C ] : 2 Marks Questions**

No	Ans	Chap	Sec	Que	Universal_Queld
2.	-	Chap 1	S7	8	QP23P11B1214_P1C1S7Q8
3.	-	PAPER - 4	S2	2	QP23P11B1214_P2C4S2Q2
4.	-	PAPER - 4	S2	4	QP23P11B1214_P2C4S2Q4
5.	-	PAPER - 2	S2	7	QP23P11B1214_P2C2S2Q7

**Section [ D ] : 3 Marks Questions**

No	Ans	Chap	Sec	Que	Universal_Queld
6.	-	Chap 1	S8	4	QP23P11B1214_P1C1S8Q4
7.	-	PAPER - 2	S2	20	QP23P11B1214_P2C2S2Q20
8.	-	PAPER - 2	S2	21	QP23P11B1214_P2C2S2Q21

Section [ E ] : 4 Marks Questions					
No	Ans	Chap	Sec	Que	Universal_Queld
9.	-	PAPER - 4	S2	23	QP23P11B1214_P2C4S2Q23
10.	-	PAPER - 4	S2	22	QP23P11B1214_P2C4S2Q22

## Aryabhata Academy

Chapters : 1,2

**Total Marks : 40**

Std 12 : Biology

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## Section A

- Choose correct answer from the given options. [Each carries 1 Mark] [14]

1. Embryo sac is to ovule as ..... is to an anther.

(A) Stamen                          (B) Filament                          (C) Pollen grain                          (D) Androecium

**Ans. (C) Pollen grain**

- Pollen grains represent as male gametophyte. As anther matures and dries up, microspores separate from each other and develop in pollen grain. So embryo sac is located in ovule and pollen grain are located in stamen.

2. During microsporogenesis, meiosis occurs in

**Ans. (B) Microspore mother cells**

- Along with development of stamen, pollen mother cells of male gametophyte cells perform meiosis and forms pollen tetrad. Pollen tetrad dries up with endothecium and releases in pollen grains.

- Endothecium is a layer located between epidermis and middle layer and it is made up of columnar cells.

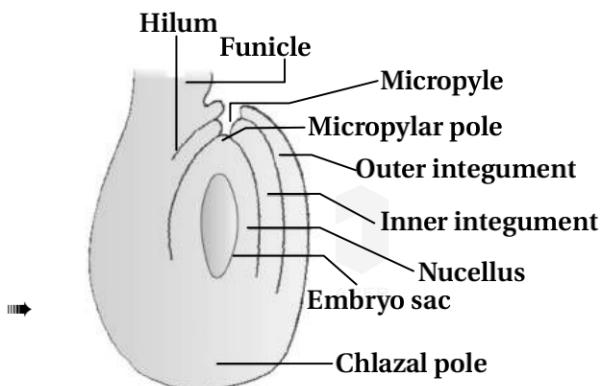
3. Starting from the innermost part, the correct sequence of parts in an ovule are

(A) egg, nucellus, embryo sac, integument      (B) egg, embryo sac, nucellus, integument

Ans. (B) egg, embryo sac, nucellus, integument

Starting from inner part of ovule, true sequence of parts of ovule is as follows :

Egg cell, embryo sac, nucellus, integument. It is shown in following figure.



## A diagrammatic view of a typical anatropous ovule

4. From the statements given below choose the option that are true for a typical female gametophyte of

(i) It is 8-nucleate and 7-celled at maturity.

(ii) It is free-nuclear during the development.

(iii) It is situated inside the integument but outside the nucellus.

(iv) It has an egg apparatus situated at the chalazal end.

**Ans. (C) i and ii**

- Female gametophyte or inside of embryo sac nucellus is covered by integuments. In most of the flowering plants one megasporangium remains active and remaining three degenerate – disintegrate. The nucleus of functional megasporangium divides three times one by one and forms 8-nucleate female gametophyte.
  - Thus out of 6 nuclei, six are arranged towards both the poles. Three nuclei get arranged at the end of micropyle and forms egg-apparatus and towards chalaza end three nuclei form antipodal cells. There are two nuclei in the large cell located in centre. It forms the large central cell.
  - Meiosis occurring in formation of embryo sac is strictly free nuclear, nuclear divisions are not followed immediately by cell wall formation. Gametophyte is located at the end of chalaza not at micropyle end.
5. Choose the correct statement from the following:
- Cleistogamous flowers always exhibit autogamy
  - Chasmogamous flowers always exhibit geitonogamy
  - Cleistogamous flowers exhibit both autogamy and geitonogamy
  - Chasmogamous flowers never exhibit autogamy

**Ans. (A) Cleistogamous flowers always exhibit autogamy**

- In open flowers, occurring of pollination is called chasmogamy. It is a commonly occurring pollination process in all types of flowers.
  - Chasmogamy is of two types means self fertilization and cross pollination. Cross pollination occurs in two types Geitonogamy and Xenogamy.
  - So it can be said that chasmogamous cleistogamous flowers show both self pollination and Allogamy. While in underground cleistogamous flowers stigma and anther are arranged tightly into closed flowers.
  - When anther dehisces into flowers bud pollen grain comes into contact with stigma, so effective pollination takes place. Thus it shows self fertilization in a way that flowers don't change. So there is no possibility of transfer of pollen grain on stigma by cross pollination.
6. In a fertilised embryo sac, the haploid, diploid and triploid structure are
- Synergid, zygote and primary endosperm nucleus
  - Synergid, antipodal and polar nuclei
  - Antipodal, synergid and primary endosperm nucleus
  - Synergid, polar nuclei and zygote.

**Ans. (A) Synergid, zygote and primary endosperm nucleus**

- (i) Synergid cells – Haploid
  - (ii) Polar nucleus cells – Haploid
  - (iii) Antipodal cells – Haploid
  - Since when these three cells (synergid cells, polar nucleus and antipodal cells) became functional megasporangium by mitosis, they are haploid(D)
  - (iv) Zygote – Diploid
    - Egg cell forms diploid zygote by male gamete through fertilization.
  - (v) Primary endosperm nucleus is a central cell having two polar nuclei. It gets converted into Triploid endosperm nucleus by male gamete through fertilization.
7. In an embryo sac, the cells that degenerate after fertilisation are
- Synergids and primary endosperm cell
  - Synergids and antipodal cells

(C) Antipodals and primary endosperm cell

(D) Egg and antipodals

**Ans. (B) Synergids and antipodals**

- In non fertilized embryo sac, Antipodal cells and synergid cells are clearly located near micropyle and chalaza respectively. While in fertilized embryo sac, antipodal cells and synergid cells are slowly destroyed after the formation of zygote.

**8. Match the column I with Column II :**

Column-I		Column-II	
(P)	Myometrium	(i)	External membrane of uterus
(Q)	Perimetrium	(ii)	Middle layer of uterus
(R)	Endometrium	(iii)	Innermost layer of uterus
(S)	Mons pubis	(iv)	Made up of fatty tissue

(A) (P - i), (Q - ii), (R - iv), (S - iii)

(B) (P - ii), (Q - i), (R - iii), (S - iv)

(C) (P - ii), (Q - iii), (R - iv), (S - i)

(D) (P - iv), (Q - iii), (R - ii), (S - i)

→ Ans : (B)

- 9. Assertion-A : During 10-17 Days of Menstrual cycle couple should avoid sexual intercourse.**

**Reason-R : During 10-17 days of menstrual cycle there is maximum possibility of fertilization.**

(A) A and R both are true and R is true explanation of a.

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(D) A is wrong and R is correct.

→ Ans : (A)

**10. Match the following and choose the correct options :**

Column - I		Column - II	
(A)	Trophoblast	(i)	Embedding of blastocyst in the endometrium
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(C)	Inner cell mass	(iii)	Outer layer of blastocyst attached to the endometrium
(D)	Implantation	(iv)	Mitotic division of zygote

(A) (A - ii) (B - i) (C - iii) (D - iv)

(B) (A - iii) (B - iv) (C - ii) (D - i)

(C) (A - iii) (B - i) (C - ii) (D - iv)

(D) (A - ii) (B - iv) (C - iii) (D - i)

→ Ans : (B)

- 11. The membranous cover of the ovum at ovulation is**

(A) Corona radiata

(B) Zona radiata

(C) Zona pellucida

(D) Chorion

**Ans. (A) Corona radiata**

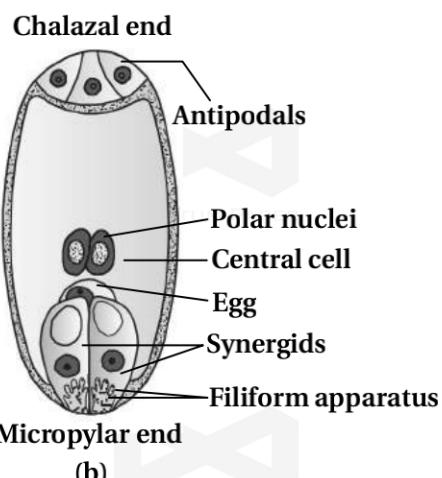
- Ovum internally surrounded by the transparent non cellular zona pellucida and outer side by thicker

coat called corona radiate.

- At the time fertilization first of all sperm comes in contact with corona radiata and zona pellucida through that it comes in contact with cytoplasmic membrane of ovum.
- 12. Spot the odd one out from the following structures with reference to the male reproductive system
  - (A) Rete testis
  - (B) Epididymis
  - (C) Vasa efferentia
  - (D) Isthmus
- Ans : (D)
- 13. Spermiation is the process of the release of sperms from
  - (A) Seminiferous tubules
  - (B) Vas deferens
  - (C) Epididymis
  - (D) Prostate gland
- Ans : (A)
- 14. What is the function of filiform apparatus ?
  - (A) Stigma recognizes proper/right pollen grain
  - (B) It induces division of germinative cell
  - (C) Produces nectar
  - (D) It guides entry of pollen tube
- Ans : (D)

### Section B

- Write the answer of the following questions. [Each carries 1 Mark] [1]
- 1. Indicate the stages where meiosis and mitosis occur (1, 2 or 3) in the flow chart.  
Megaspore mother cell  $\xrightarrow{1}$  Megaspores  $\xrightarrow{2}$  Embryo sac  $\xrightarrow{3}$  Egg
- Megaspore mother cell  $\xrightarrow{\text{Meiosis}}$  Megaspores  $\xrightarrow{\text{Mitosis}}$  embryo sac  $\xrightarrow{\text{Meiosis}}$  egg.
- Diploid megasporo mother cell ( $2n$ ) divides meiotically and produces four haploid mega spores. In activated megaspores it divides metotically for 3 times and a embryo sac having eight haploid nuclei is prepared. While other three megaspores are destroyed.
- Embryo sac is a structure having 7 celled and 8 nucleate. In which three nuclei, are located at the end of micropyle; three at the end of hilum and one cell is located in the middle.
- Cells near to micropyle combinely known as egg apparatus that contains two synergid cells and one egg cell.
- Three cells located towards hillum are antipodal cells and central cell, possese polar nuclei till fertilisation does not take place.



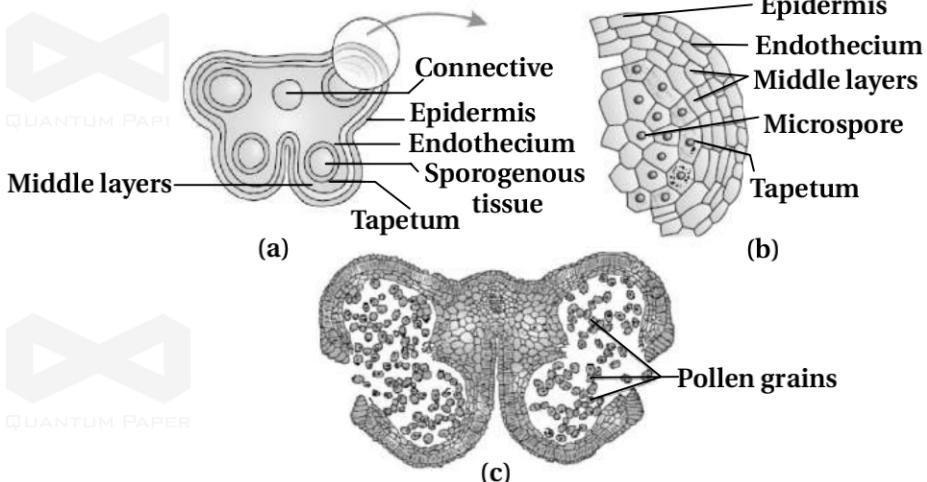
(b) A diagrammatic representation of the mature embryo sec.

### Section C

- Write the answer of the following questions. [Each carries 2 Marks] [8]
  - 2. Why does the zygote begin to divide only after the division of Primary Endosperm Cell (PEC) ?
    - Primary endosperm centre constantly divides and triploid endosperm tissue is produced. The cells of this tissue possess mass of stored food and it is used for nutrition of developing embryo.
    - Embryo develops at the end of micropyle where zygote is located. Many zygotes develop after becoming some amount of endosperm.
    - This is a type of adaptation where developing embryo gets nutrition in definite way.
  - 3. Give information about the structure and location of oviducts.
  - Try Yourself
  - 4. Describe the contraceptive techniques which are highly effective but with very poor reversibility.
  - Try Yourself
  - 5. In eukaryotes, explain splicing and tailing (figure is not necessary).
  - **Transcription of Eukaryotes :** In eukaryotes, there are two additional complexities :
    - (i) There are at least three RNA polymerases in the nucleus (in addition to the RNA polymerase found in the organelles).
      - There is a clear cut division of labour.
      - The RNA polymerase-I transcribes rRNAs (28S, 18S and 5.8S) whereas the RNA polymerase III is responsible for transcription of tRNA, 5 sr RNA and sn RNAs (small nuclear RNAs).
      - The RNA polymerase-II transcribes precursor of mRNA, the heterogenous nuclear RNA (hn RNA).
    - (ii) The second complexity is that the primary transcripts contain both the exons and the introns and are non-functional.
      - Hence, it is subjected to a process called splicing where the introns are removed and exons are joined in a defined order.
      - hnRNA undergoes additional processing called as capping and tailing.
      - In capping an unusual nucleotide (methyl guanosine triphosphate) is added to the 5' end of hnRNA.
      - In tailing, adenylate residues (200-300) are added at 3'-end in a template independent manner.
      - It is the fully processed hnRNA now called mRNA, that is transported out of the nucleus for translation.

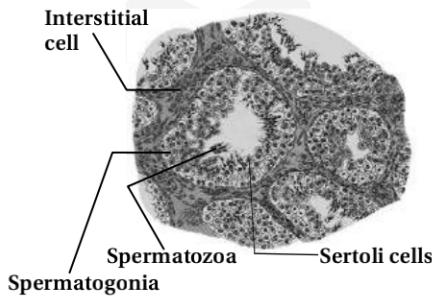
### Section D

- Write the answer of the following questions. [Each carries 3 Marks] [9]
  - 6. Draw the diagram of a microsporangium and label its wall layers. Write briefly about the wall layers ?



(a) Transverse section of a young anther (b) Enlarged view of one microsporangium showing wall layers (c) A mature dehisced anther

- In a transverse section, a typical microsporangium appears near circular in outline. It is surrounded by four wall layers which are shown below :
  - (A) **Epidermis** : It is the outer most protective layer. It is made up of flat cells surrounded by it. Cells are arranged tightly and their wall is thick. It helps at the time of dehiscence of anther.
  - (B) **Endothecium** : It is located below the epidermis. It is radially pulled by flowers thickening at maturity. They lose water and shrink and helps in dehiscence of anther.
  - (C) **Layers of the wall** : They are fibrous layer located between Endothecium and Tapetum. They are thin walled located in one to five layers. They also help in dehiscence of anther.
  - (D) **Tapetum** : It is the inner most layer of layers of the wall. It has large, thin cell wall, thick cytoplasm and more than one nuclei. It is a nutrition layer. It nourishes the developing pollen grain.
  - In the centre of microsporangium there are compactly arranged homogenous cells which is called sporogenous tissue. The cells of sporogenous tissue undergo meiotic divisions to form microspore tetrads. This method/process is known as microsporogenesis.
7. 'There is a paternity dispute for a child'. Which technique can solve the problem. Discuss the principle involved.
- DNA finger printing is used to solve the paternity dispute. DNA fingerprinting involves identifying differences in some specific regions in DNA sequence called as repetitive DNA, because in these sequences, a small stretch of DNA is repeated many times. These repetitive DNA are separated from bulk genomic DNA as different peaks during density gradient centrifugation.
  - The bulk DNA forms a major peak and the other small peaks are referred to as satellite DNA. Depending on base composition (A : T rich or G : C rich), length of segment, and number of repetitive units.
  - The satellite DNA is classified into many categories, such as micro-satellites, mini-satellites etc. These sequences normally do not code for any proteins, but they form a large portion of human genome.
  - These sequence show high degree of polymorphism and form the basis of DNA fingerprinting. Since DNA from every tissue (such as blood, hair- follicle, skin, bone, saliva, sperm etc.), from an individual show the same degree of polymorphism, they become very useful identification tool in forensic applications. Further, as the polymorphisms are inheritable from parents to children, DNA fingerprinting is the basis of paternity testing, in case of disputes.
8. Draw a diagrammatic sectional view of a seminiferous tubule in humans and label its parts. Explain it.
- **Seminiferous tubules** : Each testis has about 250 compartments called testicular lobules.



Diagrammatic sectional view of  
seminiferous tubule

- Each lobule contains one to three highly coiled seminiferous tubules in which sperms are produced.
- Each seminiferous tubule is lined on its inside by two types of cells called male germ cells and sertoli cells.
- The male germ cells undergo meiotic divisions finally leading to sperm formation. Sertoli cells provide nutrition to the germ cells.
- The region outside the seminiferous tubules called interstitial spaces contain small blood vessels are interstitial cells of leydig cells.
- Leydig cells synthesize and secrete testicular hormones called androgens. Other immunologically competent cells are also present.

#### Section E

- Write the answer of the following questions. [Each carries 4 Marks] [8]
  - 9. Explain the process of spermatogenesis.
  - Try Yourself
  - 10. Describe the structure of Megasporangium with a diagram.
  - Try Yourself