

# 3

## HOW DO ORGANISMS REPRODUCE

### 3.1 Introduction

### 3.2 Mode of Reproduction used by single organisms

### 3.3 Sexual Reproduction in Plants

### 3.4 Reproduction in Human Beings

### 3.1 INTRODUCTION

It is a process by which living organism produces young ones of their own kind and species:

Reproduction may be

- (i) Sexual
- (ii) Asexual

#### Question based on basic knowledge required to understand this chapter

1. Reproduction in Bryophyllum takes place by :
  - (A) root
  - (B) stem
  - (C) leaf
  - (D) none of the above
2. Other term for tissue culture is:
  - (A) callus
  - (B) micropropagation
  - (C) sporulation
  - (D) none of the above
3. In roses, the most common method used to produce new plants is:
  - (A) layering
  - (B) tissue culture
  - (C) cutting
  - (D) none of the above
4. Causal organism of AIDS is
  - (A) Trypanosoma
  - (B) Bacteria
  - (C) Human immuno deficiency virus
  - (D) All of these
5. Pollination by bats is called:
  - (A) cheiropterophily
  - (B) ornithophily
  - (C) malacophily
  - (D) entomophily
6. Flowers which are pollinated by insects are:
  - (A) colourless
  - (B) small in size
  - (C) coloured and scented
  - (D) very large in size
7. Self pollination can be found in
  - (A) Unisexual flower
  - (B) Bisexual flower
  - (C) Male flower
  - (D) None
8. Menopause is the stage in human female when:
  - (A) menstruation starts

(B) puberty begins

(C) menstruation stops and reproductive capacity is arrested

(D) none of the above

9. Gestation period is the duration:

(A) of fertilization

(B) between egg growth and ovulation

(C) between fertilization and parturition

(D) none of the above

10. The diploid number of chromosomes is restored in an organism by the process of:

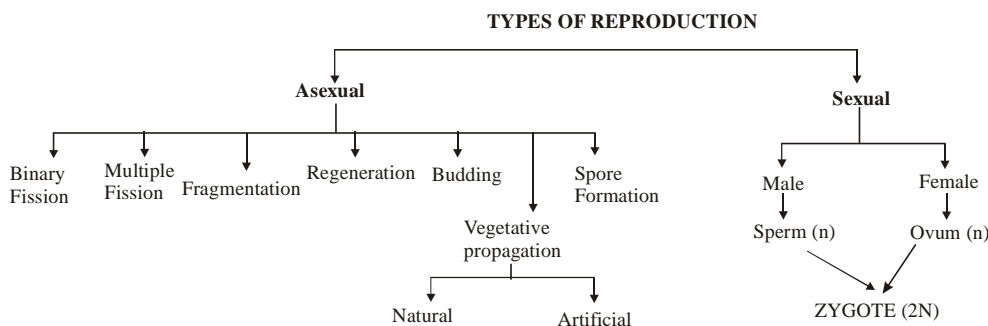
(A) spermatogenesis

(B) fertilization

(C) oogenesis

(D) reductional division.

### 3.2 MODE OF REPRODUCTION USED BY SINGLE ORGANISMS



(i) **Binary Fission:** Unicellular animals (Binary means two)

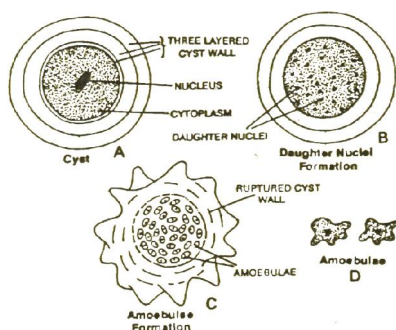
Nucleus stretch and divides followed by division of *cytoplasm*.

(a) **BINARY FISSION IN AMOEBIA**

When amoeba has reached to its maximum size of growth, the nucleus of amoeba stretch and divides into two. After that the cytoplasm of amoeba divides into two part, one part around each nucleus. Other ex. of Binary fission is seen in Leishmania (which causes Kala-azar)

(ii) **Multiple fission:- (many daughter)**

Occurs in unfavourable condition organisms secretes thick wall, nucleus show rapid mitotic division and produces many daughter nuclei. Multiple division is found in Plasmodium (causes malaria)



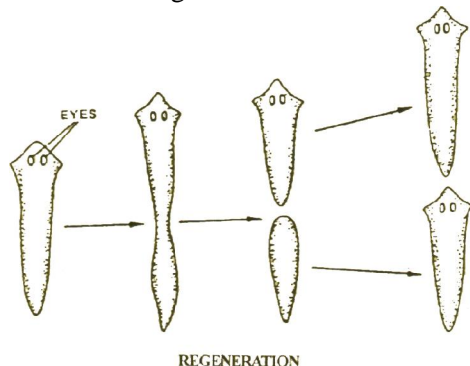
(iii) **FRAGMENTATION**

It is mode of reproduction seen in those multicellular organism where cell differentiation is absent.

Ex - Spirogyra.

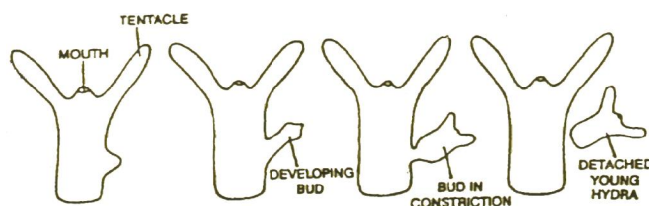
**(iv) REGENERATION**

The process of getting back the full organism from its body part is called regeneration. Or in other words, it may be described as the power to restore lost tissues, organ or the whole body. Seen in fully differentiated organism. Ex- Planaria.

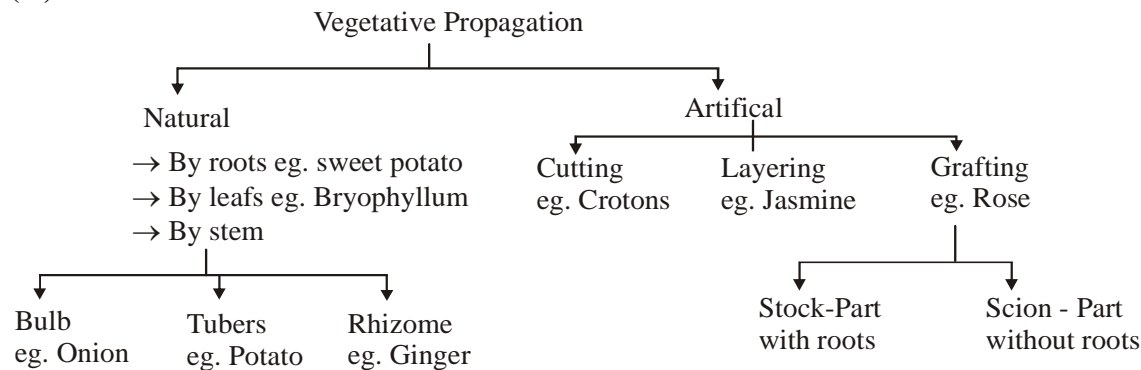


**(v) BUDDING**

In this process, a daughter organism is formed from a small projection, the bud, which arises as an outgrowth from the parent body. Ex.- Hydra.

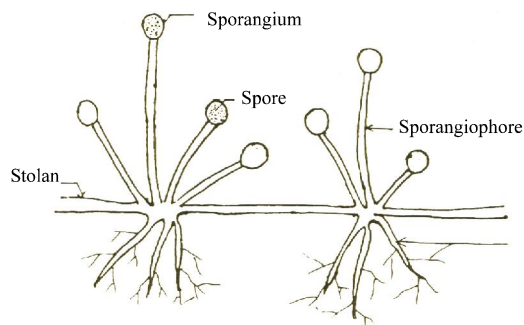


**(vi) VEGETATIVE PROPAGATION**



**(vii) SPORE FORMATION**

In this process, the parent plant produces hundred of tiny spores which can then produce new plants. Ex.-Rhizopus.



**Micropropagation/Tissue culture****Tissue culture**

The process is used to obtain desired variety of plant the production of new plant from isolated plant cell or small piece of plant tissue in a synthetic media, is called as tissues culture process.

**3.2.1 Various Steps Involved in Tissue Culture**

(i) Plant cell + Synthetic media (sterile condition)



Callus (mass of cells)

(ii) Callus + (2nd) medium (containing plant hormones that promote rooting)



development of roots

(iii) Callus with roots + (3rd) media (containing plant hormones which stimulate shoot development)



Callus having root and shoot (develop into tiny plantlets)



(iv) Plantlets are then transplanted into pots or soil.

Ex. Orchids, Dahlia can be grown by micropropagation

**Try yourself**

- DNA is
 

(A) Deoxyribonucleic acid	(B) Deoxynucleic acid
(C) Dioxribonucleic acid	(D) Dioxynucleic acid
- During cell division
 

(A) Nucleus simply splits	(B) Nuclear material replicate and then nucleus divide
(C) DNA reduction take place	(D) None of these
- Niches is
 

(A) an organism that reproduce quickly	(B) Marshy area with no organism.
(C) a type of reproduction	(D) a well defined place in the ecosystem.
- Amoeba is a
 

(A) Bacteria	(B) Fungus	(C) Protozoan	(D) None
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- Importance of variation can be seen when
 

(A) Common cold virus infects us
(B) Only few bacteria's is survive in unfavourable condition.
(C) Roses are of different colour
(D) All of these

**3.3 SEXUAL REPRODUCTION IN PLANTS**

Sexual Reproduction is also called **Amphimixis** Asexual Reproduction is also called **Apomixis**.

The males produce 'Male Gamete' also called '**Sperm**'.

The females produce 'female gamete' also called '**Egg**'.

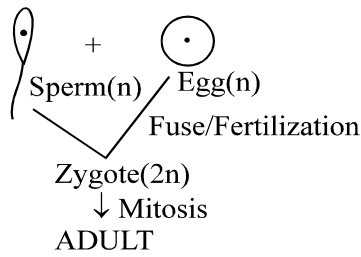
Both Gametes are haploid(n)

(Haploid → Possess half set of chromosomes)

Fertilization can be divided in following steps

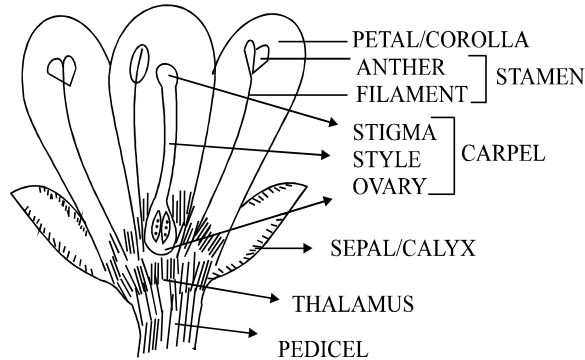
(i) **Pre-fertilization:** Sperm is formed in male plant and ovum in female plant.

(ii) **Fertilization:** Male nuclei fuse with nuclei of egg, (after they come together by pollination)

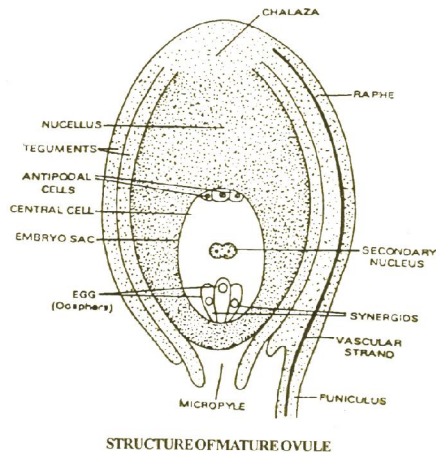


(iii) **Post-fertilization:** After fertilization following changes occurs.  
 Ovule– Seed,                      Ovary–Fruit

**IMPORTANT DIAGRAMS**



**FIGURE-1: PARTS OF FLOWER**

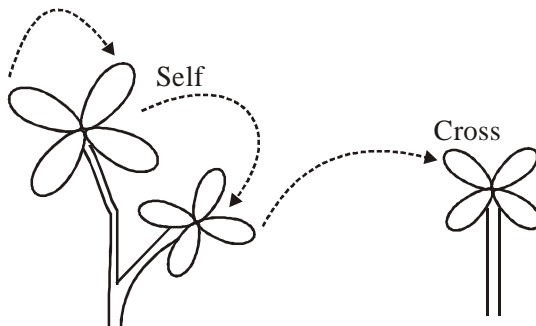
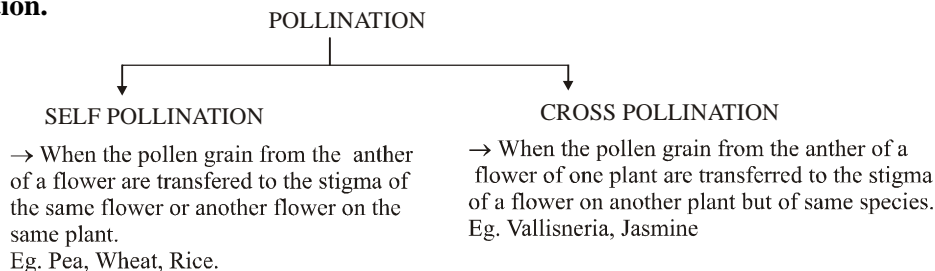


**FIGURE-1: TYPICAL OVULE**

**Egg Apparatus = 2 Synergids + 1 Egg**

### 3.3.1 Pollination

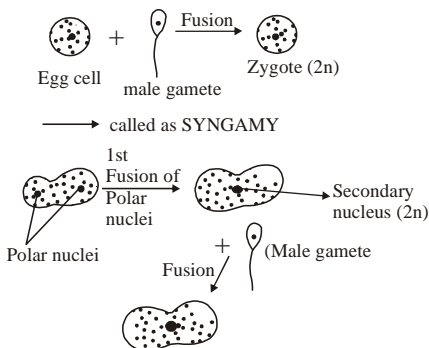
The transfer of a **Pollen grain** from the **anther** of a **stamen** to the **stigma** of the **carpel** is called **pollination**.



#### AGENCIES HELPING IN CROSS-POLLINATION

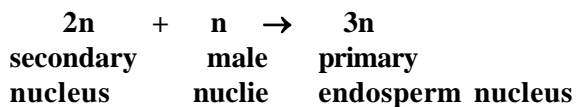
- (I) Pollination by Wind c/a ANEMOPHILY
- (II) Pollination by Water c/a HYDROPHILY
- (III) Pollination by Insects c/a ENTOMOPHILY
- (IV) Pollination by Birds c/a ORNITHOPHILY
- (V) Pollination by Bats c/a CHIROPTEROPHILY

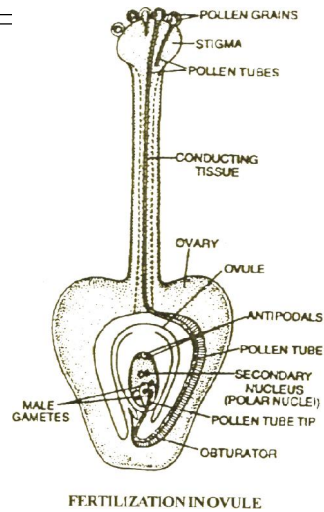
#### FERTILIZATION



#### PRIMARY ENDOSPERM NUCLEUS

Since fertilization occurs twice in angiosperm (Syngamy + Triple fusion) it is known as **Double fertilization**. Triple fusion is termed used to denote.





### “FERTILIZATION IN ANGIOSPERM”

#### 3.3.2 Chart of Fertilization in Plants

POLLEN GRAINS (has Two Male gamete)



Falls on Stigma



Pollen Tubes moves Downward through the style



Pollen Tube Reaches to Ovary where Ovules are Present



Usually enters through Micropyle. (The Male Gametes Enters The Ovule).



One Male gamete fuses with Egg: **SYNGAMY**



Another male gamete fuses with secondary nucleus and form **Primary Endosperm Nucleus (3n)**.

**Triple Fusion**

“**SYNGAMY + TRIPLE FUSION**” c/a **DOUBLE FERTILIZATION**.

#### *Try yourself*

6. Organism having whip like structure at one end of the cell is  
 (A) Amoeba                      (B) Leishmania                      (C) Plasmodium                      (D) Yeast
7. Double fertilization is seen in  
 (A) Dicot                      (B) Monocot                      (C) Both                      (D) All type of plants
8. Undifferentiate group of cell formed during tissue culture  
 (A) Plantlets                      (B) Culture                      (C) Callus                      (D) Callose
9. Plant reproducing through leaf  
 (A) Bryophyllum                      (B) Lotus                      (C) Hydra                      (D) None of these
10. The thread like structures that develop on the bread if left in moist damp place is  
 (A) Tentacle                      (B) Buds                      (C) Notches                      (D) Hyphae

### 3.4 REPRODUCTION IN HUMANS BEINGS

(1) **Male:**



(2) **Female:**

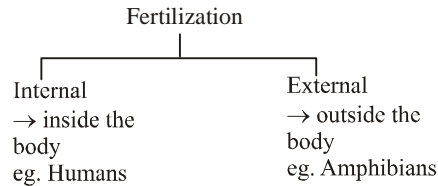


(3) **Zygote:** sperm x ova (Fertilization)

↓ Mitosis

Embryo

(4) **Fertilization**

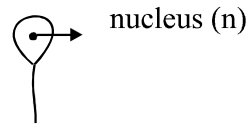


(5) **Unisexual** → Only one kind of Reproductive organ in one organism of humans male/female.

(6) **Bisexual** → both Reproductive organ present in one organism of earthworm.

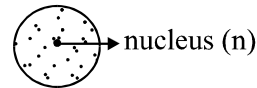
(7) **STEPS OF SEXUAL REPRODUCTION**

(1) Male Parent Produces Sperm (meiosis)



Small cell with a larg tail/flagella for movement.

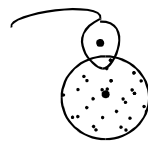
(2) Female Parent Produces Ovum



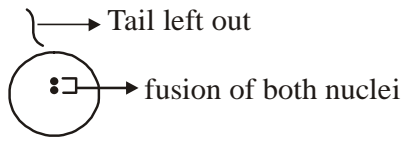
The Ovum is having a lot of Cytoplasm.

(3) Sperm enters into the Ovum and fuses with it to form a new cell c/a Zygote.

This process is c/a Fertilization.



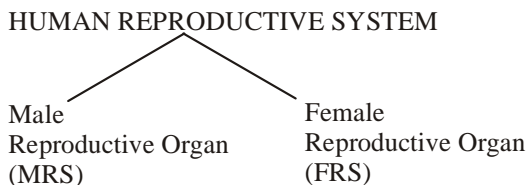
Sperm entering ovum



Zygote

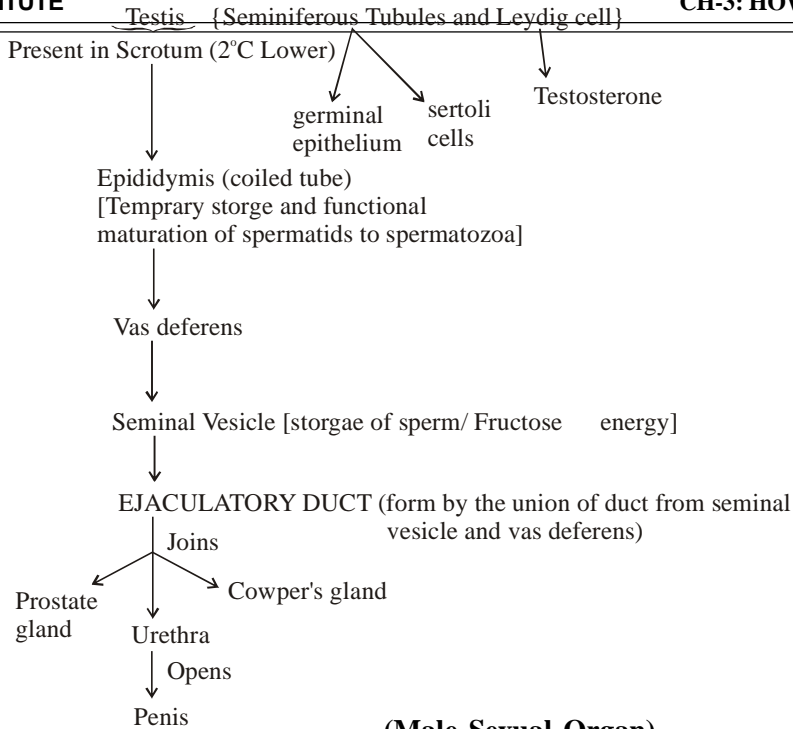
(4) The Zygote then divides by Mitosis to form large no of cells. Ultimately zygote grows and develops to become a new body.

(8) **HUMAN REPRODUCTIVE SYSTEM**

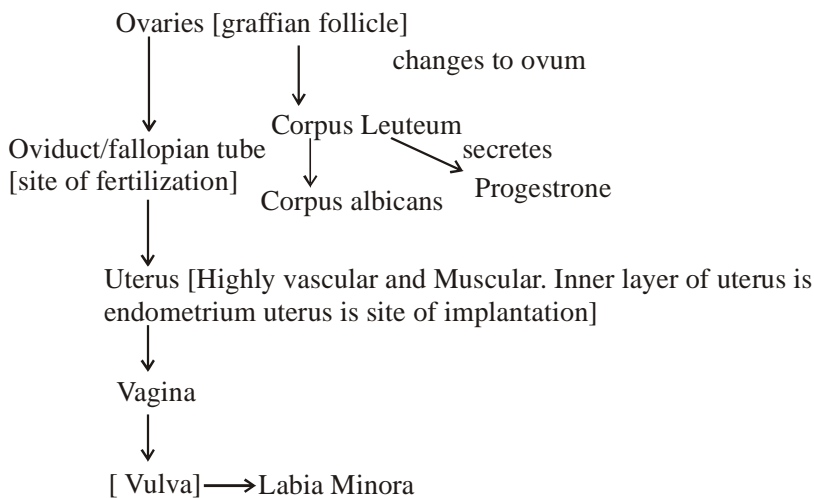


(9) **MRS**





**(10)FRS**



**Note:** Vulva is external part of female genitalia. It comprise of labia minora, labia majora, pubis and glands

**(11) GAMETOGENESIS (formation of Gametes)** – Occur in Primary sex organ i.e. tests (in male) & ovaries (in females)

**(12)SEXUAL CYCLE IN HUMAN FEMALE**

In ovaries of female 1000 of immature ova are present which are contained in immature follicles.

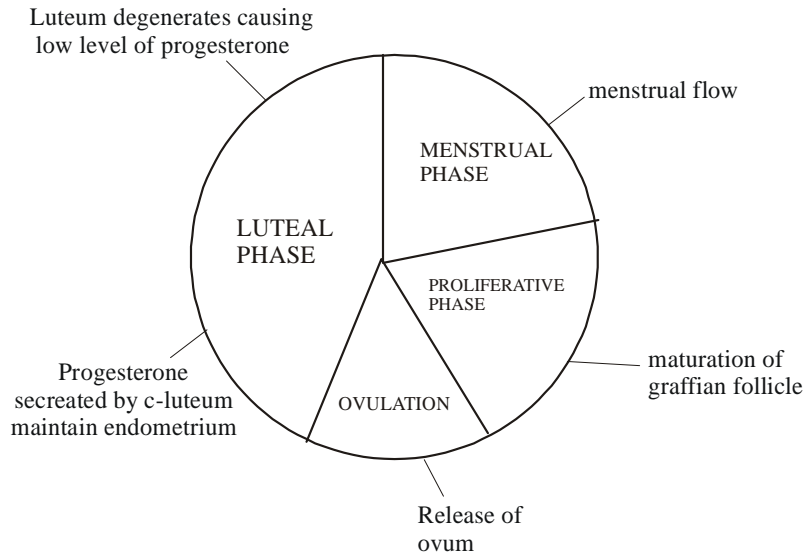
When girls reaches puberty, then one follicle develops at a time to form a mature ovum. On maturation, the follicle bursts and the ovum shoots out of the ovary. This is called OVULATION or in other words the release of an ovum (or egg) from an ovary is called ovulation.

Ovulation takes place on 14 days of the begining of MENSTRUAL CYCLE of 28 days.

In human females the ovaries start realising ovum or egg once in every 28 days from the age of puberty.

**MENSTRUATION:** The break down and removal of the inner, thick and soft lining of the uterus along with its blood vessels in the form of a vaginal bleeding is called MENSTRUAL cycle or MENSTRUATION.

**SEXUAL CYCLE IN FEMALE**



→ 4 Phases

(i) Menstrual Phase: (c/a funeral of unfertilized egg or shedding tears of Lost Ovum.

→ Phase of menstrual flow

→ discharge of blood, blood clots, cell debris etc.

1<sup>st</sup> day of menstrual phase is also considered the 1<sup>st</sup> day of menstrual cycle.

→ Sudden Red<sup>n</sup> in Oestrogen & Progesterone level

(ii) Proliferative Phase:

→ 6 to 13 day

→ Proliferation occurs in endometrium and development of Glands (uterine)

→ Occur in control of oestrogen.

So c/a oestrogen phase

(iii) Ovulation / Ovulatory Phase:

→ Ovulation occurs during this phase

→ High level of leutinizing hormone causes the ovulation.

→ Ovulation occur on 14 day.

Ovum remain viable for 48 hours.

(iv) Luteal Phase / under Progesterone secretory Phase: (by corpus leutem)

→ Progesterone stimulates the uterine gland to produce increased amount of mucus.

Corpus Luteum → 7 days viable so secrete progesterone.

Low level of oestrogen & Progesterone causes menses.

e.g. Man, Apes etc.

### (13) Fertilization (Internal)

2-3 ml semen → 300 million of sperm is discharged into vagina by penis.

sperm fuse with ovum

↓

Zygote  $\xrightarrow{\text{Mitosis}}$  Foetus (implants in Uterus)

(1) Stoppage of Menstrual cycle after implantation

(2) formation of Placenta

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## *EXERCISE-I*

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1. Define reproduction.
2. How does asexual reproduction differ from sexual reproduction?
3. Define totipotency.
4. What is the function of Leydig cells?
5. Define spermatogenesis.
6. Define oogenesis.
7. What is semen?
8. Define tissue culture.
9. What is syngamy?
10. Define menopause.
11. Mention any two functions of human ovary.
12. What is the requirement for sexual reproduction?
13. Name two non-reproductive parts of the flower.
14. What is the function of fallopian tubes?
15. What is implantation?
16. What is menarche?

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## *EXERCISE-II*

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1. Name various types of asexual reproduction. Explain any two.
  2. Distinguish between fission and budding.
  3. Which part of the following plants help in vegetative propagation:  
(a) Sweetpotato (b) Bryophyllum (c) Onion?
  4. Explain various types of pollination.
  5. How is zygote formed?
  6. How is AIDS transmitted?
  7. What is pollination? Explain cross pollination.
  8. Fertilization is possible if copulation has taken place during middle of the menstrual cycle. Give reason.
  9. Distinguish between binary and multiple fission.
  10. Why is sexual reproduction necessary for evolution?
  11. Explain the terms implantation and placenta.
  12. Why is cross pollination preferred over self pollination?
  13. Define triple fusion. What is the product of this process?
  14. What is ovulation? What is formed from the Graffian follicle after ovulation?
  15. Discuss the role of hormones in the process of reproduction.
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## ***EXERCISE-III***

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### SECTION-A

● **Fill in the blanks**

1. In \_\_\_\_\_ a bud develops as an outgrowth due to repeated cell division at one specific site.
2. After fertilisation the \_\_\_\_\_ divides several times to form an embryo within the ovule.
3. The sperm formed in testes are delivered through the \_\_\_\_\_ which unites with a tube coming from urinary bladder.
4. Child sex ratio is declining at an alarming rate in some sections of our society, due to female \_\_\_\_\_.
5. Chromosomes in the nucleus of a cell contain information for inheritance of features from parents to next generation in the form of \_\_\_\_\_.

### SECTION-B

● **Multiple choice question with one correct answers**

1. Multiple fission is found in:  
(A) Amoeba                      (B) Plasmodium                      (C) Both                      (D) None
2. Synergids are:  
(A) haploid                      (B) diploid                      (C) triploid                      (D) tetraploid
3. Fertilization in angiosperms is the:  
(A) fusion of two dissimilar flowers                      (B) union of stamens of unequal length  
(C) fusion of dissimilar gametes                      (D) fusion of two similar spores.
4. Syngamy refers to:  
(A) fusion of one of the sperms with secondary nucleus  
(B) fusion of one of the sperms with the egg  
(C) fusion of one of the sperms with the egg and other with the secondary nucleus  
(D) fusion of one of the sperms with synergids.
5. Cowper's glands are present in:  
(A) female mammals                      (B) male mammals                      (C) both (A) and (B)                      (D) none of the above
6. When a mature egg leaves the ovary, it enters the:  
(A) follicle                      (B) endometrium                      (C) interstitial cells                      (D) oviduct
7. The endometrium is the lining of :  
(A) bladder                      (B) vagina                      (C) uterus                      (D) oviduct
8. Progesterone hormone is produced by:  
(A) germinal epithelium of ovary                      (B) follicular cells  
(C) corpus luteum                      (D) none of the above
9. After ovulation, endocrine part of the ovary is:  
(A) corpus callosum                      (B) corpus albicans                      (C) corpus spongiosum                      (D) corpus luteum

10. Inner lining of uterus is  
 (A) Myometrium (B) Perimetrium (C) Endometrium (D) All of these
11. Which of the following is the correct sequence of hormonal increase beginning from menstruation?  
 (A) Estrogen, progesterone, FSH (B) FSH, progesterone, estrogen  
 (C) FSH, estrogen, progesterone (D) estrogen, FSH, progesterone.

### SECTION-C

• **Multiple choice question with one or more than one correct answers**

1. Asexual reproduction takes place through budding in  
 (A) Amoeba (B) Yeast (C) Hydra (D) Plasmodium
2. Stamen contains  
 (A) Anther (B) Filament (C) Pollens (D) Carpel
3. Which of them are a type of fertilization  
 (A) Syngamy (B) Triple fusion (C) Apomixis (D) Tissue culture
4. Following is a contraceptive  
 (A) Copper-T (B) Condom (C) Diaphragm (D) Ovulation
5. Agents of cross pollination are  
 (A) Air (B) Water (C) Insect (D) Animals

### SECTION-D

• **Assertion & Reason**

Instructions: In the following questions as Assertion (A) is given followed by a Reason (R). Mark your responses from the following options.

- (A) Both Assertion and Reason are true and Reason is the correct explanation of 'Assertion'  
 (B) Both Assertion and Reason are true and Reason is not the correct explanation of 'Assertion'  
 (C) Assertion is true but Reason is false  
 (D) Assertion is false but Reason is true

1. **Assertion:** Bryophyllum show vegetative propagation  
**Reason:** Propagation may be artificial or natural.
2. **Assertion:** If each new generation is to be the combination of the DNA copies from two pre-existing individual, then each new generation will end up having twice the amount of DNA.  
**Reason:** DNA is a genetic material in humans

### SECTION-E

• **Match the following (one to one)**

**Column-I** and **column-II** contains **four** entries each. Entries of column-I are to be matched with some entries of column-II. Only One entries of column-I may have the matching with the same entries of column-II and one entry of column-II Only one matching with entries of column-I

- | 1. <b>Column I</b> | <b>Column II</b>                   |
|--------------------|------------------------------------|
| (A) Rhizobium      | (P) Multiple fission               |
| (B) Rhizopus       | (Q) Roots                          |
| (C) Rhizoid        | (R) Bread mould                    |
| (D) Plasmodium     | (S) N <sub>2</sub> fixing bacteria |

**2. Column I**

- (A) Testis  
(B) Ovary  
(C) Egg  
(D) Sperm

**Column II**

- (P) Female gamete  
(Q) Male gonad  
(R) Male gamete  
(S) Female gonad

**SECTION-F****• Comprehension****Passage-1**

DNA is the source of information for making proteins. Any change in the information lead to production of different proteins, which ultimately lead to altered body designs. Basic event in reproduction is production of DNA copies in a reproducing cell. The process is called DNA replication. When the cell divides into two each new cell gets a copy of along with the whole cellular apparatus.

- Name the organelle of a cell having our main DNA?  
(A) Nucleus (B) Vacuole  
(C) Chromosome (D) Plasma membrane
- Which of the statement is correct  
(A) Protein → DNA → RNA (B) DNA → Protein → RNA  
(C) DNA → RNA → Protein (D) None of these
- Sons are not exactly identical to their father due to  
(A) Eating habit (B) Knowledge  
(C) Error is DNA replication (D) All of these

**Passage-2**

Cyclic changes taking place in the reproductive organs of a non pregnant woman are termed as menstrual cycle. They take place if the ovum is not fertilized important events in sexual cycle of females are release of mature ovum from the ovary, degeneration and removal of inner thickest wall leaving the uterus along with blood after every 28 days.

- Release of ovum from the ovary is called  
(A) Ovulation (B) Oogenesis (C) Disintegration (D) Puberty
- If a woman become pregnant then  
(A) Menstrual cycle stops (B) Ova is not produced for 9 month  
(C) Removal of inner thickened living of uterus continues (D) Both (A) and (B)

**SECTION-G****• Match the following (one to many)**

**Column-I** and **column-II** contains **four** entries each. Entries of column-I are to be matched with some entries of column-II. One or more than one entries of column-I may have the matching with the some entries of column-II and one entry of column-II may have one or more than one matching with entries of column-I

**1. Column I**

- (A) Sugar cane  
(B) Rose  
(C) Bacteria  
(D) Plasmodium

**Column II**

- (P) Binary fission  
(Q) Endospore formation  
(R) Vegetative propagation  
(S) Multiple fission

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# *Answers*

## Knowledge base questions

- |        |        |        |        |         |
|--------|--------|--------|--------|---------|
| 1. (C) | 2. (B) | 3. (C) | 4. (C) | 5. (A)  |
| 6. (C) | 7. (B) | 8. (C) | 9. (C) | 10. (B) |

## Try Yourself

- |         |         |         |         |         |
|---------|---------|---------|---------|---------|
| 1. (A)  | 2. (B)  | 3. (D)  | 4. (C)  | 5. (B)  |
| 6. (B)  | 7. (C)  | 8. (C)  | 9. (A)  | 10. (D) |
| 11. (C) | 12. (C) | 13. (C) | 14. (C) | 15. (C) |

## Exercise-III

### Section-A

- |                 |               |
|-----------------|---------------|
| 1. Hydra        | 2. Zygote     |
| 3. Vas deferens | 4. foeticides |
| 5. DNA          |               |

### Section-B

- |         |        |        |        |         |
|---------|--------|--------|--------|---------|
| 1. (C)  | 2. (A) | 3. (C) | 4. (B) | 5. (B)  |
| 6. (D)  | 7. (C) | 8. (C) | 9. (D) | 10. (C) |
| 11. (C) |        |        |        |         |

### Section-C

- |          |            |          |            |              |
|----------|------------|----------|------------|--------------|
| 1. (B,C) | 2. (A,B,C) | 3. (A,B) | 4. (A,B,C) | 5. (A,B,C,D) |
|----------|------------|----------|------------|--------------|

### Section-D

- |        |        |
|--------|--------|
| 1. (A) | 2. (B) |
|--------|--------|

### Section-E

- |                                      |                                       |
|--------------------------------------|---------------------------------------|
| 1. (A)-(S), (B)-(R), (C)-(Q),(D)-(P) | 2. (A)-(Q), (B)-(S), (C)-(P), (D)-(R) |
|--------------------------------------|---------------------------------------|

### Section-F

#### Passage-1

- |        |        |        |
|--------|--------|--------|
| 1. (A) | 2. (C) | 3. (C) |
|--------|--------|--------|

#### Passage-2

- |        |        |
|--------|--------|
| 1. (A) | 2. (D) |
|--------|--------|

### Section-G

- |  |  |
|--|--|
| 1. (A)-(R), (B)-(R), (C)-(P,Q),(D)-(S) | 2. (A)-(PQ), (B)-(Q), (C)-(R), (D)-(S) |
|--|--|