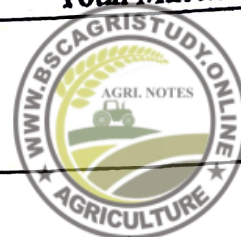


**MAHARASHTRA AGRICULTURAL UNIVERSITIES EXAMINATION BOARD, PUNE**  
**SEMESTER END EXAMINATION**

**B.Sc.(Hons.) Agriculture/ B.Sc.(Hons.) A.B.M./ B.Tech. (Food Tech.)**

Semester	: I (New)	Term	: I	Academic Year	: 2017-18
Course No.	: BIO 111	Title	: Introductory Biology		
Credits	: 2(1+1)				
Day & Date	: Friday, 29.12.2017	Time	: 14.00 to 16.00	Total Marks	: 40

- Note :
1. Solve ANY EIGHT questions from SECTION "A".
  2. All questions from SECTION "B" are compulsory.
  3. All questions carry equal marks.
  4. Draw neat diagrams wherever necessary.

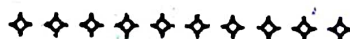


**SECTION "A"**

- Q.1 What is meant by living organism? Explain characteristics /features of living organisms.
- Q.2 Define cell cycle. Draw neat labeled diagram of cell cycle and explain in brief the different phases of cell cycle.
- Q.3 State the laws of inheritance based on Mendel's experiment and explain any one with suitable example.
- Q.4 What is binomial nomenclature? Explain it with suitable example and give universal rules of nomenclature.
- Q.5 Define taxonomy. Enlist and explain in brief various taxonomic categories.
- Q.6 Describe modifications of stem and root with suitable examples.
- Q.7 Define seed. Enlist the types of seed germination and explain the factors affecting seed germination.
- Q.8 Enlist and explain in brief main theories of evolution.
- Q.9 Write short notes (Any Two).
- a) Significance of taxonomical classification
  - b) Role of animals in agriculture.
  - c) Diversity
- Q.10 Distinguish between the following (Any Two).
- a) Racemose and Cymose inflorescence
  - b) Dicotyledonae and Monocotyledonae
  - c) Mitosis and Meiosis.

**SECTION "B"**

- Q.11 Fill in the blanks.
- 1) A taxonomic group of closely related genera is known as \_\_\_\_\_.
  - 2) The mode of arrangement of leaves on the stem and the branch is known as \_\_\_\_\_.
  - 3) The term 'classification' was coined by \_\_\_\_\_.
  - 4) \_\_\_\_\_ is the most important event during prophase -I.
- Q.12 Define the following terms.
- 1) Division
  - 2) Synonym
  - 3) Placentation
  - 4) Inflorescence



Semester	: I (New)	Academic year	: 2017-2018
Course No.	: BIO-111	Course Title	: Introductory Biology
Credits	: 1+1=2	Time	: 2 hours Total marks : 40
Day & Date			

- Note :
- 1) All questions carry equal marks.
  - 2) Attempt any five questions from SECTION 'A'
  - 3) All questions from SECTION 'B' are compulsory.
  - 4) Draw neat diagram wherever necessary

SECTION "A"

Q. 1. What do you mean by living organism? Explain the characteristics/feature of living. 4

Ans. Living organisms is self-replicating, evolving, and self-regulating systems capable of responding to external stimuli. 1

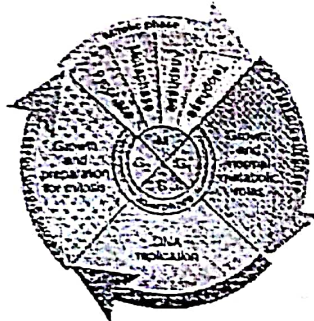
Characteristics/features of Living:

- a) Cellular organization 3
- b) Metabolism
- c) Growth
- d) Reproduction
- e) Response to stimuli (Irritability).

(Explanation of each is to be given in brief)

Q. 2 Define cell cycle. Draw neat labeled diagram of cell cycle and explain the different phases of cell cycle in brief. 1

Diagram of Cell Cycle:



Definition: The series of sequential events or changes that occur in the life of dividing cell is known as cell cycle. 1





**Description:**

Cell cycle consists of two phases, viz., 1) Interphase and 2) Mitotic phase.

**Interphase:** Interphase is generally known as DNA synthesis phase.

Interphase consists of  $G_1$ , S and  $G_2$  sub phases.  $G_1$  is the resting phase, S is the period of DNA replication, and  $G_2$  again is a resting stage after DNA replication.

**$G_1$  Phase:** It is a pre-DNA replication phase. Thus, this is a phase between telophase and S phase. This is the longest phase which takes 12 hours in *Vicia faba*. It is the most variable period of cell cycle. Synthesis of proteins and RNA take place during this phase.

**S (Synthetic) Phase:** This phase comes after  $G_1$  and takes lesser time than  $G_1$  phase. In *Vicia faba*, it takes six hours. The chromosome and DNA replications take place during this phase.

**$G_2$  Phase:** This is the post-DNA replication phase and last sub stage of interphase.

This phase also takes 12 hours in *Vicia faba*. Synthesis of protein and RNA occur during this stage.

Cell organelles such as mitochondria, chloroplasts, and centrioles are duplicated.

Two centrosomes are formed.

The cell prepares itself for entering into the mitotic phase of cell division.

**Q. 3** State the laws of inheritance based on Mendel's experiment and explain any one with suitable example.

1. **Law of segregation:** It states that when a pair of alleles is brought together in a hybrid ( $F_1$ ) they remain together without contaminating each other and they separate or segregate from each other into a gamete in a complete and pure form during the formation of gametes.

2. **Law of Independent assortment:** This law states that when two pair of gene enters in  $F_1$  combination; both of them have their independent dominant effect. These genes segregate when gametes are formed, but the assortment occurs randomly and freely.

(Explanation is to be given with suitable Example)

**Q. 4** What is binomial nomenclature? Explain it with suitable example and give universal rules of nomenclature

**Ans.** **Definition:** System of nomenclature of plants and animals in which scientific name of a plant or an animal consists of two components/parts is known as

## binomial nomenclature

### Example (Any Plant/animal):

According to binomial nomenclature system, the scientific name of Mango is *Mangifera indica*. In this, first name denotes the name of genus and while the second denotes the name of species.

### Universal rules of nomenclature:

1. Biological names are generally in Latin and written in italics. They are Latinized or derived from Latin irrespective of their origin.
2. The first word in a biological name represents the genus while the second component denotes the specific epithet.
3. Both the words in a biological name, when handwritten, are separately underlined, or printed in italics to indicate their Latin origin.
4. The first word denoting the genus starts with a capital letter while the specific epithet starts with a small letter.

**Q. 5 Define taxonomy. Enlist various taxonomic categories and explain in brief.**

**Definition:** It is the study of identification, nomenclature and classification of plants and animals.

### Taxonomic Categories:

- a) **Species:** It is the basic unit in classification. The members of a species are closely related, derived from a common ancestor and can interbreed to produce fertile offspring's.
- b) **Genus:** Genus is a group of related species, which have co-related characters.
- c) **Family:** Family is a group of related genera.
- d) **Order:** The order includes several related families.
- e) **Class:** Several related orders are included in a class.
- f) **Phylum/ Division:** Phylum in animals and Division in plants includes related classes.
- g) **Kingdom:** Kingdom comprises of various phyla of animals and various divisions of plants.

**Q. 6 Describe modifications of stem and root with suitable examples.**

**Ans.** In order to perform certain special functions stem undergoes various modifications which are as below

### Modifications of Stem:

- I) **Underground stems:** (Rhizome, tuber, bulb and corm)

II) Sub-aerial stems: (Runner, sucker, stolon)

III) Aerial stems: (tendrils, thorn, phylloclade, cladode, bulbils)

(Explanations of each is to be given with suitable examples)

**Q. 7** Define seed. Enlist the types of seed germination and explain the factors affecting seed germination.

**Ans.** Definition: A mature ovule consisting of an embryonic plant together with a store food, all surrounded by a protective coat.

Types of Seed germination:

1. Epigeal germination
2. Hypogeal Germination
3. Viviparous germination

Factors affecting seed germination:

I) Abiotic factors: [Light, Temperature, Aeration and soil type (depth)]

II) Biotic factors: [seed viability, dormancy period]

(Explanation of each factor is to be given in brief)

**Q. 8** Enlist main theories of evolution and explain in brief

**Ans.** Theories of evolution:

I) Lamarckism or Theory of Inheritance of Acquired characters.

(II) Darwinism or Theory of Natural Selection.

III) Mutation Theory of Evolution

IV) Neo-Darwinism or Modern Concept or Synthetic Theory of Evolution:

(Explanation of each theory is to be given in brief)

**Q. 9** Write short notes (Any two)

4. Significance of taxonomical classification

5. Role of animals in agriculture

6. Diversity

### SECTION "B"

**Q. 10** Distinguish between the following (Any two)

4. Racemose & Cymose inflorescence

5. Dicotyledonae & Monocotyledonae

6. Mitosis & Meiosis

**Ans.** (Minimum 4 to 5 Points)



1. Recemose inflorescence	Cymose inflorescence	2
Growing point of the peduncle is not utilized in the production of a flower.	Growing point of the peduncle is utilized in the production of flower.	
Recemose inflorescence has indefinite growth	Cymose inflorescence has definite growth	
Flowers are produced in acropetal succession i.e older flowers towards the base and younger flowers are towards the apex.	Flowers are produced in basipetal succession i.e older flowers towards the apex and younger flowers are towards the base.	
e.g. Caesalpinia, Brassica etc.	e.g. Clerodendron, Jasmine etc.	

2. Dicotyledonae	Monocotyledonae	2
Members belonging to the class dicotyledonae referred to as dicotyledonae	Members belonging to the class monocotyledonae referred to as monocotyledonae.	
The seeds of dicotyledons contains two cotyledons	The seeds of monocotyledons contains single cotyledons	
Root system is tap root system which is differentiated into primary, secondary and tertiary roots.	Root system is of fibrous or adventitious type.	
Leaves show reticulate venation	Leaves show parallel venation	
Stem is generally branched	Stem is generally unbranched	
Flowers are generally large, tetramerous or pentamerous	Flowers are generally small, non-conspicuous and trimerous.	

3. Mitosis	Meiosis	2
Consist of one nuclear division	Consist of two nuclear division	
One cell cycle results in production of two daughter cells	One cell cycle results in formation of four daughter cells.	
The chromosome number of daughter cells is the same as that of mother cell	Daughter cells contains half the chromosome number of mother cell	
Daughter cells are identical with mother cell in structure and chromosome	Daughter cells are different from mother cell in chromosome number and	

composition.	composition
Mitosis occurs in somatic tissues	It occurs in reproductive tissues.
Total DNA of nucleus replicates during S phase	99.7% DNA replicates during S phase and remaining 0.3% during zygotene stage
There is no pairing between homologous chromosomes	Homologous chromosomes pair during pachytene.

### SECTION "B"

Q. 11 Fill in the blanks.

4

- i) A taxonomic group of closely related genera is known as **family**. 1
- ii) The mode of arrangement of leaves on the stem and the branch is known as **phyllotaxy**. 1
- iii) The term 'classification' was coined by **A. P. de Candolle**. 1
- iv) **Crossing over** is the most important event during prophase - I. 1

Q. 12 Define the following terms

4

1. **Division:** Category composed of related classes. 1
2. **Synonym:** Single species is described under different names by different authors. 1
3. **Placentation:** Mode of arrangement of ovules on the placenta within the ovary. 1
4. **Inflorescence:** The reproductive axis/ peduncle bearing a group of similar flowers in a cluster is known as inflorescence. 1