

PARUL UNIVERSITY
COLLEGE OF AGRICULTURE

B.Sc.(Hons.) Agriculture, Winter 2016 - 17 Examination

Semester: I**Subject Code: 20103101****Subject Name: Introduction to Soil Science****Date: 19/12/2016****Time: 2:00 pm to 5:00 pm****Total Marks: 60****Instructions:**

1. Attempt all questions from each section.
2. Figures to the right indicate full marks.
3. Make suitable assumptions wherever necessary.
4. Write section-A, section-B on separate answer sheets.

SECTION A**Q.1** Fill in the blanks. (Each of 0.50 marks) **(10)**

1. Gypsum is the example of _____ mineral.
2. Granite is the example of _____ rock.
3. Muscovite is the example of _____ minerals.
4. _____ is consolidated mass of one or more minerals.
5. _____ is the study of the soil as a natural body and does not focus primarily on the soil's immediate practical use.
6. The process involves the accumulation of sodium ions on the exchange complex of the clay, resulting in the formation of _____ soils.
7. Hematite is the example of _____ minerals.
8. _____ rocks formed from molten material on cooling.
9. _____ is the study of soil from the standpoint of higher plants.
10. Diamond-C is the example of _____ of minerals.
11. Apatite is the source of _____ in soils.
12. A mechanical analysis is based on _____ law.
13. Physical weathering brought about by the mechanical action of the various weathering agents, is designated as _____.
14. _____ is the process of accumulation of salts, such as sulphates and chlorides of calcium, magnesium, sodium and potassium, in soils in the form of salty horizons.
15. The cation exchange capacity of kaolinite clay mineral is _____.
16. The movement of water through a column of soil is called _____.
17. The vertical section of the soil showing the various layers from the surface to the unaffected parent material is known as a _____.
18. _____ refers to the downward entry or movement of water into the soil surface.
19. The oven dry weight of a unit volume of soil inclusive of pore spaces is called _____.
20. Desert soils are found in the _____ in Gujarat state.

Q.2 Match group A with B. (Each of 0.50 marks) **(05)**

- | A | B |
|--------------------------------|---|
| 1) Motmorillonite | a) Ionic substitution |
| 2) Illite | b) First recognized cation exchange |
| 3) Interstratified | c) 15-40 |
| 4) Source of negative charge | d) It acts as a buffering agent |
| 5) Thompson and Way(1892) | e) Sand |
| 6) Easy in tillage operation | f) magnitude of negative charge |
| 7) High water holding capacity | g) Mica-chlorite |
| 8) Zeta potential | h) Maintaining levels of mono and di-valent cations in the soil |
| 9) CEC of plant roots | i) Clay |
| 10) Role of organic matter | j) 80-100 |

- Q.3** Define the following. (Any ten) **(05)**
1. Dentrification
 2. Ammonification
 3. A horizons
 4. Soil texture
 5. Cohesion
 6. Nitrification
 7. Structure
 8. Rocks
 9. Particle density
 10. Pore space
 11. Available water
 12. Soil
- Q.4** Answer the following. (Any ten) **(10)**
1. Why Na^+ is easily replaced than Ca^{+2} ?
 2. How the soil consistence increases the soil fertility?
 3. Why clay soil has high water holding capacity?
 4. Which soil has very low fertility?
 5. Why montmorillonite clay mineral has high cation exchange capacity?
 6. What are the sources of negative charges on silicate minerals?
 7. Enlist the component of soils on volume basis.
 8. What is the optimum temperature for the activity of most of the micro-organisms?
 9. Enlist the properties and importance of soil colloids.
 10. Give the chemical classification of humic substances.
 11. Enlist the colloids other than silicate clay minerals.
 12. What is the effect of organic matter on water holding capacity of soil?

SECTION B

Q.1 Multiple choice type questions. (Each of 0.50 marks)

(10)

1. Which of the following is not mineral?

- a) Hematite
- b) Granite
- c) Gypsum
- d) Muscovite

2. Which of the following is a primary mineral?

- a) Limonite
- b) Gypsum
- c) Dolomite
- d) Biotite

3. Which of the following is a secondary mineral?

- a) Hornblende
- b) Calcite
- c) Augite
- d) Muscovite

4. Breakdown and transformation of rocks & minerals into unconsolidated residues, called

- a) weathering
- b) disintegration
- c) regolith
- d) decomposition

5. Carbon dioxide dissolved in water, it forms

- a) Carbon acid
- b) Carbonic acid
- c) water dioxide
- d) None of the above

6. The process of decomposition of organic matter and synthesis of new organic substances is called as

- a) humus
- b) humification
- c) humic acid
- d) None of the above

7. There is usually an accumulation of calcium carbonate in the profile is called as

- a) calcium carbonate
- b) calcification
- c) salinization
- d) basification

8. Salinization takes place in

- a) humid region
- b) arid and semi arid region
- c) temperate region
- d) None of the above

9. The alluvial soils are found in the following states of India

- a) Maharashtra, M.P. and Mysore
- b) Kerala, Orissa and parts hills in the Deccan
- c) Rajasthan, Punjab and U.P
- d) Bihar, West Bengal and Jammu and Kashmir

10. Which soil separates have a high fertility?

- a) sand
- b) clay
- c) silt
- d) gravel

11. Which materials are taking part in aggregate formation?

- a) iron and silicon hydroxides
- b) iron and aluminum hydroxides
- c) Calcium and magnesium hydroxides
- d) Potassium hydroxides

12. In which condition, the consistency is described in terms of stickiness and plasticity?

- a) Under dry condition
- b) at field condition
- c) Under slightly wet condition
- d) Under very saturated condition

13. What is the effect of addition of organic matter on particle density?

- a) It increases the particle density
- b) No effect on particle density
- c) decreases the particle density
- d) None of the above

14. A soil having bulk density of 1.3 and particle density of 2.6 have the following percentage of pore space.

- a) 55.0 %
- b) 45.0 %
- c) 50.0 %
- d) 40.0 %

15. What is the effect of soil compaction?

- a) Beneficial for soil fertility
- b) Better root growth of crops
- c) Restrict root penetration & reduce the water and nutrient uptake by crops
- d) Increase nutrient uptake by crops

16. The soil colour is best determined with the following.

- a) Chroma
- b) Hue
- c) Munsell colour
- d) None of the above

17. Each water molecule carries the following charges

- a) Positive
- b) Negative
- c) Both negative and positive
- d) None of the above

18. Hygroscopic water held so tenaciously by soil particles so that plants

- a) cannot absorb it
- b) can absorb it
- c) partially absorb
- d) None of the above

19. The following factors reduce the percolation losses.

- a) vegetation and high water table
- b) low water table
- c) high rainfall
- d) None of the above

20. The scattering of visible light by colloidal particle is called

- a) Tyndall effect
- b) Brownian movement
- c) Zeta potential
- d) Flocculation

Q.2 Give the sentence true or false. (Each of 0.50 marks) **(05)**

1. Cohesion and adhesion forces are responsible for water retention in the soil.

2. The overall -ve charge carried out by clay crystal is the substitution of one atom by another similar size in a crystal lattice without disrupting or changing the crystal structure of the mineral is known as isomorphous substitution.

3. The plasticity of montmorillonite is lower because water cannot enter between the sheets.

4. The cation exchange capacity of kaolinite is 15-40 me/100 g .

5. Monocot plants roots have high CEC, while dicot plant roots have high CEC.

6. Humus is more resistant to decay and may present in soils even hundreds of years.

7. At a point carbon-nitrogen ratio, becomes more or less constant, generally stabilizes at 10: 1 or 12: 1.

8. Zeta potential is the magnitude of negative charge on the colloidal particles.

9. In alumina sheet aluminum (or magnesium) ion is surrounded by four oxygen or hydroxyls gives an eight-sided configuration termed as alumina octahedron.

10. Capillary water is held in the macro pores.

Q.3 Write short notes. (Any five) **(10)**

1. Bulk density

2. Porosity of soil

3. Polarity or Dipole Character of water molecule

4. Physical classification of water

5. Percolation

6. Flocculation

Q.4 Differentiate the following (Any five) **(05)**

1. Hygroscopic water Vs Capillary water

2. A Horizons Vs B Horizons

3. Ammonification Vs Nitrification

4. Soil texture Vs soil structure

5. Montmorillonite Vs Illite

6. CEC of monocot plant Vs CEC of dicot plants

7. Soil particle density Vs soil bulk density