

PARUL UNIVERSITY
COLLEGE OF AGRICULTURE

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

Semester:1**Date: 06/07/2017****Subject Code: 20103101****Time: 10:00 am to 1:00 pm****Subject Name: Introduction to Soil Science****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. A mechanical analysis is based on _____ law.
2. _____ soil separates visible by ultra microscope.
3. Apatite is the source of _____ in soils.
4. _____ and _____ two elements are occurring in greatest abundance of the total composition of the crust.
5. _____ is the process of removal of constituents by percolation from upper layers to lower layers.
6. The process involves the accumulation of sodium ions on the exchange complex of the clay, resulting in the formation of _____ soils.
7. Soil organic matter represents partially decayed and partially synthesized _____ and _____ residues.
8. The mineral colloides (colloidal clay) by virtue of their properties of _____ and _____, stick together to form aggregates.
9. Bulk density normally _____ as mineral soils becomes finer in texture.
10. Soils with _____ bulk densities have favorable physical conditions.
11. Water in excess of the field capacity is termed _____ water.
12. When clay particles are _____, soil develops small clods of a crumby nature.
13. The plasticity of montmorillonite is higher because _____ can enter between the sheets.
14. The cation exchange capacity is low in kaolinite clay due to _____ space between the sheets for the activity.
15. _____ first recognized cation exchange phenomenon.
16. _____ is the magnitude of negative charge on the colloidal particles.
17. Monocot plant roots have _____ CEC, while dicot plant roots have _____ CEC.
18. The transformation of organic nitrogenous compounds into ammonia is called _____.
19. The ratio of carbon to nitrogen in the arable (cultivated) soils commonly ranges from _____.
20. The cation exchange capacity of kaolinite is _____ me/100g.

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

- | A | B |
|-----------------------------------|-------------------------------|
| 1) High cation exchange capacity | a) Granite |
| 2) Interstratified | b) Drainage |
| 3) Nitrification | c) Polyvalent ion |
| 4) Acidic rock | d) Montmorillonite |
| 5) Basic rock | e) Mica-chlorite |
| 6) Difficult in tillage operation | f) Increase fertility of soil |
| 7) Low water holding capacity | g) Nitosomonas |

- 8) Soil consistence
- 9) Hydrogen
- 10) removal of excess water from soil
- h) Sand
- i) Clay
- j) Basalt

Q.3 Define the following. (Any ten)

(05)

1. Humus
2. Soil
3. Field capacity
4. Bulk density
5. Adhesion
6. Nitrification
7. Salinization
8. Rocks
9. Soil profile
10. Minerals
11. Cation exchange capacity
12. Pedology

Q.4 Answer the following. (Any ten)

(10)

1. Which soil separate has high plasticity and swelling properties?
2. What are the components of soils on volume basis?
3. Why sandy soil has low water holding capacity?
4. How you will improve poor fertility of sandy soils?
5. Why nitrate-nitrogen disappears from the soil when organic residues are added in a soil with a wide C/N ratio (50:1)?
6. How crop rotation of monocot and dicot plants helps in maintaining levels of mono and di-valiant cations in the soil?
7. What are the sources of negative charges on silicate minerals?
8. Why the sand and silt particles cannot form aggregates?
9. Why cations which have lower valiancy have higher zeta potential?
10. What is the purpose of drainage?
11. Why the permeability of soil usually decreases with depth?
12. What is the important of percolation?

SECTION - B

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

(10)

1. What is soil ?
 - a) The lowermost layer of earth.
 - b) The middle layer of earth.
 - c) The uppermost layer of earth.
 - d) None of the above.
2. How igneous rock is formed?
 - a) Formed from sediments under pressure
 - b) Formed from pre-existing rocks through action of heat and pressure.
 - c) Formed from molten material on cooling.
 - d) Formed from sediment deposition.
3. Which of the following is not mineral?
 - a) Hematite
 - b) Granite
 - c) Gypsum
 - d) Muscovite
4. What is the effect of addition of organic matter of the soil on particle density?
 - a) It increases the particle density.
 - b) decreases the particle density.
 - c) No effect on particle density.
 - d) None of the above.
5. Which of the following is not metamorphic rock?
 - a) Quartzite
 - b) Slate
 - c) Conglomerate
 - d) Marble
6. 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

7. What is the effect of matric potentials on soil water?
 a) Soil moisture retention and on soil water movement c) soil infiltration
 b) soil water drainage d) None of the above
8. Hygroscopic water held so tenaciously by soil particles so that plants
 a) Can absorb it c) partially absorb
 b) cannot absorb it d) none of the above
9. Physical weathering brought about by mechanical action of various weathering agents is known as
 a) decomposition c)disintegration
 b)denudation d)None of the above
10. Carbon dioxide dissolved in water, it forms
 a)carbon acid c)water dioxide
 b)carbonic acid d)None of the above
11. Salinization takes place in
 a) humid region c) temperate region
 b) arid and semi arid region d) None of the above
12. The unconsolidated material under the B-horizon is called as
 a)B horizon c) C horizon
 b)A horizon d) Organic horizon
13. The 7th Approximation lays more stress on the
 a)the environmental factors c) the chemical constituents
 b) the morphology of soils d) None of the above
14. Soil air contains a much greater proportion of the following gas.
 a) oxygen c) water vapour
 b) carbon dioxide d) nitrogen
15. The alluvial soils are found in the following states of India
 a)Maharashtra, M.P. and Mysore c)Rajasthan, Punjab and U.P.
 b)Kerala, Orissa and tops hills in the Deccan d) Bihar, West Bengal and Jammu and Kashmir
16. Which soil separates have the lowest total pore space?
 a)Silt c)Sand
 b)Clay d)None of the above
17. A soil having bulk density of 1.3 and particle density of 2.6 have the following percentage of pore space.
 a) 55.0% c) 45.0%
 b) 50.0% d) 40.0%
18. The following are the role of organic matter.
 a) increases WHC and acts as a buffering agent. c)increases surface run off and erosion
 b) decreases WHC d)None of the above
19. The process which involves conversion of soil nitrate into gaseous nitrogen or nitrous oxide is called
 a) denitrification c)nitrification
 b) ammonification d)None of the above
20. What is the cation exchange capacity of montmorillonite?
 a)5-20 c)15-40
 b)80-100 d) 40-50

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

(05)

1. Cation exchange is not important reaction in soil fertility.
2. Metamorphic rocks formed pre-existing rocks through action of heat and pressure.
3. Igneous rocks are classified into plutonic, intrusive and extrusive.
4. The consistency of soil is generally describe at three soil moisture levels viz., wet, moist and dry.

5. The cation exchange capacity of kaolinite is 15-40 me/100 g.
6. Climate and vegetation are the passive soil forming factors.
7. Iron and aluminum hydroxide act as cementing agent in binding the soil particles together.
8. Capillary water is held in the macro pores.
9. The soil colour is best determined by the comparison with the Munsell colour.
10. Clays and clayey soils have a greater number of macro pores.

Q.3 Write short notes. (Any five)

(10)

1. Significance of C: N Ratio
2. Properties and importance of soil colloids
3. Components of soils (volume basis)
4. Soil consistence
5. Factors affecting soil structure
6. Role of organic matter

Q.4 Differentiate the following (Any five)

(05)

1. Gravitational water Vs Capillary water
2. Primary minerals Vs secondary minerals
3. Nitrification Vs Denitrification
4. Flocculation Vs deflocculation
5. Kaolinite Vs montmorillonite
6. Sand Vs clay
7. Macro pore Vs Micro pore