**PART - II**

 **JRF : Soil Science - Basic Concepts and Applications**

 **Part - W**

 **1. Write True or False**

i. The criteria of essentiality of plant nutrients was proposed by Arnon and Stout. ( T )

ii. Sulphur may be considered as micronutrient element.( F )

iii. The movement of nutrient elements in soils along with water is called diffusion. ( F )

iv. Khaira disease in rice is due to the deficiency of zinc. ( T )

v. Tissue analysis is the best way to evaluate the nutrients levels of plants in order to correct nutrient deficiencies. ( T )

vi. Ammonical fertilizers contribute towards the development of soil acidity. ( T )

vii. EC (electrical conductivity) of soils > 4 dS m-1 is critical for plant growth. ( T )

**2. Choose the correct answer**

i. Saline soils pose the problem of

a.Soil dispersion b. Exosmosis from roots c. Aluminium toxicity d. None

ii. Neutral soil covers the pH range of

a. 6.6 to 7.3 b. 6.0 to 6.6 c.. 5.5 – 6.0 d. None

1. When RSC (Residual Sodium Carbonate) value of irrigation water is more than \_› 2.50 \_\_\_\_\_\_\_\_\_\_ meq/L the water is unsuitable for irrigation.

 a. ‹ 1.25 b. 1.25 - 2.500 c. › 2.50 d. None

iv. If pH <8.5, EC >4 dSm-1, ESP >15%, the soil will be ---

 a. Saline b. Saline-sodic c. Sodic d. Calcareous

1. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ method is followed for the determination of lime requirement.

 a. Shoemaker’s method b. Bray’s method c. Chesnin & Yien method d. None

vi .The deadly problem of soil that is increasing throughout the world is –

 a. Soil salinity b. Water logging c. Both a & b d. None

vii. Leaching is used for the treatment of ------------ soil.

1. Saline b. Saline-sodic c. Sodic d. Calcareous

viii. b. The term *black alkali* is frequently used for ……………………………….

(Saline / saline-sodic / sodic)

ix. Crop that can tolerate soil acidity –

 a. Rice b. Tomato c. Carrot d. Red clover

x. Lime stone is used for the reclamation of

a.Saline soil b. Saline-sodic soil c. Sodic soil d. Acid soil

xi. If the pH of the soil is < 4.5, the soil is considered to be

i. Strongly acidic ii. Moderately acidic iii. Slightly acidic iv. Extremely acidic

xii. Sodic soils are deficient in

 a. Fe b. Mn c. Cu iv. All of the above

 **Part - X**

 **1. Mark the statements whether True or False**

1. Nitrogen can be taken up by plants both in anionic and cationic forms. **True**
2. The movement of nutrient elements in soil along with water is called diffusion. **False**
3. Available Zn. Cu, Fe and Mn can be determined by DTPA method. ( TRUE )
4. Available phosphorus in moderate to strong acid soils is determined by Olsen’s method. **False**
5. The critical level approach has been put forwarded by Cate and Nelson. **TRUE**
6. Aspergillus niger method, Neubauer seedling method are the biological diagnostic methods for soil fertility evaluation. **TRUE**
7. Saline soils can be reclaimed by gypsum. **FALSE**

**2. Choose the correct answer:**

i.. Opening of stomata is regulated by

 a. K b. Fe c. Ca d. Mg

ii. Which of the following elements is part of the chlorophyll?

 a. Mg b. Mn c. Zn d. Fe

iii. The criteria of essentiality was proposed by

 a. Bray b. Olsen c. Arnon d. Mitscherlich

 iv. Which of the following plant nutrient shows deficiency symptoms on younger

 leaves of the plant?

**a. S** b. N c. Mg d. P

1. Heart rot of sugarbeet is due to the deficiency of :

 **a. B** b. Mo c. Zn d. Mg

6. Sodium Adsorption Ratio (SAR) can be expressed as

**i. [Na+] / √ [Ca++ + Mg++]/2** ii. [Na+] / [Ca++ + Mg++]/2 iii. Exch. Na / CEC x 100

8.The deadly problem of soil that is increasing throughout the world is –

**a.Soil salinity** b. Water logging c. Both a & b d. None

2. Liming to acid soil mainly satisfies

a. Active acidity b. Reserve acidity c. Salt replaceable acidity d. None

1. **Write whether the following statements are True (T) or False (F):**
2. Montmorillonite is a nonexpanding clay mineral. T
3. CEC is expressed as Cmol (P+)/kg. T
4. Histic epipedon is a mineral surface horizon. F
5. Soil rich in organic matter have high porosity. T
6. Carbon dioxide content of soil air is more than that of atmospheric air. T
7. Mulch has a tendency to increase soil temperature fluctuation. T
8. Pore space increases with decrease in bulk density of soil. T
9. The science which deals with rock is known as pedology. F
10. **Fill in the blanks:**
11. Surface area of kaolinite is .................LESS..........................than montmorillonite.
12. ........................ALLOPHANE.................................... is an amorphous clay.
13. A subsurface horizon having EC > 4 dSm-1 is known as ....................................................
14. Generally...........................................colour chart is used for determination of soil colour.
15. Compaction increases .............Bulk Density.........................density of soil.
16. The most abundant mineral in earth crust is .. Feldspars..................................................
17. Slate is a metamorphic rock obtained from......................Shale................................
18. Limestone is used for reclamation of ...................Acid................................soil.
19. **Choose the correct answer:**

i . Octahedral layer containing Mg is known as (a) Gibbsite layer (b) Brucite layer (c) Granite layer (d) none of these.

ii. The most fertile soil of the world is under the soil order (a) Ultisol (b) Oxisol (c) Gelisol (d) Mollisol

iii. The logarithm of the negative pressure head in centimetre of water column height is known as (a) pH (b) Eh (c) pF (d) ET

iv. Occurrence of quartz in high amounts makes a rock (a) alkaline (b) acidic (c) Hard (c) soft

**Part - Y**

1. **The criteria of essentiality of plant nutrients was proposed by - a. Bray b. Olsen c. Arnon d. Mitscherlich**
2. **The term ‘Functional Nutrient’ has been introduced by- a. Arnon and Stout b. Bray c. Nicholas d. Baule**

**3.Which of the following fertilizer can be absorbed by plants as + ve and –ve ions: a. P b. K c. N d. Ca**

 **4. Khaira disease of rice/wheat is caused by deficiency of – a. Zn b. Mo c. S d. B**

**5. Phosphorus is taken by the plants mostly in the form of : a. H3PO4 b. H2PO4-  c. HPO4- - d. PO43-**

 **6..‘Per cent sufficiency concept’ was given by – a. Baule b. Thomson c. Flemming d. Frankel**

**7.‘The Law of Minimum’ was put forwarded by a. Mitscherlich b. Liebig c. Baule d. Thomson**

**8. ‘The nutrient Mobility’ concept was given by a. Mitscherlich b. Liebig c. Baule d. Bray**

**9.‘The Law of Diminishing Return’ put forward by a. Mitscherlich b. Liebig c. Baule d. Thomson**

**10..‘The Law of Restitution’ was given by a. Mitscherlich b. Liebig c. Baule d. Thomson**

**11. Which of the following plant nutrient shows deficiency symptoms on older leaves of the plant?**

 **a. K b. N c. Mg d. P**

**12. Which of the following plant nutrient shows deficiency symptoms on younger leaves of the plant?**

 **a. S b. N c. Mg d. P**

**13. Opening of stomata is related with – a. K b. Fe c. Ca d. Mg**

**14.Which of the following elements is part of the chlorophyll? a. Mg b. Mn c. Zn d. Fe**

**15. Sulphur loving plant is a. Mustard b. Oat c. Rice d. Wheat**

**16. Which of the following is called “Energy Currency” of plant a. N b. P c. Zn d. S**

**17. Which of the following is called ‘Free Lancer’ nutrient element a. N b. P c. K d. Zn**

**18. Whiptail disease is caused by the deficiency of a. Mg b. S c. Mn d. Mo**

**19.If nodulation is less in any legume crop which of the following nutrient shall be applied at pre-flowering stage?**

 **a. Mo b. N c. B d. P**

**20.. The rossetting and little leaf of plants is due to the deficiency of a. B b. Mo c. Zn d. Mg**

 **21. Heart rot of sugarbeet is due to the deficiency of a. B b. Mo c. Zn d. Mg**

**22. Which is the ‘ultra-micronutrient’? a. Boron b. Molybdenum c. Zinc d. Iron**

**23. Though plant do not show any symptoms but yet it requires some extra nutrients for its growth and development –**

 **a. Luxury consumption b. Deficiency c. Hidden hunger d. None**

**24. The author of the book ‘Opus ruralium commodorum’**

 **a. Justus von Liebig b. .Arthur Young c. Jethro Tull d. Pietro de Cescenzi**

**25. The author of the book ‘Horse Hoeing Husbandry’**

 **a. Justus von Liebig b. .Arthur Young c. Jethro Tull d. Pietro de Cescenzi**

Part - Z

1. **Fill in the blanks**
2. According to Stokes’ law the rate of fall of particle in a fluid is **.directly proportional**............ to the square of the radius of the particle and ………inversely………… to the viscosity of the medium.
3. The diameter of a clay particle is …………**<0.002**………… mm.

3. The important components of total soil water potential are pressure, gravitational and solute potentials

 4. Soil moisture characteristics curve is drawn by plotting volumetric moisture content of a soil against matric suction.

1. **True or False**
2. The soil texture can easily be altered by management practices. False
3. Addition of heavy amount organic matter improves the texture of a light soil. False
4. ‘Calgon’ a dispersing agent is the commercial name of Sodium Hexametaphosphate. True
5. Conc. of Boron, more than 1 ppm in irrigation water is toxic. True
6. For a good quality irrigation water amount of total soluble salts should not exceed 1000 ppm. True
7. **Multiple Choice**
8. The relative distribution of primary soil particles in a given soil is known as

a. Soil texture b. Soil structure c. Soil plasticity d. Soil consistency

 2. For mechanical analysis of a soil, organic matter is destroyed by heating the soil

 with : a. H2O2 (6%) b. NaOH (1N) c. K2Cr2O7 (1N) d. HCl (1N)

3. Fractionation of Silt and Clay fractions of soil particles is done by using

a. Darcy’s law b. Stokes’ Law c. Poiseuille’s law d. Fick’s law

4. Soils containing almost equal proportion of sand, silt and clay particles are said to be : a. Sandy soils b. Loamy soils c. Silty soils d. Clayey soils

 5. Soil water tension at field capacity of a sandy loam soil is

a. 1/3d bar b. 1 bar c. 3 bar d. 15 bar

6. Available water in soil refers to that water which is held between

a. a maximum water holding capacity and field capacity

b. Field capacity and hygroscopic coefficient

c. Wilting point and hygroscopic coefficient

d. Field capacity and permanent wilting point

7. Residual Sodium Carbonate (RSC) can be defined as

 a. (Ca++ + Mg++) – (CO3-- + HCO3-) b. (CO3-- + HCO3-) - (Ca++ + Mg++)

 c. (Ca++ + Mg++) – (Na+ + K+) d. None

8. Sodium Adsorption Ratio (SAR) can be expressed as

i. [Na+] / √ [Ca++ + Mg++]/2 ii. [Na+] / [Ca++ + Mg++]/2

iii. Exch. Na / CEC x 100 iv. None

 9. At field capacity the pF value is

a. 1 b. 2.5 c. 4.2 d. 4.5