PRACTICAL

FILL UP THE BLANKS

1. Soil profile descriptions are basic data in all _____
2. Profile pits are traditionally _____ in shape
3. The key task in profile description is recognizing how many _____ it contains
4. The distinctness of the boundary is described based on the _____ and ___ of the horizon.
5. The degree of horizon irregularity is described as ______, ________, _______, ________
6. Horizons with multiple colors is called as _______
7. Stones are the soil particles larger than 2 mm in diameter and are described in terms of _____, ________ and _____
8. Calcium carbonate content in soil profile is qualitatively assessed by adding ______
9. Krotovina is related to _____ activity
10. Surface horizon rich in organic matter is known as _________
11. Surface horizon which is light colored with low organic matter is____
12. The sub surface horizon present in sodic soil is ________
13. The formative element for vertisol is _____
14. Mollisol order will have ________ epipedon
15. Argillic horizon with more than 35% BSP comes under ______ order
16. Fibrist is the suborder coming under ____ order
17. Plinthite layer is formed in ________ order
18. The vertical section of soil column showing different horizons is called as ____
19. There are ________ number of soil orders
20. The scale of map used in RSS is _______
21. ______ is the base map used in DSS
22. Map produced with a scale of 1:100,000 is called as ________
23. The soil mapping unit in DSS is ________
24. There are _______ number of epipedons
25. The highest category in the soil taxonomy is____
26. The lowest category in the soil taxonomy is ________
27. In soil classification as Peelamedu, fine montmorillonitic isohyperthermic Typic Haplusterts, soil order is _______
28. The AC profile is noticed in _______ order
29. The OC profile is noticed in _________ order
30. ____ order has bestowed with thick A horizon
31. The Bss is noticed in _______ order

32. The Bhs is observed in _________ order
33. The juvenile soil belongs to _____ order
34. The matured soil belongs to _______ order
35. Soil moisture regimes range from _____to ____
36. Soil temperature regime ranges from _______ to _______
37. Soils are divided into different orders based on __________
38. Sub orders are grouped based on ____ and _________
39. A geographical representation showing diversity of soil types and/or soil properties is referred to as __________
40. Maps used for delineations of soil boundaries is ______
41. Classifying the soils above the level of soil series is called as _________
42. An alternative to a base map is to use an _______
43. The base map used in RSS is _________
44. The cadastral map as base map is used in _________
45. The frequency of auger sampling in RSS is ___
46. The profile observation is done in DSS is _____
47. The profile observation is done in RSS is ______
48. The scale of map in RSS is _______
49. The scale of map in DSS is ______-
50. The soil mapping unit in RSS is ______
51. The soil mapping unit in DSS is _____
52. Soil series and its association is used as mapping unit in __________
53. Soil types and phases is used as mapping unit in _______
54. The level of mapping under RSS is ______
55. The level of mapping under DSS is ____-
56. The map produced at 1: 100,000 scale is called as _________
57. The map produced at 1: 10000 scale is called as _____
58. The large scale map is advocated in _________ survey
59. The small scale map is advocated in _______ survey
60. The intensity of survey undertaken in RSS is ______
61. The intensity of survey undertaken in DSS is _______
62. The scale of mapping done at national level planning is _______
63. The scale of mapping done at Regional level of mapping is ______
64. The scale of mapping done at Village or taluk level of mapping is ______
65. _____ proposed that four factors are responsible for productivity of soil
66. Storie index showed 65%, the productivity of soil comes under_________

67. Coefficient improvement of soil is given by the formula______
68. The structure of LCC consists of capability classes, capability sub classes and ____
69. In LCC, as the capability class move from I to VIII, limitation _______
70. Capability class I to IV is fit for ________
71. In LIC, class 6 indicates _____
72. In FCC, Type indicates _____
73. Maps generated out of standard soil surveys is _____
74. The structure of land suitability classification is _______ and ____
75. _____ is the predictor of various chemical properties of soil
76. The apparatus used to extract water from soil water paste is _______
77. The Buchner funnel comes under ___ type of filtration
78. _____ is used an index for finding extent of soluble salts present in the soil
79. Soil EC is used as an parameter to distinguish a _____from a ______
80. _____ method is preferred to estimate soil EC in saline and sodic soils
81. The CEC in problem soils is estimated by _________ method
82. Lime is added to reclaim _______ soil
83. Lime requirement of acid soil by ____was proposed by_______
84. The gypsum requirement of sodic soil was proposed by____
85. The indicator used in the estimation of gypsum requirement is _____
86. The equivalent weight of gypsum is _______
87. The amendment used for reclaiming sodic soil is _______
88. Calcium and magnesium in the water is estimated by _____ method
89. The equivalent weight of calcium is ____-
90. The equivalent weight of magnesium is ___
91. one ml of 0.02N EDTA is equal to _______ g of Ca
92. one ml of 0.02N EDTA s equal to ________ g of Mg
93. The indicator used in the estimation of calcium is ____
94. The indicator used in the estimation of calcium and magnesium is ___-
95. Meq/l = ppm/ ?
96. Sodium and potassium in water is estimated using ____ instrument
97. The indicator used in the estimation of chlorides in water is ___
98. one ml of 0.02N $AgNO_3$ is equal to _______ g of Cl^{-1}
99. The end point in the estimation of chlorides is ___
100. The equivalent weight of chloride is ____-
101. Presence of carbonate in the irrigation water is found by using _____ indicator
102. The indicator used for bicarbonate estimation is______

103. The equivalent weight of carbonate is __________

104. The water on analysis gave 6 meq/l of calcium, in terms of ppm is _____

105. Sulfate content in the irrigation water is estimated by __________ method

106. The equivalent weight of sulfate ion is ________

107. SAR is given by the formula_________

108. RSC of water showed 1.75 meq/ l, the suitability of water showed __________

109. The red flesh precipitate formed in chloride estimation is chemically called as ___

110. SAR of water is 20, the suitability of water is _____

111. The sodium to calcium activity ratio is given by the formula _____

112. For a good water, sodium ratio shall not exceed ________

113. Alkali hazard in water is evaluated by ______ and ________

114. The potential salinity in water is given by the formula ________

115. If chloride concentration is more than 20 m.e/l, the water is considered ________

116. Classification of irrigation water as per USSL is based on __________ and _____

117. The headquarters of National Bureau of Soil Survey and Land Use Planning is located at ________

118. The number of regional centres under NBSS & LUP is ________

119. Soil survey unit in Tamilnadu was started at ______ and during _____

120. The number of soil survey units in Tamilnadu is ________ to conduct soil studies

PROBLEMS

1) Identify the order, sub order, great group, sub group, texture, mineralogy, temperature and moisture regime for the following soil description
   1) Loamy, mixed, isohyperthermic Typic Ustorthents
   2) Sandy, Mixed, isohyperthermic Typic Calciustepts
   3) Very fine, Smectitic, isohyperthermic, Typic Haplusterts
   4) Coarse loamy, mixed ,hyperthermic Ustic Haplocambid
   5) Fine loamy, mixed, mesic, Typic Calcixeroll
   6) Fine loamy, mixed, thermic Typic Haploustults
   7) Fine loamy, mixed, isohyperthermic Typic Haplustalf
   8) Fine, kaolinitic, isohyperthermic, Rhodic Haplustox

Format

Order	
Suborder	
Great group	
Subgroup	
Soil moisture regime	
Soil temperature regime	
Texture	
Mineralogy	

2) Calculate the amount of gypsum requirement of sodic soil using the following data
Weight of soil taken for analysis = 5 g
Volume of saturated calcium sulfate solution added = 100 ml
Volume of aliquot pipetted for analysis = 5 ml
Volume of 0.02N EDTA consumed in blank titration = 12 ml
Volume of 0.02N EDTA consumed in sample titration = 10 ml

2) Calculate separate amounts of carbonate and bicarbonate in the irrigation water using the following data
Volume of irrigation water pipetted = 50 ml
Volume of 0.1N H_2SO_4 consumed with phenolphthalein indicator = 2.5 ml
Volume of 0.1N H_2SO_4 consumed to neutralize original bicarbonate and bicarbonate from carbonate = 9.0 ml

3) Calculate separate amounts of calcium and magnesium in the irrigation water using th following data
Volume of irrigation water pipetted = 25 ml
Volume of 0.02N EDTA consumed in Calcium estimation = 3 ml
Volume of 0.02N EDTA consumed with Calcium and Magnesium estimation = 9 ml

4) Twenty five ml of irrigation water utilized 2.5 ml of 0.02N $AgNO_3$ using potassium chromate as indicator in the estimation of chloride by Mohr's method. Calculate the amount of chloride in the water and express the result in meq/l.

5) Calculate the amount of sulfate present in the irrigation water using the following data
Weight of empty silica crucible = 56.54 g
Weight of silica crucible and precipitate = 56.63 g

6) The irrigation water sample was analyzed for the following
CO_3^{2-} = 120 ppm, HCO_3^{-1} = 120 ppm, Ca^{2+} = 244 ppm, Mg^{2+} = 72 ppm, Na^{+} = 92 ppm,
Calculate SAR, RSC, RSBC and comment on its quality

7) The composition of the irrigation water used at the experimental station is given below along with that of drainage water from one of the experimental plots Calculate RSC and SAR and comment on its quality

Ion	Irrigation water(meq/l)	Drainage water(meq/l)
Ca	7.55	15.25
Mg	4.12	8.96
Na	12.65	27.32
CO_3	15.5	20.5
HCO_3	16.5	22.5

8) A sample of irrigation water gave the following results

Cations	Meq/l	Anion	Meq/l
Ca	5	CO_3	2
Mg	3	HCO_3	10
Na	21.6	-	-

Calculate RSC, SAR and give the opinion about the suitability of irrigation water for agriculture

9) Calculate the RSC of the water sample based on the following data and comment on its suitability

Volume of water sample used = 25 ml
Volume of 0.1N H_2SO_4 consumed with phenolphthalein = 2 ml
Volume of 0.1N H_2SO_4 consumed with methyl orange = 5 ml
Volume of 0.02N EDTA consumed with Ca titration = 0.5 ml
Volume of 0.02N EDTA consumed with Ca and Mg titration = 1.6 ml

10) Calculate SAR in the irrigation water using the following data and comment on its quality of water
Volume of irrigation water pipetted for analysis= 10 ml
Volume of 0.02N EDTA consumed with Ca titration = 0.6 ml
Volume of 0.02N EDTA consumed with Ca and Mg titration = 1.1 ml
Concentration of Na in the water sample as read from the standard graph = 63 ppm

11) Calculate CEC of the given soil using the following data
Weight of soil taken for analysis = 5 g
Volume of sodium acetate extract made up =100 ml
Concentration of sodium in the extract as read from the graph = 25 ppm (**10 times dilution)**

SOLUTION TO THE PROBLEMS

1) Weight of soil taken for analysis = 5 g
Volume of saturated calcium sulfate solution added = 100 ml
Volume of aliquot pipetted for analysis = 5 ml
Volume of 0.02N EDTA consumed in blank titration = 12 ml
Volume of 0.02N EDTA consumed in sample titration = 10 ml
Volume of 0.02N EDTA used up for Ca adsorbed by soil colloids = 12-8 ml
Meq of Ca = 0.02 x (12-10)
Meq. of Ca in 5 ml = (12-10) x 0.02
Meq. of Ca in 100 ml = (12-10) x 0.02 x 100/5
Meq. of Ca in 5 g soil = (12-10) x 0.02 x 100/5
Meq.of Ca in one hectare soil = (12-10) x 0.02 x 100/5x 100/5 x 2465000/100
In terms of gypsum (kg/ ha) = (12-10) x 0.02 x 100/5 X 100/5 x 2465000/100x86/1000
In terms of ton/ha = (12-10) x .02 x 100/5 x 100 / 5 x 2465000/100 x 86/1000 x 1/1000
Result: The gypsum requirement of sodic soil = **33.9 t/ha**

2) Volume of irrigation water pipetted = 50 ml
Volume of 0.1N H_2SO_4 consumed with phenolphthalein indicator = 2.5 ml
Volume of 0.1N H_2SO_4 consumed to neutralize original bicarbonate and bicarbonate from carbonate = 9.0 ml
Volume of 0.1N H_2SO_4 required to neutralize the bicarbonate alone = (9 – 2.5) ml
Volume of 0.1N H_2SO_4 required to neutralize the carbonate alone = 2.5 x 2 ml

Carbonate

One ml of 0.1N H_2SO_4 = 0.003 g of CO_3^-

2.5 x 2ml of 0.1N H_2SO_4 = 0.003 x 2 g of CO_3^-

50 ml of irrigation water contains = 0.003 x 2.5 x 2 g of CO_3^-

1000 x 1000 ml of irrigation water contains = $\frac{0.003 \times 2.5 \times 2 \times 1000 \times 1000}{50}$ ppm of CO_3^-

Equivalent weight of CO_3^- = 30

In terms of meq / l = $\frac{ppm}{Eq.wt}$

$$= \frac{0.003 \times 2.5 \times 2 \times 1000 \times 1000}{50 \times 30} = \mathbf{10}$$

Bicarbonate

One ml of 0.1N H_2SO_4 = 0.0061g of HCO_3^-

(9 – 2.5) ml of 0.1N H_2SO_4 = 0.0061 x (9 – 2.5) g of HCO_3^-

50 ml of irrigation water contains = 0.0061 x (9 – 2.5) g of HCO_3^-

1000 x 1000 ml of irrigation water contains = $\frac{0.0061 \times (9-2.5) \times 1000 \times 1000}{50}$ ppm of HCO_3^-

Equivalent weight of HCO_3^- = 61

In terms of meq / l = $\frac{ppm}{Eq.wt}$

$$\frac{0.0061 \times (9-2.5) \times 1000 \times 1000}{61 \times 50} = \mathbf{13}$$

Result;

Amount of carbonate present in irrigation water = **10 meq l^{-1}**

Amount of bicarbonate present in irrigation water = **13meql^{-1}**

3) Volume of irrigation water pipetted = 25 ml

Volume of 0.02N EDTA consumed in calcium estimation = 3 ml

Volume of 0.02N EDTA consumed with calcium and magnesium estimation = 9 ml

Volume of 0.02N EDTA used for Mg titration = (9 – 3) ml

Calcium

One ml of 0.02N EDTA = 0.0004 g of Ca

3 ml of 0.02N EDTA contains = 3 x 0.0004 g Ca

25 ml of water sample contains = 3 x 0.0004 g Ca

1000 x 1000 ml of water sample contains = $\frac{3 \times 0.0004 \times 1000 \times 1000}{25}$ ppm Ca^{2+}

Equivalent weight of calcium = 20

In terms of meq / litre = $\frac{ppm}{Eq.wt}$

$$= \frac{3 \times 0.0004 \times 1000 \times 1000}{25 \times 20} = \mathbf{2.4}$$

Magnesium

One ml of 0.02N EDTA = 0.0002432 g of Mg

(9 – 3) ml of 0.02N EDTA contains = (9 – 3) x 0.0002432 g Mg

25 ml of water sample contains = (9 – 3) x 0.0002432 g Mg

1000 x 1000 ml of water sample contains = $\frac{(9-3) \times 0.0002432 \times 1000 \times 1000}{25}$ ppm Mg^{2+}

Equivalent weight of magnesium = 12.16

In terms of meq / litre = $\frac{\text{ppm}}{\text{Eq. Wt.}}$

$$= \frac{(9-3) \times 0.0002432 \times 1000 \times 1000}{25 \times 12.16} = \mathbf{4.8}$$

Result

1. Amount of calcium present in the water sample = **2.4 meq l^{-1}**
2. Amount of magnesium present in the water sample = **4.8 meql^{-1}**

4) Volume of irrigation water taken for analysis = 25 ml

Volume of 0.02N $AgNO_3$ solution used in titration = 2.5 ml

One ml of 0.02N $AgNO_3$ = 0.00071 g Cl^-

2.5 ml of 0.02N $AgNO_3$ = 0.00071 x 2.5 g Cl^-

25 ml of irrigation water contains = $\frac{0.00071 \times 2.5 \times 1000 \times 1000}{25}$ ppm Cl-

Equivalent weight of chlorides = 35. 5

In terms of meq / l = $\frac{0.00071 \times 2.5 \times 1000 \times 1000}{25 \times 35.5} = \mathbf{2}$

Result

The amount of chloride in the given irrigation water = **2 meql^{-1}**

5) Volume of irrigation water used = 50 ml

Weight of empty silica crucible = 56.54 g

Weight of silica crucible and precipitate = 56.63 g

Weight of barium sulphate = (56.63 – 56.54) g

233.3 g of barium sulphate contains = 96 g sulphate

(56.63 – 56.54) g of barium sulphate = $\frac{96 \times (56.63 - 56.54)}{233.3}$

50 ml of irrigation water contains = $\frac{96 \times (56.63 - 56.54)}{233.3}$ g sulphate

1000 x 1000 ml of irrigation water contains = $\frac{96 \times (56.63 - 56.54) \times 1000 \times 1000}{233.3 \times 50}$ ppm SO_4^{2-}

Equivalent weight of sulphate = 48

In terms of meq/l = ppm/ eq. Wt. = $\frac{96 \times (56.63 - 56.54) \times 1000 \times 1000}{233.3 \times 50 \times 48}$ = **15.4**

Result

Amount of sulphate present in the water sample = **15.4 meql^{-1}**

6) CO_3^{2-} = 120 ppm, HCO_3^{-1} = 120 ppm, Ca^{2+} = 244 ppm, Mg^{2+} = 72 ppm, Na^+ = 92 ppm,

In terms of meq /l

CO_3^{2-} = 120/ 30 = 4, HCO_3^{-1} = 120/61 = 1.97, Ca^{2+} = 244/20 = 12.2, Mg^{2+} = 72/12.16 = 5.92, Na^+ = 92/23 = 4

1) Sodium absorption ratio = $\frac{Na^+}{\sqrt{\frac{Ca^{2+} + Mg^{2+}}{2}}}$

$$\frac{4}{\sqrt{\frac{12.2 + 5.92}{2}}} = \mathbf{1.33}$$

2) RSC = $[CO_3^{2-} + HCO_3^-] - [Ca^{2+} + Mg^{2+}]$

[4 + 1.97] – [12.2 + 5.92]

5.97- 18.12 = **-12.15**

3) RSBC = $[HCO_3^- - Ca^{2+}]$

[1.97- 12.2] = **-10.23**

Result

The given water sample is safe for irrigation with respect to all the three indices

7) **Irrigation water**

Ca^{2+} = 7.55, Mg^{2+} = 4.12, Na^+ = 12.65, CO_3^{2-} =15.5 and HCO_3 = 16.5

1) SAR= $\frac{12.65}{\sqrt{\frac{7.55 + 4.12}{2}}} = \frac{12.65}{2.42}$ = **5.22**

2) RSC = $[CO_3^{2-} + HCO_3^{-1}] - [Ca^{2+} + Mg^{2+}]$

[15.5 + 16.5] – [7.55 + 4.12]

[32] – [11.67] = **20.33**

Drainage water

Ca^{2+} =15.25, Mg^{2+} =8.96, Na^+ = 27.32, CO_3^{2-} =20.5 and HCO_3 = 22.5

$$SAR = \frac{27.32}{\sqrt{\frac{15.25 + 8.96}{2}}} = \frac{27.32}{3.48} = \mathbf{7.85}$$

RSC =-[CO_3^{2-} + HCO_3^{-1}] – [Ca^{2+} + Mg^{2+}]

[20.5 + 22.5] – [15.25 + 8.96]

[43] – [24.21]

= **18.79**

The results indicated that both irrigation and drainage water was normal with respect to sodic problem. While both waters showed alkalinity problem.

8) Ca = 5 meq/l, Mg= 3 meq/l, Na- 21.6 meq/l, CO_3^{2-} = 2 meq/l and HCO_3= 10 meq/l

RSC= =-[CO_3^{2-} + HCO_3^{-1}] – [Ca^{2+} + Mg^{2+}]

[2+ 10] –[5 + 3] = **4**

$$SAR = \frac{Na}{\sqrt{\frac{Ca^{2+} + Mg^{2+}}{2}}} \quad \frac{3}{\sqrt{\frac{5 + 3}{2}}} = ¾ = \mathbf{0.75}$$

The suitability of irrigation water with respect to RSC is unsafe and with respect to SAR is safe

9) Volume of water sample used = 25 ml

Volume of 0.1N H_2SO_4 consumed with phenolphthalein = 2 ml

Volume of 0.1N H_2SO_4 consumed with methyl orange = 5 ml

Volume of 0.02N EDTA consumed with Ca titration = 0.5 ml

Volume of 0.02N EDTA consumed with Ca and Mg titration = 1.6 ml

Carbonate

Volume of 0.1N H_2SO_4 required to neutralize the carbonate alone = 2.0 x 2 ml

One ml of 0.1N H_2SO_4 = 0.003 g of CO_3^-

2.0 x 2ml of 0.1N H_2SO_4 = 0.003 x 2 x 2 g of CO_3^-

25 ml of irrigation water contains = 0.003 x 2 x 2 g of CO_3^-

1000 x 1000 ml of irrigation water contains = $\frac{0.003 \times 2 \times 2 \times 1000 \times 1000}{25}$ ppm of CO_3^-

Equivalent weight of CO_3^- = 30

In terms of meq / l = $\frac{ppm}{Eq.wt}$

$$= \frac{0.003 \times 2 \times 2 \times 1000 \times 1000}{25 \times 30} = \mathbf{16}$$

Bicarbonate

Volume of 0.1N H_2SO_4 required to neutralize the bicarbonate alone = (5 – 2) ml

One ml of 0.1N H_2SO_4 = 0.0061g of HCO_3^-

(5 –2) ml of 0.1N H_2SO_4 = 0.0061 x (5 – 2) g of HCO_3^-

25 ml of irrigation water contains = 0.0061 x (5 – 2) g of HCO_3^-

1000 x 1000 ml of irrigation water contains = $\frac{0.0061 \times (5-2) \times 1000 \times 1000}{25}$ ppm of HCO_3^-

Equivalent weight of HCO_3^- = 61

In terms of meq / l = $\frac{ppm}{Eq.wt}$

$$\frac{0.0061 \times (5-2) \times 1000 \times 1000}{61 \times 25} = \mathbf{12}$$

Calcium

Volume of 0.02N EDTA consumed with Ca titration = 0.5 ml

One ml of 0.02N EDTA = 0.0004 g of Ca

0.5 ml of 0.02N EDTA contains = 0.5 x 0.0004 g Ca

25 ml of water sample contains = 0.5 x 0.0004 g Ca

1000 x 1000 ml of water sample contains = $\frac{0.5 \times 0.0004 \times 1000 \times 1000}{25}$ ppm Ca^{2+}

Equivalent weight of calcium = 20

In terms of meq / litre = $\frac{ppm}{Eq.wt}$

$$= \frac{0.5 \times 0.0004 \times 1000 \times 1000}{25 \times 20} = \mathbf{0.4}$$

Magnesium

Volume of 0.02N EDTA consumed with Ca and Mg titration = 1.6 ml

Volume of 0.02N EDTA used for Mg titration = (1.6 – 0.5) ml

One ml of 0.02N EDTA = 0.0002432 g of Mg

(1.6 – 0.5) ml of 0.02N EDTA contains = (1.6 – 0.5) x 0.0002432 g Mg

25 ml of water sample contains = (1.6 – 0.5) x 0.0002432 g Mg

1000 x 1000 ml of water sample contains = $\frac{(1.6-0.5) \times 0.0002432 \times 1000 \times 1000}{25}$ ppm Mg^{2+}

Equivalent weight of magnesium = 12.16

In terms of meq / litre = $\frac{ppm}{Eq. Wt.}$

$$= \frac{(1.6-0.5) \times 0.0002432 \times 1000 \times 1000}{25 \times 12.16} = \mathbf{0.88}$$

Residual sodium carbonate (RSC)

RSC= =-[CO_3^{2-} + HCO_3^{-1}] – [Ca^{2+} + Mg^{2+}]

[16 + 12] – [0.4 + 0.88] = **26.72**

Result

Based on RSC value, the given water is unsafe for irrigation

10) Volume of irrigation water pipetted for analysis= 10 ml

Volume of 0.02N EDTA consumed with Ca titration = 0.6 ml

Volume of 0.02N EDTA consumed with Ca and Mg titration = 1.1 ml

Concentration of Na in the water sample as read from the standard graph = 63 ppm

Calcium

Volume of 0.02N EDTA consumed with Ca titration = 0.6 ml

One ml of 0.02N EDTA = 0.0004 g of Ca

0.6 ml of 0.02N EDTA contains = 0.6 x 0.0004 g Ca

10 ml of water sample contains = 0.6 x 0.0004 g Ca

1000 x 1000 ml of water sample contains = $\frac{0.6 \times 0.0004 \times 1000 \times 1000}{10}$ ppm Ca^{2+}

Equivalent weight of calcium = 20

In terms of meq / litre = $\frac{ppm}{Eq.wt}$

$= \frac{0.6 \times 0.0004 \times 1000 \times 1000}{10 \times 20} = \mathbf{1.2}$

Magnesium

Volume of 0.02N EDTA consumed with Ca and Mg titration = 1.1 ml

Volume of 0.02N EDTA used for Mg titration = (1.1 – 0.6) ml

One ml of 0.02N EDTA = 0.0002432 g of Mg

(1.1 – 0.6) ml of 0.02N EDTA contains = (1.1 – 0.6) x 0.0002432 g Mg

10 ml of water sample contains = (1.1 – 0.6) x 0.0002432 g Mg

1000 x 1000 ml of water sample contains = $\frac{(1.1-0.6) \times 0.0002432 \times 1000 \times 1000}{10}$ ppm Mg^{2+}

Equivalent weight of magnesium = 12.16

In terms of meq / litre = $\frac{ppm}{Eq.\ Wt.}$

$$= \frac{(1.1-0.6) \times 0.0002432 \times 1000 \times 1000}{10 \times 12.16} = \mathbf{1.0}$$

Sodium

Concentration of Na in the water sample as read from the standard graph = 63 ppm

In terms of meq/l = 63/23 = **2.74**

Sodium absorption ratio (SAR)

$$SAR = \frac{Na}{\sqrt{\frac{Ca^{2+} + Mg^{2+}}{2}}} = \frac{2.74}{\sqrt{\frac{1.2 + 1.0}{2}}} = \mathbf{2.61}$$

Result

Based on SAR value, the given water is safe for irrigation

11) Weight of soil taken for analysis = 5 g

Volume of sodium acetate extract made up =100 ml

Concentration of sodium in the extract as read from the graph = 25 ppm (10 times dilution)

100 ml of sodium acetate extract contains = 25 ppm of Na

W g of soil contains = $\frac{25 \times 10 \times 100}{5}$ ppm Na

Meq of Na/100 g soil = $\frac{25 \times 10 \times 100}{5 \times 10 \times 23}$ = 21.7 cmol (p^{+}) kg^{-1}

Result

The CEC of given soil **= 21.7 cmol (p+) kg^{-1}**

Description	Soil Order	Sub order	Great Group	Sub Group	SMR	STR	Texture	Mineralogy
Loamy, mixed, isohyperthermic Typic Ustorthents	Entisol	Orthents	Ustorthents	Typic Ustorthents	Ustic	isohyperthermic	Loamy	Mixed
Sandy, Mixed, isohyperthermic Typic Calciustepts	Inceptisols	Ustepts	Calciustepts	Typic Calciustepts	Ustic	Isohyperthermic	Sandy	Mixed
Very fine, Smectitic, isohyperthermic, Typic Haplusterts	Vertisol	Usterts	Haplusterts	Typic Haplusterts	Ustic	Isohyperthermic	Very fine	Smectitic
Coarse loamy, mixed ,hyperthermic Ustic Haplocambid	Aridisol	Cambid	Haplocambid	Ustic Haplocambid	Ustic	Hyperthermic	Coarse loamy	Mixed
Fine loamy, mixed, mesic, Typic Calcixeroll	Mollisol	Xeroll	Calcixeroll	Typic Calcixeroll	Xeric	Mesic	Fine loamy	Mixed
Fine loamy, mixed, thermic Typic Haploustults	Ultisols	Ustults	Haploustults	Typic Haploustults	Ustic	Thermic	Fine loamy	Mixed
Fine loamy, mixed, isohyperthermic Typic Haplustalf	Alfisols	Ustalfs	Haplustalf	Typic Haplustalf	Ustic	Isohyperthermic	Fine loamy	Mixed
Fine, kaolinitic, isohyperthermic, Rhodic Haplustox	Oxisol	Ustox	Haplustox	Rhodic Haplustox	Ustic	Isohyperthermic	Fine	Kaolinitic

Fill up the blanks

1	Soil Survey	39	Soil map
2	Rectangular	40	Base map
3	Horizons	41	Taxonomic unit
4	Thickness , irregularity	42	Aerial photograph , satellite imageries
5	Smooth, wavy, irregular, broken	43	Toposheets
6	Mottles	44	DSS
7	Abundance, size , shape	45	½ to 1 km
8	Dilute HCl	46	640 acre
9	Amimal	47	3 to 6 km
10	Histic	48	1: 50,000
11	Ochric	49	1: 4000 or 1: 8000
12	Natric	50	Soil series and association
13	Erts	51	Soil types and phases
14	Mollic	52	RSS
15	Alfisols	53	DSS
16	Histosols	54	Taluk or district
17	Oxisols	55	Village or block
18	Soil profile	56	Small scale
19	12	57	Large scale
20	I inch = 1 mile	58	DSS
21	Cadastral / Village	59	RSS
22	Small scale map	60	Low intensity
23	Soil types, soil phases	61	High Intensity
24	seven	62	1: 1 million
25	order	63	1: 250.000
26	Soil series	64	1: 50,000 or 1:10000
27	Vertisol	65	Storie
28	Entisol	66	Good
29	Histosol	67	Potential productivity/ productivity
30	Mollisol	68	Capability units
31	Vertisol	69	Increases
32	Spodosol	70	cultivation
33	Entisol	71	Unsuitable
34	Oxisol	72	Surface texture
35	Aquic to Xeric	73	Soil survey maps
36	Pergelic to isothermic	74	Order and Class
37	Diagnostic horizons	75	pH
38	SMR and STR	76	Buchner funnel

77	Vacuum	99	Flesh red
78	Soil EC	100	35.5
79	Saline and Non-saline soil	101	Phenolphthalein
80	Saturation paste	102	Methyl orange
81	Sodium acetate	103	30
82	Acid soil	104	120 ppm
83	Buffer , Shoemaker et al., (1961)	105	Gravimetric
84	Schoonover et al., (1952)	106	48
85	Eriochrome black T	107	$Na/\sqrt{\frac{Ca + Mg}{2}}$
86	86	108	Moderately safe
87	Gypsum	109	Silver chromate
88	EDTA or Versenate	110	Unsuitable
89	20	111	$Na / \sqrt{Ca}$
90	12.16	112	one
91	0.0004 g	113	RSC and RSBC
92	0.0002432 g	114	$Cl^- + ½ SO_4$
93	Mureoxide	115	Not suitable
94	Eriochrome black T	116	EC and SAR
95	Eq Wr	117	Nagpur
96	Flame photometer	118	Five
97	Potassium chromate	119	Coimbatore , 1970
98	0.00071 g	120	four