

63 Soil Sciences ICAR SEPT 2022

Topic:- GEN KNOW COMMON PHD

1) Colour of the tag used on certified seed bags is[Question ID = 16958][Question Description = 101_221_GKD_SEP22_Q01]

1. Blue [Option ID = 37829]
2. Purple [Option ID = 37830]
3. White [Option ID = 37831]
4. Golden Yellow [Option ID = 37832]

2) Following are the statements regarding the Usar soil -

- A. It is reclaimed by adding lime.
- B. This soil has pH more than seven.
- C. Paddy crop can be grown in this soil.

Choose the *correct* answer from the options given below:

[Question ID = 16959][Question Description = 102_221_GKD_SEP22_Q02]

1. A and B only [Option ID = 37833]
2. B and C only [Option ID = 37834]
3. C only [Option ID = 37835]
4. A only [Option ID = 37836]

3) When total utility of a commodity increases, marginal utility will be

[Question ID = 16960][Question Description = 103_221_GKD_SEP22_Q03]

1. Negative but increasing
[Option ID = 37837]
2. Positive but decreasing
[Option ID = 37838]
3. Constant
[Option ID = 37839]
4. Either positive or negative
[Option ID = 37840]

4) Where is the headquarter of International Fund for Agriculture Development located?

[Question ID = 16961][Question Description = 104_221_GKD_SEP22_Q04]

1. Vienna, Austria
[Option ID = 37841]
2. Rome, Italy
[Option ID = 37842]
3. New York, USA
[Option ID = 37843]
4. Berlin, Germany
[Option ID = 37844]

5) Mid-Oceanic Ridges are one of the important divisions of the ocean floor. In this respect, point out the incorrect statement regarding the 'Mid-Oceanic Ridges'. [Question ID = 16962][Question Description = 105_221_GKD_SEP22_Q05]

1. It is the largest mountain chain on the surface of the earth [Option ID = 37845]
2. It is a series of interconnected chain within the ocean. [Option ID = 37846]
3. It is characterised by a central rift system [Option ID = 37847]
4. The rift system at the crest is the zone of very low volcanic activity. [Option ID = 37848]

6) Consider the following facts about the union territory of India and point out the one which is incorrect in relation to union territory.[Question ID = 16963][Question Description = 106_221_GKD_SEP22_Q06]

1. These are the areas under the direct control of central government. [Option ID = 37849]
2. Also known as the 'centrally administered territories. [Option ID = 37850]

3. These territories constitute a conspicuous departure from the unitary feature of India. [Option ID = 37851]
4. There is no uniformity in their administrative systems. [Option ID = 37852]

7) Variety of flora and fauna are found in the different types of forest in India. In this regard, species of trees like teak, *sal shisham*, *sandalwood*, etc. are found in which of the following type of forests in India?[Question ID = 16964][Question Description = 107_221_GKD_SEP22_Q07]

1. Tropical evergreen forests [Option ID = 37853]
2. Tropical thorn forests [Option ID = 37854]
3. Tropical deciduous forests [Option ID = 37855]
4. Montane forests [Option ID = 37856]

8) The Marginal Preference Theory of consumption behaviour was proposed by

[Question ID = 16965][Question Description = 108_221_GKD_SEP22_Q08]

1. Armstrong
[Option ID = 37857]
2. J.K.Hicks
[Option ID = 37858]
3. Neumann
[Option ID = 37859]
4. Edmund Cannon
[Option ID = 37860]

9) Point out the incorrect statements regarding the service sector in India.[Question ID = 16966][Question Description = 109_221_GKD_SEP22_Q09]

1. It is the highest contributor to GDP [Option ID = 37861]
2. It requires skilled labour [Option ID = 37862]
3. It is the fastest growing sector [Option ID = 37863]
4. It is restricted to very few sectors. [Option ID = 37864]

10) Consider the statements regarding the agriculture sector in India and point out the incorrect statement.[Question ID = 16967][Question Description = 110_221_GKD_SEP22_Q10]

1. Agriculture sector is the largest employer of workforce [Option ID = 37865]
2. It has contributed to the Gross Value Added (GVA) [Option ID = 37866]
3. Growth in allied sectors is the major drivers of overall growth in the sector. [Option ID = 37867]
4. Minimum Support Price (MSP) policy is used as to promote crop uniformity. [Option ID = 37868]

11) In case of related goods, the cross elasticity of demand is[Question ID = 16968][Question Description = 111_221_GKD_SEP22_Q11]

1. Low [Option ID = 37869]
2. High [Option ID = 37870]
3. Zero [Option ID = 37871]
4. Unity [Option ID = 37872]

12) With reference to organic farming in India, consider the following statements :

- A. The National Programme for Organic Production' (NPOP) is operated under the guidelines and directions of the Union Ministry of Rural Development.
- B. The Agricultural and Processed Food Products Export Development Authority' (APEDA) functions as the Secretariat for the implementation of NPOP.
- C. Sikkim has become India's first fully organic state.

Choose the *correct* answer from the options given below:

[Question ID = 16969][Question Description = 112_221_GKD_SEP22_Q12]

1. A and B only
[Option ID = 37873]
2. B and C only
[Option ID = 37874]
3. C only
[Option ID = 37875]
4. A, B and C

[Option ID = 37876]

13) With reference to the circumstances in Indian agriculture, the concept of "Conservation Agriculture" assumes significance. Which of the following falls under the Conservation Agriculture ?

- A. Avoiding the monoculture practices.
- B. Adopting minimum tillage.
- C. Avoiding the cultivation of plantation crops.
- D. Using crop residues to cover soil surface.
- E. Adopting spatial and temporal crop sequencing/ crop rotations.

Choose the *correct* answer from the options given below:

[Question ID = 16970][Question Description = 113_221_GKD_SEP22_Q13]

- 1. A, C and D only [Option ID = 37877]
- 2. B, C, D and E only [Option ID = 37878]
- 3. B, D and E only [Option ID = 37879]
- 4. A, B, C and E only [Option ID = 37880]

14) Consumers are likely to get a variety of goods in which kind of market competition[Question ID = 16971][Question Description = 114_221_GKD_SEP22_Q14]

- 1. Monopoly [Option ID = 37881]
- 2. Duopoly [Option ID = 37882]
- 3. Oligopoly [Option ID = 37883]
- 4. Monopolistic [Option ID = 37884]

15) What is the correct chronological order of the following laws enacted for the conservation and protection of environment ?

- A. Environment (Protection) Act.
- B. Water (Prevention & Control of Pollution) Act.
- C. Air (Prevention & Control of pollution) Act.
- D. National Green Tribunal Act.

Choose the *correct* answer from the options given below:

[Question ID = 16972][Question Description = 115_221_GKD_SEP22_Q15]

- 1. B, C, A, D [Option ID = 37885]
- 2. A, B, C, D [Option ID = 37886]
- 3. C, B, A, D [Option ID = 37887]
- 4. D, C, B, A [Option ID = 37888]

16) The scientific study of soil is[Question ID = 16973][Question Description = 116_221_GKD_SEP22_Q16]

- 1. Earth Study [Option ID = 37889]
- 2. Soil Science [Option ID = 37890]
- 3. Pedology [Option ID = 37891]
- 4. Soil Chemistry [Option ID = 37892]

17) *Triticum aestivum*, the common bread wheat is -

[Question ID = 16974][Question Description = 117_221_GKD_SEP22_Q17]

- 1. Tetraploid
[Option ID = 37893]
- 2. Hexaploid
[Option ID = 37894]
- 3. Haploid
[Option ID = 37895]
- 4. Diploid
[Option ID = 37896]

18) Sectoral inflation refers to[Question ID = 16975][Question Description = 118_221_GKD_SEP22_Q18]

- 1. Running inflation [Option ID = 37897]

2. Comprehensive inflation [Option ID = 37898]
3. Sporadic inflation [Option ID = 37899]
4. Creeping inflation [Option ID = 37900]

19) Keynes Liquidity trap refers to[Question ID = 16976][Question Description = 119_221_GKD_SEP22_Q19]

1. Speculative demand for money [Option ID = 37901]
2. Transactions motive of money is inelastic [Option ID = 37902]
3. Precautionary motive of money is inelastic [Option ID = 37903]
4. Transactions motive of money is constant [Option ID = 37904]

20) A business is solvent if[Question ID = 16977][Question Description = 120_221_GKD_SEP22_Q20]

1. Total receipts exceed total expenditures [Option ID = 37905]
2. Total debt exceeds total equity [Option ID = 37906]
3. Total sales exceed total cash expense [Option ID = 37907]
4. Total assets exceed total liabilities [Option ID = 37908]

Topic:- Natural Resource Mgmt 2_PHD

1) The maximum permissible limit of biuret in urea as per FCO for foliar application is

[Question ID = 16353][Question Description = 101_152_NRM2_SEP22_Q01]

1. <0.25
[Option ID = 35409]
2. >1.00%
[Option ID = 35410]
3. <2.5%
[Option ID = 35411]
4. <0.5%
[Option ID = 35412]

2) Following are the statements about Molybdenum (Mo)

- A. It comes under the category of beneficial elements
- B. It is absorbed by plants as MoO_4^{2-}
- C. It moves to plant roots largely through diffusion
- D. Deficiency of Mo increase with a decrease in soil pH
- E. Deficiency of Mo can be prevented or overcome through seed treatment prior to planting or by spraying it on crop foliage

Choose the *correct* answer from the options given below

[Question ID = 16354][Question Description = 102_152_NRM2_SEP22_Q02]

1. A, C and D
[Option ID = 35413]
2. B, C and E
[Option ID = 35414]
3. B, D and E
[Option ID = 35415]
4. A, C and E
[Option ID = 35416]

3) Given below are two statements

Statement I: Generally, a large fraction of the carbon fixed prior to the seed filling is remobilized towards seed

Statement II: A small amount of photosynthates currently assimilated are utilized by the tissues that are currently growing actively, prior to seed filling

In light of the above statements, choose the *most appropriate* answer from the options given below

[Question ID = 16355][Question Description = 103_152_NRM2_SEP22_Q03]

1. Both Statement I and Statement II are correct [Option ID = 35417]
2. Both Statement I and Statement II are incorrect [Option ID = 35418]

3. Statement I is correct but Statement II is incorrect [Option ID = 35419]
4. Statement I is incorrect but Statement II is correct [Option ID = 35420]

4) Frost-stress tolerant rapeseed-mustard varieties are

[Question ID = 16356][Question Description = 104_152_NRM2_SEP22_Q04]

1. Pusa Mustard 26 and Navgold [Option ID = 35421]
2. RGN 145 and Vardan [Option ID = 35422]
3. Pusa Gold and Geeta [Option ID = 35423]
4. RH 819 and RGN 48 [Option ID = 35424]

5) Which type of cotton provides the highest ginning percentage?

[Question ID = 16357][Question Description = 105_152_NRM2_SEP22_Q05]

1. *Gossypium barbadense* [Option ID = 35425]
2. *Gossypium hirsutum* [Option ID = 35426]
3. *Gossypium arboreum* [Option ID = 35427]
4. No variation of ginning percentage among different types of cotton [Option ID = 35428]

6) Which among the following experimental designs is the least accurate one?

[Question ID = 16358][Question Description = 106_152_NRM2_SEP22_Q06]

1. CRD [Option ID = 35429]
2. RCBD [Option ID = 35430]
3. Split-plot Design [Option ID = 35431]
4. Strip-plot Design [Option ID = 35432]

7) When the yellow sarson should be harvested to obtain the highest oil content in seeds?[Question ID = 16359][Question Description = 107_152_NRM2_SEP22_Q07]

1. 27 days after flowering [Option ID = 35433]
2. 37 days after flowering [Option ID = 35434]
3. 47 days after flowering [Option ID = 35435]
4. 67 days after flowering [Option ID = 35436]

8) A wetland wooden plough ordinarily covers about _____ ha area in eight hours for the first puddling.[Question ID = 16360][Question Description = 108_152_NRM2_SEP22_Q08]

1. 0.28 [Option ID = 35437]
2. 0.24 [Option ID = 35438]
3. 0.16 [Option ID = 35439]
4. 0.10 [Option ID = 35440]

9) Maize and pigeonpea are sown in 250 m² in 1:1 ratio in replacement series of intercropping. The production of maize and pigeonpea from this intercropping is 150 and 25 kg, respectively. What is the intercrop yield of pigeonpea in q/ha?

[Question ID = 16361][Question Description = 109_152_NRM2_SEP22_Q09]

1. 2000 [Option ID = 35441]
2. 20 [Option ID = 35442]
3. 1000 [Option ID = 35443]
4. 10 [Option ID = 35444]

10) For a given level of soil fertility, decrease in soil moisture supply is associated with a definite increase in concentration of which nutrient in plant tissue?[Question ID = 16362][Question Description = 110_152_NRM2_SEP22_Q10]

1. Nitrogen [Option ID = 35445]
2. Phosphorus [Option ID = 35446]
3. Potassium [Option ID = 35447]
4. Calcium [Option ID = 35448]

11) Which anti-nutritional factor present in lentil reacts with lysine and methionine and reduces their availability during digestion process in human body?

[Question ID = 16363][Question Description = 111_152_NRM2_SEP22_Q11]

1. Phytic acid [Option ID = 35449]
2. Condensed tannins [Option ID = 35450]
3. Saponins [Option ID = 35451]
4. Phytolcithins [Option ID = 35452]

12) Which of the nitrogenous fertilizers has the highest salt index value

[Question ID = 16364][Question Description = 112_152_NRM2_SEP22_Q12]

1. Ammonium sulphate [Option ID = 35453]
2. Ammonium chloride [Option ID = 35454]
3. Ammonium nitrate [Option ID = 35455]
4. Calcium ammonium nitrate [Option ID = 35456]

13) Soil most suitable for corrugation irrigation

[Question ID = 16365][Question Description = 113_152_NRM2_SEP22_Q13]

1. Saline soil [Option ID = 35457]
2. Clay soil [Option ID = 35458]
3. Loam soil [Option ID = 35459]
4. Sandy soil [Option ID = 35460]

14) Equipment that provides a direct measure of the tenacity with which water is held by the soils

[Question ID = 16366][Question Description = 114_152_NRM2_SEP22_Q14]

1. Tensiometer [Option ID = 35461]
2. Pressure plate equipment [Option ID = 35462]
3. Neutron moisture meter [Option ID = 35463]
4. Gypsum block [Option ID = 35464]

15) In the “stability series” of weatherability of minerals, the least stable mineral which has independent tetrahedron is:

[Question ID = 16367][Question Description = 115_152_NRM2_SEP22_Q15]

1. Olivine [Option ID = 35465]
2. Biotite [Option ID = 35466]
3. Amphiboles [Option ID = 35467]
4. Mg-pyroxenes [Option ID = 35468]

16) The Universal Soil Loss Equation (USLE) as presented by expression

($A = R \times K \times L \times S \times C \times P$) is proposed by:

[Question ID = 16368][Question Description = 116_152_NRM2_SEP22_Q16]

1. Wischmeier and Smith (1978) [Option ID = 35469]
2. Wischmeier (1959) [Option ID = 35470]
3. Zingg (1940) [Option ID = 35471]
4. Smith (1941) [Option ID = 35472]

17) As per International Union of Soil Sciences (IUSS), the size (diameter) of silt is:

[Question ID = 16369][Question Description = 117_152_NRM2_SEP22_Q17]

1. 0.002 mm [Option ID = 35473]
2. 0.02 mm [Option ID = 35474]
3. 0.2 mm [Option ID = 35475]
4. 2.0 mm [Option ID = 35476]

18) Given below are two statements

Statement I: The configuration of land surface is known as ‘topography’ or relief.

Statement II: Topography influences soil formation primarily through its effects on modifying water and temperature relations.

In light of the above statements, choose the *correct* answer from the options given below

[Question ID = 16370][Question Description = 118_152_NRM2_SEP22_Q18]

1. Both Statement I and Statement II are true [Option ID = 35477]
2. Both Statement I and Statement II are false [Option ID = 35478]
3. Statement I is true but Statement II is false [Option ID = 35479]
4. Statement I is false but Statement II is true [Option ID = 35480]

19) The pedogenic process involving removal of silica from soil and accumulation of sesquioxides (goethite, gibbsite, etc.) with or without the formation of iron stone and concretions is known as:

[Question ID = 16371][Question Description = 119_152_NRM2_SEP22_Q19]

1. Ferruginisation [Option ID = 35481]
2. Podzolization [Option ID = 35482]
3. Laterization [Option ID = 35483]
4. Baunification [Option ID = 35484]

20) *Kaolinite group* of minerals includes a number of clay minerals such as:

- A. Kaolinite
- B. Halloysite
- C. Dickite
- D. Phlogopite

Choose the *correct* answer from the options given below:

[Question ID = 16372][Question Description = 120_152_NRM2_SEP22_Q20]

- 1. A, B and C only [Option ID = 35485]
- 2. A, B and D only [Option ID = 35486]
- 3. A, C and D only [Option ID = 35487]
- 4. B, C and D only [Option ID = 35488]

21) Adsorption process involves accumulation of the substance adsorbed[Question ID = 16373][Question Description = 121_152_NRM2_SEP22_Q21]

- 1. Throughout the body of the substance adsorbing it. [Option ID = 35489]
- 2. On the surface of the adsorbing substance. [Option ID = 35490]
- 3. In a solution in contact with the adsorbing substance. [Option ID = 35491]
- 4. Below the adsorbing substance. [Option ID = 35492]

22) Micronutrient cations are extracted with DTPA extractant which consisted of:[Question ID = 16374][Question Description = 122_152_NRM2_SEP22_Q22]

- 1. 0.05 M DTPA + 0.1 M TEA + 0.01 M CaCl_2 [Option ID = 35493]
- 2. 0.05 M DTPA + 0.1 M TEA + 0.1 M CaCl_2 [Option ID = 35494]
- 3. 0.005 M DTPA + 0.1 M TEA + 0.01 M CaCl_2 [Option ID = 35495]
- 4. 0.05 M DTPA + 0.1 M TEA + 0.1 M CaCl_2 [Option ID = 35496]

23) A number of temporary yet dramatic changes occur in the NH_3 retention zone after application of anhydrous NH_3 in soil. These are:

- A. A retention zone of both ammonia (NH_3) and ammonium (NH_4^+) having circular to oval shape (3-13 cm diameter) is formed.
- B. The concentrations of both NH_3 and NH_4^+ are increased in the range of 1000-3000 ppm.
- C. Concentration of NO_2^- (nitrite) is increased to toxic levels (100-300 ppm) because *Nitrobacter* is much more sensitive to high pH (9.0-9.5) than *Nitrosomonas*.
- D. Population of microorganisms increased tremendously because free NH_3 (non-ionized NH_4) is less toxic to plants, animals, microorganisms.

Choose the *correct* answer from the options given below:

[Question ID = 16375][Question Description = 123_152_NRM2_SEP22_Q23]

- 1. A, B and D only [Option ID = 35497]
- 2. A, B and C only [Option ID = 35498]
- 3. A, C and D only [Option ID = 35499]
- 4. B, C and D only [Option ID = 35500]

24) When a soil solution is concentrated four times, the activity ratio of potassium (K)-calcium (Ca) in solution will[Question ID = 16376][Question Description = 124_152_NRM2_SEP22_Q24]

- 1. Increase eight times [Option ID = 35501]
- 2. Decrease two times [Option ID = 35502]
- 3. Increase two times [Option ID = 35503]
- 4. Decrease four times [Option ID = 35504]

25) Given below are two statements, one is labelled as Assertion A and the other is labelled as Reason R

Assertion A: Nickel is associated with nitrogen metabolism by way of influencing urease activity.

Reason R: In systems where urea is used as the sole N fertilizer for foliar spray and nickel supply is poor, lower urease activity causes urea toxicity to the foliage and leads to severe necrosis of the root tips.

In light of the above statements, choose the *correct* answer from the options given below

[Question ID = 16377][Question Description = 125_152_NRM2_SEP22_Q25]

1. Both A and R are true and R is the correct explanation of A [Option ID = 35505]
2. Both A and R are true but R is NOT the correct explanation of A [Option ID = 35506]
3. A is true but R is false [Option ID = 35507]
4. A is false but R is true [Option ID = 35508]

26) Match List I with List II

List I	List II
A. Iron	I. Eriochrome Black T
B. Boron	II. Ferric alum
C. Chlorine	III. Orthophenanthroline
D. Calcium	IV. Azomethine-H

Choose the correct answer from the options given below:

[Question ID = 16378][Question Description = 126_152_NRM2_SEP22_Q26]

1. A-II, B-I, C-IV, D-III [Option ID = 35509]
2. A-IV, B-II, C-III, D-I [Option ID = 35510]
3. A-III, B-IV, C-II, D-I [Option ID = 35511]
4. A-I, B-III, C-II, D-IV [Option ID = 35512]

27) "Contaf" is a trade name of[Question ID = 16379][Question Description = 127_152_NRM2_SEP22_Q27]

1. Hexaconazole [Option ID = 35513]
2. Propiconazole [Option ID = 35514]
3. Imidacloprid [Option ID = 35515]
4. Cyhalothrin [Option ID = 35516]

28) Which of the following two pesticides should NOT be stored together?

[Question ID = 16380][Question Description = 128_152_NRM2_SEP22_Q28]

1. Insecticide and fungicide [Option ID = 35517]
2. Fungicide and rodenticide [Option ID = 35518]
3. Fungicide and plant growth regulator [Option ID = 35519]
4. Insecticide and herbicide [Option ID = 35520]

29) Diflubenzuron is an example of[Question ID = 16381][Question Description = 129_152_NRM2_SEP22_Q29]

1. Ecdysone inhibitor [Option ID = 35521]
2. Herbicide [Option ID = 35522]
3. Chitin synthesis inhibitor [Option ID = 35523]
4. Plant growth regulator [Option ID = 35524]

30) Rubber is an example of[Question ID = 16382][Question Description = 130_152_NRM2_SEP22_Q30]

1. Monoterpene [Option ID = 35525]
2. Diterpene [Option ID = 35526]
3. Triterpene [Option ID = 35527]
4. Polyterpene [Option ID = 35528]

31) Number of carbon present in monoterpene[Question ID = 16383][Question Description = 131_152_NRM2_SEP22_Q31]

1. 5 [Option ID = 35529]
2. 10 [Option ID = 35530]
3. 15 [Option ID = 35531]
4. 20 [Option ID = 35532]

32) Which crop can tolerate the exchangeable sodium percentage of 70 better than crops?

[Question ID = 16384][Question Description = 132_152_NRM2_SEP22_Q32]

1. Rice
[Option ID = 35533]
2. Barley
[Option ID = 35534]
3. Beets
[Option ID = 35535]
4. Mustard
[Option ID = 35536]

33) A 10 mg propiconazole in 1 L solvent makes solution concentration of

[Question ID = 16385][Question Description = 133_152_NRM2_SEP22_Q33]

1. 0.01 ppm [Option ID = 35537]
2. 0.001 ppm [Option ID = 35538]
3. 0.1 ppm [Option ID = 35539]
4. 1 ppm [Option ID = 35540]

34) Calculate the concentration of the solution (0.1gm/ml) when it is diluted 100 times

[Question ID = 16386][Question Description = 134_152_NRM2_SEP22_Q34]

1. 0.1 ppm [Option ID = 35541]
2. 1.0 ppm [Option ID = 35542]
3. 10.0 ppm [Option ID = 35543]
4. 0.01 ppm [Option ID = 35544]

35) Piperonyl butoxide is a[Question ID = 16387][Question Description = 135_152_NRM2_SEP22_Q35]

1. Fungicide [Option ID = 35545]
2. Insecticide [Option ID = 35546]
3. Herbicide safener [Option ID = 35547]
4. Insecticide synergist [Option ID = 35548]

36) Total number of pesticides registered in India till date range between

[Question ID = 16388][Question Description = 136_152_NRM2_SEP22_Q36]

1. 280-290 [Option ID = 35549]
2. 290-300 [Option ID = 35550]
3. 300-310 [Option ID = 35551]
4. 310-320 [Option ID = 35552]

37) According to recent data, which of the following groups of pesticides is being used maximum by farmers worldwide?

[Question ID = 16389][Question Description = 137_152_NRM2_SEP22_Q37]

1. Rodenticide [Option ID = 35553]
2. Herbicide [Option ID = 35554]
3. Fungicide [Option ID = 35555]
4. Insecticide [Option ID = 35556]

38) Jasmolin is linked to[Question ID = 16390][Question Description = 138_152_NRM2_SEP22_Q38]

1. *Tanacetum* sp [Option ID = 35557]
2. *Eucalyptus* sp [Option ID = 35558]
3. *Cynodon* sp [Option ID = 35559]
4. *Phalaris* sp [Option ID = 35560]

39) Kakrapara project was implemented on the river

[Question ID = 16391][Question Description = 139_152_NRM2_SEP22_Q39]

1. Chenab
[Option ID = 35561]
2. Tapti
[Option ID = 35562]
3. Godavari
[Option ID = 35563]
4. Koyana
[Option ID = 35564]

40) The founding Chairman of Central Water Commission

[Question ID = 16392][Question Description = 140_152_NRM2_SEP22_Q40]

1. Dr. B.R. Ambedkar [Option ID = 35565]
2. Dr. R. K. Gupta [Option ID = 35566]
3. Dr. A. N. Khosla [Option ID = 35567]
4. Dr. Rajendra Prasad [Option ID = 35568]

41) The ICAR was bestowed with 'the King Baudouin Development Prize International' in 1989 and 2004. The King Baudouin Foundation (KBF) was set up on the occasion of the 25th anniversary of King Baudouin's reign to sponsor the award is based in which country?

[Question ID = 16393][Question Description = 141_152_NRM2_SEP22_Q41]

1. Philippines

[Option ID = 35569]

2. Indonesia

[Option ID = 35570]

3. South Africa

[Option ID = 35571]

4. Belgium

[Option ID = 35572]

42) AMRUT 2.0 programme was launched on

[Question ID = 16394][Question Description = 142_152_NRM2_SEP22_Q42]

1. March 22, 2021 [Option ID = 35573]

2. March 12, 2021 [Option ID = 35574]

3. October 1, 2021 [Option ID = 35575]

4. April 24, 2022 [Option ID = 35576]

43) The foundation day of ICAR-Indian Institute of Water Management is [Question ID = 16395][Question Description = 143_152_NRM2_SEP22_Q43]

1. July 16 [Option ID = 35577]

2. February 22 [Option ID = 35578]

3. April 23 [Option ID = 35579]

4. May 12 [Option ID = 35580]

44) Publisher of 'Water Resources Management' journal [Question ID = 16396][Question Description = 144_152_NRM2_SEP22_Q44]

1. John Wiley and Sons [Option ID = 35581]

2. Elsevier [Option ID = 35582]

3. Springer [Option ID = 35583]

4. Taylor and Francis [Option ID = 35584]

45) The Brahmaputra river enters at which place of Arunachal Pradesh in India? [Question ID = 16397][Question Description = 145_152_NRM2_SEP22_Q45]

1. Tawang [Option ID = 35585]

2. Bhalukpong [Option ID = 35586]

3. Changlang [Option ID = 35587]

4. Dihang [Option ID = 35588]

46) 'AMRUT' scheme is implemented by which ministry

[Question ID = 16398][Question Description = 146_152_NRM2_SEP22_Q46]

1. Ministry of Jal Shakti [Option ID = 35589]

2. Ministry of Environment, Forest and Climate Change [Option ID = 35590]

3. Ministry of Housing and Urban Affairs [Option ID = 35591]

4. Ministry of Agriculture and Farmers' Welfare [Option ID = 35592]

47) Soil moisture deficiency level for scheduling irrigation in jute [Question ID = 16399][Question Description = 147_152_NRM2_SEP22_Q47]

1. 40 - 50 % [Option ID = 35593]

2. 50 - 60 % [Option ID = 35594]

3. 60 - 70 % [Option ID = 35595]

4. 30 - 40 % [Option ID = 35596]

48) Water man of India [Question ID = 16400][Question Description = 148_152_NRM2_SEP22_Q48]

1. Pavan Sukhdev [Option ID = 35597]

2. Rattan Lal [Option ID = 35598]

3. Anna Hazare [Option ID = 35599]

4. Rajendra Singh [Option ID = 35600]

49) 'Bunga' watershed is located in

[Question ID = 16401][Question Description = 149_152_NRM2_SEP22_Q49]

1. Uttarakhand [Option ID = 35601]

2. Chandigarh [Option ID = 35602]

3. Madhya Pradesh [Option ID = 35603]
4. Chhatisgarh [Option ID = 35604]

50) The state having highest water resources

[Question ID = 16402][Question Description = 150_152_NRM2_SEP22_Q50]

1. Odisha [Option ID = 35605]
2. Punjab [Option ID = 35606]
3. Tamilnadu [Option ID = 35607]
4. Uttar Pradesh [Option ID = 35608]

Topic:- 63 Soil Sciences_PHD

1) Which of the following statements is/are correct about acid sulphate soils?

- A. Contains high amount of pyrite (FeS_2)
- B. Has soil pH below 4
- C. Soil have black mottles
- D. Soil have red mottles

Choose the *correct* answer from the options given below:

[Question ID = 16203][Question Description = 101_186_SAC_SEP22_Q01]

1. A, B and C only [Option ID = 34809]
2. A, B and D only [Option ID = 34810]
3. A and B only [Option ID = 34811]
4. B and C only [Option ID = 34812]

2) Match the following with correct association of statements

List I	List II
A. Supervised classification	I. Snow and clouds can not be separated
B. Unsupervised classification	II. All bodies at 0 deg absolute emit EMR
C. Thermal IR region	III. Gaussian maximum likelihood (MXL)
D. Plank's law	IV. Specific site in remotely sensed data is located

Choose the correct answer from the options given below:

[Question ID = 16204][Question Description = 102_186_SAC_SEP22_Q02]

1. A - I, B - II, C - IV, D - III [Option ID = 34813]
2. A - II, B - IV, C - III, D - I [Option ID = 34814]
3. A - IV, B - III, C - I, D - II [Option ID = 34815]
4. A - IV, B - II, C - III, D - I [Option ID = 34816]

3) In a soil capability classification map an area having orange colour would indicate which of the following?

[Question ID = 16205][Question Description = 103_186_SAC_SEP22_Q03]

1. Land is in good condition to grow horticultural crops [Option ID = 34817]
2. Land is suitable for recreation purpose [Option ID = 34818]
3. Land is suitable for pastures and forestry [Option ID = 34819]
4. Land has least limitations for cultivation [Option ID = 34820]

4) Which of the following is/are correct while designing any mechanical erosion control structures?

- A. Type of crop
- B. Amount of rainfall received in the area
- C. Slope of the area
- D. Area of watershed

Choose the *correct* answer from the options given below

[Question ID = 16206][Question Description = 104_186_SAC_SEP22_Q04]

1. B and C only [Option ID = 34821]
2. B, C and D only [Option ID = 34822]
3. B and D only [Option ID = 34823]
4. A, B, C and D [Option ID = 34824]

5) Among the followings which one is the most resistant mineral to weathering?

[Question ID = 16207][Question Description = 105_186_SAC_SEP22_Q05]

1. Quartz [Option ID = 34825]
2. Muscovite [Option ID = 34826]
3. Microcline [Option ID = 34827]
4. Orthoclase [Option ID = 34828]

6) What is the correct sequence of weathering?

[Question ID = 16208][Question Description = 106_186_SAC_SEP22_Q06]

1. Initial, juvenile, virile, senile [Option ID = 34829]
2. Initial, juvenile, senile, virile, [Option ID = 34830]
3. Initial, senile, juvenile, virile [Option ID = 34831]
4. Initial, virile, juvenile, senile [Option ID = 34832]

7) Which one of the following is correct about alkalization?

[Question ID = 16209][Question Description = 107_186_SAC_SEP22_Q07]

1. Accumulation of Na^+ on exchange complex [Option ID = 34833]
2. Soil needs application of $\text{CaSO}_4 \cdot \frac{1}{2}\text{H}_2\text{O}$ [Option ID = 34834]
3. Soil may develop both prismatic and/or columnar structure [Option ID = 34835]
4. Soils are termed solonetz [Option ID = 34836]

8) Which of the following are the passive factors of soil formation?

[Question ID = 16210][Question Description = 108_186_SAC_SEP22_Q08]

1. Relief and time [Option ID = 34837]
2. Parent material and relief [Option ID = 34838]
3. Vegetation and organisms [Option ID = 34839]
4. Vegetation and climate [Option ID = 34840]

9) A humus poor sesquioxide rich horizon is termed as[Question ID = 16211][Question Description = 109_186_SAC_SEP22_Q09]

1. Placic [Option ID = 34841]
2. Patrocalcic [Option ID = 34842]
3. Plinthite [Option ID = 34843]
4. Petrogypsic [Option ID = 34844]

10) Eluviation refers to which one of the following?

[Question ID = 16212][Question Description = 110_186_SAC_SEP22_Q10]

1. Removal of clay from a horizon to lower [Option ID = 34845]
2. Removal of constituents in suspension or solution by percolating water from upper to lower layers [Option ID = 34846]
3. Removal of soluble salts from upper horizon to lower horizon [Option ID = 34847]
4. Accumulation of clay and sesquioxides in lower horizon [Option ID = 34848]

11) Soil particle density refers to which one of the following?

[Question ID = 16213][Question Description = 111_186_SAC_SEP22_Q11]

1. Ratio of mass of soil solids to total volume of soil [Option ID = 34849]
2. Ratio of soil mass to volume of soil solids [Option ID = 34850]
3. Ratio of soil mass to total volume of pores [Option ID = 34851]
4. Ratio of volume of solids to volume of pores [Option ID = 34852]

12) Stoke's law DOES NOT assume which one of the following?

[Question ID = 16214][Question Description = 112_186_SAC_SEP22_Q12]

1. The particles are spherical in shape [Option ID = 34853]
2. The particles are rigid [Option ID = 34854]
3. The viscosity of the medium [Option ID = 34855]
4. Downward force on particles is not equal to upthrust [Option ID = 34856]

13) Four basic shapes of structure types of the soil aggregates includes[Question ID = 16215][Question Description = 113_186_SAC_SEP22_Q13]

1. Granular, platy, prismatic and columnar [Option ID = 34857]
2. Spheroid, cuboid, platy, blocky [Option ID = 34858]
3. Granular, platelike, prislmlike, block like [Option ID = 34859]

4. Block, subangular blocky, columnar, platy [Option ID = 34860]

14) Which one of the following is true about massive soils?

[Question ID = 16216][Question Description = 114_186_SAC_SEP22_Q14]

1. They do not break up at all [Option ID = 34861]
2. They break up into single grain and incoherent particles [Option ID = 34862]
3. They break up into random shaped clods or chunks [Option ID = 34863]
4. They break only at optimum moisture conditions [Option ID = 34864]

15) If dry soil in core weighs 200 g and the core is having the dimension as: diameter-6 cm and height 5 cm, calculate the bulk density of the soil.

[Question ID = 16217][Question Description = 115_186_SAC_SEP22_Q15]

1. 2.12 Mg m^{-3}
[Option ID = 34865]
2. 1.41 Mg m^{-3}
[Option ID = 34866]
3. 1.32 Mg m^{-3}
[Option ID = 34867]
4. 1.22 Mg m^{-3}
[Option ID = 34868]

16) A capillary tube is dipped into a 200 ml glass beaker filled with water to 10 cm and the rise in water level in the capillary is 2.5 cm. What is the water pressure in the capillary tube?

[Question ID = 16218][Question Description = 116_186_SAC_SEP22_Q16]

1. -2.5 g cm^{-2} [Option ID = 34869]
2. -7.5 g cm^{-2} [Option ID = 34870]
3. 2.5 g cm^{-2} [Option ID = 34871]
4. 7.5 g cm^{-2} [Option ID = 34872]

17) Pressure chamber is used to measure matric potential of [Question ID = 16219][Question Description = 117_186_SAC_SEP22_Q17]

1. Less than -0.6 bar [Option ID = 34873]
2. Less than -0.8 bar [Option ID = 34874]
3. Less than -1.0 bar [Option ID = 34875]
4. Between -1.0 and 1.0 bar [Option ID = 34876]

18) What is correct about Darcy's law?

- A. It is applicable for movement of water in saturated soil
- B. It is applicable for unsaturated soils
- C. If the distance of water movement through soil is doubled, the quantity of water flow is halved
- D. It helps decide the distance between drainage lines for water logged soil conditions

Choose the *correct* answer from the options given below:

[Question ID = 16220][Question Description = 118_186_SAC_SEP22_Q18]

1. A and B only [Option ID = 34877]
2. B and C only [Option ID = 34878]
3. A, C and D only [Option ID = 34879]
4. A, B, C and D [Option ID = 34880]

19) In Darcy's law the hydraulic conductivity (K) has the physical dimension of : [Question ID = 16221][Question Description = 119_186_SAC_SEP22_Q19]

1. ML^{-1}T^2 [Option ID = 34881]
2. $\text{M}^{-1} \text{L}^3\text{T}$ [Option ID = 34882]
3. LT^{-1} [Option ID = 34883]
4. L^3T^{-1} [Option ID = 34884]

20) A copper colorimeter weighing 10 g has the specific heat $0.093 \text{ cal g}^{-1} \text{ }^\circ\text{C}^{-1}$. When water at $45 \text{ }^\circ\text{C}$ was added its weight was 60 g. Then 30 g soil at $25 \text{ }^\circ\text{C}$ was put in it. The final equilibrium temperature was $40 \text{ }^\circ\text{C}$. Calculate the specific heat of the soil.

[Question ID = 16222][Question Description = 120_186_SAC_SEP22_Q20]

1. $0.55 \text{ cal g}^{-1} \text{ }^{\circ}\text{C}^{-1}$ [Option ID = 34885]
2. $0.57 \text{ cal g}^{-1} \text{ }^{\circ}\text{C}^{-1}$ [Option ID = 34886]
3. $0.59 \text{ cal g}^{-1} \text{ }^{\circ}\text{C}^{-1}$ [Option ID = 34887]
4. $0.61 \text{ cal g}^{-1} \text{ }^{\circ}\text{C}^{-1}$ [Option ID = 34888]

21) According to Jackson *et al.* (1964), minerals having higher 'weathering index' shows increase in the resistance of clay size minerals to weathering.

- A. Olivine
- B. Calcite
- C. Biotite
- D. Gypsum

Choose the *correct* answer from the options given below in order of increasing weather index:

[Question ID = 16223][Question Description = 121_186_SAC_SEP22_Q21]

1. $A < B < C < D$
[Option ID = 34889]
2. $B < D < A < C$
[Option ID = 34890]
3. $B < D < C < A$
[Option ID = 34891]
4. $D < B < A < C$
[Option ID = 34892]

22) Given below are two statements

Statement I: Oxidation of iron is a disintegrative weathering process in minerals containing ferrous as part of their crystal structure.

Statement II: Reduction in size and increase in electrical charge on oxidation of Fe^{2+} to Fe^{3+} create electrical and structural imbalances in these minerals.

In light of the above statements, choose the *correct* answer from the options given below

[Question ID = 16224][Question Description = 122_186_SAC_SEP22_Q22]

1. Both Statement I and Statement II are true [Option ID = 34893]
2. Both Statement I and Statement II are false [Option ID = 34894]
3. Statement I is true but Statement II is false [Option ID = 34895]
4. Statement I is false but Statement II is true [Option ID = 34896]

23) In the "stability series" of weatherability of minerals, the most stable mineral having three-dimensional network of silicon tetrahedra is:[Question ID = 16225][Question Description = 123_186_SAC_SEP22_Q23]

1. Biotite [Option ID = 34897]
2. Quartz [Option ID = 34898]
3. Olivines [Option ID = 34899]
4. Muscovite [Option ID = 34900]

24) Given below are two statements, one is labelled as Assertion A and the other is labelled as Reason R

Assertion A: Soil is a source as well as a sink to adsorb, desorb, fix or release mineral elements and gases and grow plants and decompose crop residues incorporated into it.

Reason R: Soil is a living factory where millions of tiny organisms are ceaselessly working day and night, transforming the organic matter and participating in carbon and nitrogen cycles and many mineral elemental cycles.

In light of the above statements, choose the *correct* answer from the options given below

[Question ID = 16226][Question Description = 124_186_SAC_SEP22_Q24]

1. Both A and R are true and R is the correct explanation of A [Option ID = 34901]
2. Both A and R are true but R is NOT the correct explanation of A [Option ID = 34902]
3. A is true but R is false [Option ID = 34903]
4. A is false but R is true [Option ID = 34904]

25) Given below are two statements

Statement I: The potential difference, known as zeta potential, between the fixed part and the freely mobile portion of the solution side of the double layer governs the stability of the colloids.

Statement II: When the zeta potential attains the value of zero, the given colloidal system is said to correspond to the *isoelectric state* of the system concerned.

In light of the above statements, choose the *most appropriate* answer from the options given below

[Question ID = 16227][Question Description = 125_186_SAC_SEP22_Q25]

1. Both Statement I and Statement II are correct [Option ID = 34905]
2. Both Statement I and Statement II are incorrect [Option ID = 34906]
3. Statement I is correct but Statement II is incorrect [Option ID = 34907]
4. Statement I is incorrect but Statement II is correct [Option ID = 34908]

26) The basic theory of adsorption of gases on solids is due to Langmuir (1918) and it is based on the following assumptions:

- A. The surface of solid is made up of adsorption sites, each of which can adsorb one gas molecule.
- B. All the adsorption sites are different in their affinity for that gas molecule.
- C. The presence of a gas molecule on one site does not affect the properties of the neighbouring sites.
- D. The rate of adsorption is proportional to the number of adsorption sites and the pressure of gas.

Choose the *correct* answer from the options given below:

[Question ID = 16228][Question Description = 126_186_SAC_SEP22_Q26]

1. A, B and D only [Option ID = 34909]
2. A, C and D only [Option ID = 34910]
3. A, B and C only [Option ID = 34911]
4. B, C and D only [Option ID = 34912]

27) Iron oxides, hydroxides and oxyhydroxides are:

- A. Goethite
- B. Hematite
- C. Maghemite
- D. Gibbsite

Choose the *correct* answer from the options given below:

[Question ID = 16229][Question Description = 127_186_SAC_SEP22_Q27]

1. A, B and D only [Option ID = 34913]
2. A, C and D only [Option ID = 34914]
3. A, B and C only [Option ID = 34915]
4. B, C and D only [Option ID = 34916]

28) Sand dunes and depositions from the materials transported by wind are called[Question ID = 16230][Question Description = 128_186_SAC_SEP22_Q28]

1. Aeolian deposits [Option ID = 34917]
2. Loess [Option ID = 34918]
3. Limestone deposits [Option ID = 34919]
4. Moraines [Option ID = 34920]

29) Match List I with List II

List I	List II
A. Law of diffusion of gas	I. Jenny
B. Soil forming equation	II. Donnan
C. Soil colour chart	III. Fick
D. Membrane potential	IV. Munshell

Choose the correct answer from the options given below:

[Question ID = 16231][Question Description = 129_186_SAC_SEP22_Q29]

1. A - II, B - I, C - IV, D - III [Option ID = 34921]
2. A - I, B - II, C - III, D - IV [Option ID = 34922]
3. A - IV, B - III, C - II, D - I [Option ID = 34923]
4. A - III, B - I, C - IV, D - II [Option ID = 34924]

30) A. MnO_2

B. NO_3^-

C. $\text{Fe}(\text{OH})_3$

D. CO_2

E. SO_4^{2-}

Choose the *correct* answer from the options given below according to their thermodynamic sequence of soil reduction:

[Question ID = 16232][Question Description = 130_186_SAC_SEP22_Q30]

1. $A > B > C > D > E$ [Option ID = 34925]
2. $B > A > E > C > D$ [Option ID = 34926]
3. $B > A > C > E > D$ [Option ID = 34927]
4. $C > A > B > D > E$ [Option ID = 34928]

31) The book *Principles of Plant Nutrition* is authored by:

[Question ID = 16233][Question Description = 131_186_SAC_SEP22_Q31]

1. W. L. Lindsay [Option ID = 34929]
2. H. Marschner [Option ID = 34930]
3. K. Mengel and E. A. Kirkby [Option ID = 34931]
4. J. J. Mortvedt [Option ID = 34932]

32) A. Red soils are highly prone to crusting after heavy rains.

B. Because of the dominance of the kaolinite mineral, black soils exhibit swell-shrink properties.

C. Black soils are characterized by high clay content and consequently, high available water holding capacity.

D. The kaolinite-dominant red and laterite soils contain the lowest amount of all forms of K.

Choose the *correct* answer from the options given below:

[Question ID = 16234][Question Description = 132_186_SAC_SEP22_Q32]

1. A, B and D only [Option ID = 34933]
2. A, C and D only [Option ID = 34934]
3. A, B and C only [Option ID = 34935]
4. B, C and D only [Option ID = 34936]

33) Given below are two statements, one is labelled as Assertion A and the other is labelled as Reason R

Assertion A: The concepts of intensity, quantity and buffering power are useful in describing and measuring the potassium supplying power of soils. The intensity factor is a measure of K in soil solution that is immediately available for absorption by plant root.

Reason R: The absorption of K is influenced by the activity of other cations like Ca^{2+} and Mg^{2+} in the soil solution; thus, the potassium activity ratio is used, in place of K concentration alone, to indicate the intensity factor.

In light of the above statements, choose the *correct* answer from the options given below

[Question ID = 16235][Question Description = 133_186_SAC_SEP22_Q33]

1. Both A and R are true and R is the correct explanation of A [Option ID = 34937]
2. Both A and R are true but R is NOT the correct explanation of A [Option ID = 34938]
3. A is true but R is false [Option ID = 34939]
4. A is false but R is true [Option ID = 34940]

34) Given below are two statements, one is labelled as Assertion A and the other is labelled as Reason R

Assertion A: The cation exchange capacity is the total amount of exchangeable cations that can be adsorbed at a definite pH and expressed as $\text{cmol}(\text{p}^+)\text{kg}^{-1}$ soil.

Reason R: The values of cation exchange capacity increases with the increase in pH and low clay content.

In light of the above statements, choose the *most appropriate* answer from the options given below

[Question ID = 16236][Question Description = 134_186_SAC_SEP22_Q34]

1. Both A and R are correct and R is the correct explanation of A [Option ID = 34941]
2. Both A and R are correct but R is NOT the correct explanation of A [Option ID = 34942]
3. A is correct but R is not correct [Option ID = 34943]
4. A is not correct but R is correct [Option ID = 34944]

35) Given below are two statements

Statement I: Phosphoric acid produced through acidulation route is known as green acid which is produced by reacting rock phosphate usually with nitric acid.

Statement II: Phosphoric acid manufactured through electric furnace route by reacting rock phosphate with silica and coke at above 1400 °C is usually used for pharmaceutical industries instead of agricultural use.

In light of the above statements, choose the *correct* answer from the options given below

[Question ID = 16237][Question Description = 135_186_SAC_SEP22_Q35]

- Both Statement I and Statement II are true
[Option ID = 34945]
- Both Statement I and Statement II are false
[Option ID = 34946]
- Statement I is true but Statement II is false
[Option ID = 34947]
- Statement I is false but Statement II is true
[Option ID = 34948]

36) A. Flux of a gas across a plane is proportional to the concentration gradient.

B. Ion exchange isotherm such as Freundlich isotherm is known as the simplest ion exchange and assumes to be empirical.

C. Volumetric water content is defined as the volume of water associated with a given volume of wet soil.

D. Vertical velocity of a falling particle in a medium is directly proportional to the square of the radius of soil particle and inversely proportional to viscosity of the particle.

Choose the *correct* answer from the options given below:

[Question ID = 16238][Question Description = 136_186_SAC_SEP22_Q36]

- A, B and C only [Option ID = 34949]
- A, B and D only [Option ID = 34950]
- A, C and D only [Option ID = 34951]
- B, C and D only [Option ID = 34952]

37) A. Boron is neither a constituent of enzymes nor it activates any of the enzymes.

B. Phosphorus is involved in energy transfer, and transfer of genetic characteristics from one generation to the next.

C. Zinc is a constituent of enzymes such as carbonic anhydrase, alcoholic dehydrogenase and superoxide dismutase.

D. Potassium is a part of the chemical structure of plants, and plays a major role in catalysing activities of more than 60 enzymes.

Choose the *correct* answer from the options given below:

[Question ID = 16239][Question Description = 137_186_SAC_SEP22_Q37]

- A, B and D only [Option ID = 34953]
- A, B and C only [Option ID = 34954]
- A, C and D only [Option ID = 34955]
- B, C and D only [Option ID = 34956]

38) Given below are two statements

Statement I: The difference between the pH of soil in 1 N KCl solution and pH of soil in water is called ΔpH .

Statement II: A negative value of ΔpH indicates the presence of a negatively charged clay colloids.

In light of the above statements, choose the *correct* answer from the options given below

[Question ID = 16240][Question Description = 138_186_SAC_SEP22_Q38]

- Both Statement I and Statement II are true [Option ID = 34957]
- Both Statement I and Statement II are false [Option ID = 34958]
- Statement I is true but Statement II is false [Option ID = 34959]
- Statement I is false but Statement II is true [Option ID = 34960]

39) A. Active Acidity - The activity of hydrogen (H^+) ions in the soil solution which is measured and expressed as pH value.

B. Exchangeable Acidity - Soil acidity associated with exchangeable aluminium (Al^{3+}) and H^+ ions, which can be replaced in a

strongly acid soil by an unbuffered salt solution, such as KCl or NaCl.

C. Residual/Reserve Acidity - Soil acidity that cannot be replaced by an unbuffered salt solution. This is associated with H^+ and Al^{3+} ions that are bound in non-exchangeable form by clay and organic matter in soils.

D. Total Acidity - Sum of exchangeable acidity + residual acidity in a soil.

Choose the *correct* answer from the options given below:

[Question ID = 16241][Question Description = 139_186_SAC_SEP22_Q39]

1. A, B and D only [Option ID = 34961]
2. A, B and C only [Option ID = 34962]
3. B, C and D only [Option ID = 34963]
4. A, C and D only [Option ID = 34964]

40) Given below are two statements, one is labelled as Assertion A and the other is labelled as Reason R

Assertion A: Bray's (Bray 1954) concept of nutrient mobility suggests that anions like nitrate(NO_3^-), chloride (Cl^-) or bicarbonate(HCO_3^-) are classified as "mobile" nutrients, while cations like potassium (K^+), magnesium (Mg^{2+}) and calcium (Ca^{2+}) are classified as "immobile" nutrients.

Reason R: Barber (1995) defined the available or bio-available nutrient as the "one that is present in a pool of ions in the soil and can move to the plant root during plant growth if the root is close enough".

In light of the above statements, choose the *most appropriate* answer from the options given below

[Question ID = 16242][Question Description = 140_186_SAC_SEP22_Q40]

1. Both A and R are correct and R is the correct explanation of A [Option ID = 34965]
2. Both A and R are correct but R is NOT the correct explanation of A [Option ID = 34966]
3. A is correct but R is not correct [Option ID = 34967]
4. A is not correct but R is correct [Option ID = 34968]

41) The amount of Analytical grade potassium permanganate required for preparation of 1000 mL of 0.1 N potassium permanganate (0.1 N $KMnO_4$) solution is:

[Question ID = 16243][Question Description = 141_186_SAC_SEP22_Q41]

1. 15.8 g [Option ID = 34969]
2. 3.16 g [Option ID = 34970]
3. 158.0 g [Option ID = 34971]
4. 31.6 g [Option ID = 34972]

42) The dihydrate gypsum route of wet process of phosphoric acid preparation involves four essential steps:

- A. Disintegration of apatite in sulphuric acid (3-5 minutes) and release of phosphoric acid.
- B. Holding the slurry for sufficiently long time (1.5 to 12 hours) to allow growth of gypsum crystals of adequate size.
- C. Separation of phosphoric acid from residue (phospho-gypsum and other insoluble materials) by filtration.
- D. The product containing 26-32% P_2O_5 is concentrated usually to 72-74% P_2O_5 strength by evaporation.

Choose the *correct* answer from the options given below:

[Question ID = 16244][Question Description = 142_186_SAC_SEP22_Q42]

1. A, B and D only [Option ID = 34973]
2. A, C and D only [Option ID = 34974]
3. A, B and C only [Option ID = 34975]
4. B, C and D only [Option ID = 34976]

43) The slow release or controlled release fertilizers are characterized by their activity index (AI) as proposed by the Association of Official Agricultural Chemists (AOAC). The AI of CRFs is defined as:[Question ID = 16245][Question Description = 143_186_SAC_SEP22_Q43]

1. $AI = 100 \times (CWIN - HWIN) / HWIN$ [Option ID = 34977]
2. $AI = 100 \times (CWIN - HWIN) / CWIN$ [Option ID = 34978]
3. $AI = 100 \times (HWIN - CWIN) / CWIN$ [Option ID = 34979]
4. $AI = 100 \times (HWIN - CWIN) / HWIN$ [Option ID = 34980]

44) Given below are two statements, one is labelled as Assertion A and the other is labelled as Reason R

Assertion A: Dehydrogenases activity reflects the total range of the oxidative activity of soil microorganisms and may be considered a good indicator of the oxidative metabolism in soils.

Reason R: Dehydrogenases oxidize soil organic matter by transferring protons and electrons from organic substrates to inorganic acceptors.

In light of the above statements, choose the *correct* answer from the options given below

[Question ID = 16246][Question Description = 144_186_SAC_SEP22_Q44]

1. Both A and R are true and R is the correct explanation of A [Option ID = 34981]
2. Both A and R are true but R is NOT the correct explanation of A [Option ID = 34982]
3. A is true but R is false [Option ID = 34983]
4. A is false but R is true [Option ID = 34984]

45) Most commonly used urease inhibitors are:

- A. NBPT (N-(n-butyl) thiophosphoric triamide)
- B. Phenyl phosphorodiamidate (PPD)
- C. Hydrquinone (HQ)
- D. Dicyandiamide (DCD)

Choose the *correct* answer from the options given below:

[Question ID = 16247][Question Description = 145_186_SAC_SEP22_Q45]

1. A, B and D only
[Option ID = 34985]
2. A, B and C only
[Option ID = 34986]
3. A, C and D only
[Option ID = 34987]
4. B, C and D only
[Option ID = 34988]

46) Ammonia (NH₃) synthesis is developed by Haber Bosch. The optimum production of NH₃ is obtained by the reaction between H₂ and N₂ at

- A. Temperature of 400-450 °C.
- B. Temperature of 200-250 °C.
- C. An elevated pressure of 200-1000 kg cm⁻²
- D. In presence of catalyst (Fe₂O₃) and promoter (Al₂O₃, K₂O, Mg, CaO)

Choose the *correct* answer from the options given below:

[Question ID = 16248][Question Description = 146_186_SAC_SEP22_Q46]

1. A, B and D only [Option ID = 34989]
2. A, C and D only [Option ID = 34990]
3. A, B and C only [Option ID = 34991]
4. B, C and D only [Option ID = 34992]

47) The equilibrium activity ratio (AR_e^K) of the (Q/I) plot of soil K provides a measure of the [Question ID = 16249][Question Description = 147_186_SAC_SEP22_Q47]

1. Specifically held K in soil [Option ID = 34993]
2. Inherent K availability in soil [Option ID = 34994]
3. Hysteresis of K adsorption-desorption in soil [Option ID = 34995]
4. Buffering capacity of the soil [Option ID = 34996]

48) A. Urease enzyme is responsible for the hydrolysis of urea into NH₃ and CO₂ with the concomitant decrease in soil pH and N loss to the atmosphere through NH₃ volatilization.

B. Phosphatases enzymes catalyze the hydrolysis of organic P compounds and transform into an inorganic form of P, which is then assimilated by plants and microorganisms.

C. Cellulases is a group of hydrolytic enzymes that catalyze the breakdown of B-1,4 linked bonds in cellulose.

D. Arylsulphatase enzyme is involved in the hydrolysis of aromatic sulphate esters (R-O-SO₃⁻) into phenols (R-OH) and sulphate-sulphur (SO₄²⁻) by splitting the oxygen-sulphur (O-S) linkage and mineralizes the ester-sulphate in soil.

Choose the *correct* answer from the options given below:

[Question ID = 16250][Question Description = 148_186_SAC_SEP22_Q48]

1. A, B and D only [Option ID = 34997]
2. A, C and D only [Option ID = 34998]
3. A, B and C only [Option ID = 34999]
4. B, C and D only [Option ID = 35000]

49) Match List I with List II

List I	List II
A. Die-back symptom	I. Molybdenum
B. White bud of maize and sorghum	II. Copper
C. Whip-tail of cauliflower	III. Boron
D. Heart rot of sugarbeet and mangold	IV. Zinc

Choose the correct answer from the options given below:

[Question ID = 16251][Question Description = 149_186_SAC_SEP22_Q49]

1. A - III, B - IV, C - I, D - II [Option ID = 35001]
2. A - II, B - I, C - III, D - IV [Option ID = 35002]
3. A - I, B - II, C - IV, D - III [Option ID = 35003]
4. A - II, B - IV, C - I, D - III [Option ID = 35004]

50) Match List I with List II

List I	List II
A. Electric-arc process of fixation of atmospheric N ₂	I. Ottokar Serpek (1890)
B. Cyanamide process of fixation of atmospheric N ₂	II. Fritz Haber and Carl Bosch (1913)
C. Conversion of atmospheric N ₂ by certain metals (e.g. Magnesium, Aluminium)	III. Kristian Birkeland and Samuel Eyde (1903)
D. Commercial production of N-fertilizer by industry today	IV. Adolph Frank and Nikodem Caro (1895-1898)

Choose the correct answer from the options given below:

[Question ID = 16252][Question Description = 150_186_SAC_SEP22_Q50]

1. A - III, B - IV, C - I, D - II [Option ID = 35005]
2. A - II, B - I, C - III, D - IV [Option ID = 35006]
3. A - I, B - II, C - IV, D - III [Option ID = 35007]
4. A - II, B - IV, C - I, D - III [Option ID = 35008]