

**DR. PANJABRAO DESHMUKH KRISHI VIDYAPEETH, AKOLA**  
**SEMESTER END THEORY EXAMINATION**  
**B.Sc.(Hons.) Agriculture**  
**MODEL ANSWER**

Semester	:	IVth	Term	:	II	Academic year	:	2020-21
Course No.	:	SSAC-242	Title	:Problematic soils and their management				
Credits	:	1+1						
Day & Date	:	18/6/2021	Time	:	12.00 to1.00 pm	Total marks	:	40

**SECTION –A**

**Q1.Characteristics of healthy soil-any four**

- 1.Sustain productivity
2. Maintain environmental quality
3. Good soil tilth
4. Enhance plant and animal health
5. Good soil drainage
6. Population of microorganism
7. Sufficient supply of essential nutrients /sufficient depth
8. Low weed pressure.
9. Resistant to degradation
10. Free of chemicals and toxins that may harm the crop

**Biological soil indicators:** Particulate organic matter, potentially mineralizable nitrogen, respiration, soil enzymes and total organic carbon.

**Q2. Factors responsible for formation of saline and alkaline soil.**

1. Arid and semiarid climate
2. Poor drainage
3. High water table
4. Overflow of seawater over lands
5. Introduction of irrigation water
6. Salts blown by wind
7. Saline nature of parent rock material
8. Excessive use of basic fertilizers
9. Humid and semi humid region

**Q3. What is mean by soil pollution? State its any two sources/causes and their remediation.**

Soil pollution:Soil pollution involves the changes in physical, chemical and biological condition of the soil through man's interventions resulting in degradation in quality of the soil.

Sources/causes of soil pollution-Any two

1. Indiscriminate use of fertilizers/irrigation water
2. Indiscriminate use of pesticides, insecticides and herbicides
3. Deforestation and soil erosion

4. Use of raw sewage water and sludge
5. Use of saline water
6. Nitrate pollution ground water
7. Phytotoxic content organic residues use
8. Dumping of large quantities of solid waste

Remediation of soil pollution ( Any four)

1. Reducing chemical fertilizer and pesticide use
2. Applying manures and bio-fertilizers
3. Recycling and recovery of materials
4. Reforesting
5. Solid waste management
6. Reduced availability of toxic cations
7. Sustainable water management
8. Use of fertilizers should be highly judicious

**Q4. Quality parameter of irrigation water.**

- i. Total concentration of soluble salts (EC)
- ii. Relative proportion of sodium to other cations (SAR)
- iii. Concentration of boron(B) or other elements that may be toxic
- iv. Bicarbonates concentration as related to the concentration of calcium + magnesium (RSC)

Classify water class based on sodium (SAR) hazard.

Water class	SAR, Meq/L	Suitability
S <sub>1</sub> : Low sodium	0 – 10	Can be used on all soils with little danger of exchangeable sodium.
S <sub>2</sub> : Medium sodium	10 – 18	Produce appreciable hazard in fine textured soils, can be used in coarse textured soils.
S <sub>3</sub> : High sodium	18 – 26	Produce harmful levels of exchangeable sodium
S <sub>4</sub> : Very high sodium	more than 26	Unsuitable for irrigation.

**Q.5. Characteristic of calcareous soil.**

1. Clay complex is base saturated and calcium forms the predominant exchangeable base.
2. The soils are highly buffered in presence of water. pe clay minerals
3. Soil reaction is slightly to moderate pH 7.5 to 8.5 depending upon the concentration of carbon dioxide in soil air.

**Calcareous soil its effect on plant growth.**

- 1, When it accumulate in the subsoil, it tends to form hardpan by cementing the soil particles causes waterlogging
- 2, Reduce plant nutrient due to high pH and presence of Calcium and magnesium and responsible for physiological disorder “lime induced chlorosis”

3. A high level of calcium exerts a depressing effect on absorption /uptake of nutrients like K, Mg.

### SECTION-B

(Write the answers in one sentence only. Each question carries 2 marks)

**Q6. Define the following term**

**a) Salinization**-It is the process of accumulation of salts leading to the formation of saline soil.

**b) Remote sensing**-It is broadly defined as the collecting and interpretation information about a target without being a physical contact with the object.

**c) Submerged soil**-The soil which is saturated with water for a sufficiently long time annually to give the soil distinctive gley horizons resulting from oxidation reduction processes.

**d) Water pollution:** It is contamination of water bodies usually as a result of human activities; water bodies include lakes, river, oceans, aquifers and ground water.

**e) Wasteland**-It includes any type of land, irrespective of its ownership, which is producing less than 20 % of its optimum biological productivity.( degraded and laying unutilized land)

**f) Bioremediation**- It is the use of living organism for the recovery/cleaning up of contaminated medium( soil, air , water, sediment)

**g) Sewage water**- It is waste matter which includes faeces or dirty water from home/ city drainage, factories which flows away through sewers.

### SECTION-C

(Choose the correct option. Each question carry 1 mark)

1.The amount of liming material that must be added to raise the soil pH to some prescribed value is called as

**a) Lime requirement** b) Acid sulphate soil c) Problematic soil d) Soil compaction

2.The process in which soil particles are packed together in a closer state of contact indicated by a change in bulk density, porosity is termed as

a) Soil crusting    **b) Soil compaction**    c) Aggregate stability    d) None of these

3.< 15 ESP and >4 ECE is a characteristics of soil.

a) Sodic soil    b) Saline –Alkali soil    c) Degraded soil    **d) Saline soil**

4. Land capability classification has been developed and classified according to its.

a) Capabilities    **b) Capabilities & limitations**    c) limitations    d) Vegetation

5. Which type of problematic soil forms due to oxidation of sulphide( FeS<sub>2</sub>).

a) Acid soil    b) Alkali soil    **c) Acid sulphate soil**    d) None of these

6. Saline soil is also called

**a) White alkali soil**    b) Degraded alkali soil    c) Marshy soil    d) Sodic soil

7. The presence of excess nitrates gives colour on the saline soil surface.

- a) White                      b) Yellowish-brown                      **c) Brown**                      d) Grey
8. Particulate organic matter is indicator of soil quality.
- a) Physical                      b) Chemical                      **c) Biological**                      d) None of these
9. The use of organic materials/organic acids reduce the -----of soil.
- a) Residual acidity                      **b) Alkalinity**                      c) Land suitability                      d) None of these
10. A technique of rotational farming in which vegetation is cleared for cultivation by fire and then left to regenerate after few year.
- a) Sand dune                      b) Soil aggregate                      c) Strip farming                      **d) Shifting cultivation**
11. It is term common to agroforestry, particularly when speaking of tropical agroforestry where the tree owner is subsistence farmer.
- a) waste land                      b) fencing                      **c) Multipurpose tree**                      d) waterlogged land
12. In general, water class with RSC value ---- Meq/L is safe for irrigation.
- a) <1.25 to 2.50                      b) 2.50 to 4.00                      c) > 4.00                      **d) < 1.25**

Signature of the Course teacher  
Name :Dr. R. M. Ghodpage  
Designation: Associate Professor of SSAC

College: College of Agriculture, Nagpur  
NO. 9823180002

Signature of Head of the Department  
Name : Dr. W. P. Badole  
Department: Soil Science & Agril.  
Chemistry

College of Agriculture, Nagpur Mobile  
Office seal