

Course Title: Geo-informatics and Nanotechnology and Precision Farming  
For VI<sup>th</sup> Semester as per ICAR revised syllabus

# Objectives on Geoinformatics and Nanotechnology and Precision Farming



Prepared by

**Prof. S. R. Suryavanshi,**

**Asst. Prof. of Agronomy,**

**DYP AC Talsande**

**Prepared by Prof. S. R. Suryavanshi, DYP AC Talsande**

This Note Downloaded from WEBSITE  
Visit For Other **B.Sc AGRICULTURE** Notes, Practical Manual, Question  
Paper, Model Answer Paper, And other Agriculture Information

**WWW.BSCAGRISTUDY.ONLINE**

## 1) Precision Agriculture, Concept, tools & techniques

### Q. 1. Fill in the blanks.

- a) Precision agriculture also known as \_\_\_\_\_ agriculture as needed farming & site specific crop management.
- b) The concept of precision is strictly based on \_\_\_\_\_.
- c) The goal of grid soil sampling is to generate a map of nutrients and water requirement is called \_\_\_\_\_.
- d) In India overall fertilizer consumption rate \_\_\_\_.
- e) \_\_\_\_\_ as a system for capturing, storing, checking, manipulating, analyzing & displaying data which are spatially referenced to earth.

### Q. 2. Match the pairs.

- |                                    |                                          |
|------------------------------------|------------------------------------------|
| a) Sensor technology               | i) Grain flow sensor                     |
| b) Uncorrected GPS signal accuracy | ii) To measure humidity, vegetation etc. |
| c) PLF system                      | iii) Fertilizer & pesticide application  |
| d) VRT technique                   | iv) Information about livestock          |
| e) Yield monitor                   | v) 300 feet                              |

### Q. 3. True or false.

- a) The unique character of GPS is precision in time and space.
- b) GPS systems help users to record positional information with an accuracy between 10 to 0.1m.
- c) Mass flow sensors work on the principle of transmitting beams of microwave energy.
- d) Seeding/sowing is a critical stage in crop growing.
- e) Precision farming can be utilized in every crop.

### Q. 4. Choose correct option.

- a) Grid soil sampling uses the same principle of soil sampling but \_\_\_\_\_ the intensity of sampling
  - i) Increases
  - ii) Decreases
  - iii) Remains constant
  - iv) None of the above
- b) BMPS stands for \_\_\_\_\_
  - i) Bad Management Practice
  - ii) Best management Practice
  - iii) Brief Management Practice
  - iv) Brief Management process
- c) Which of the following is a correct sentence:  
Precision farming deals with \_\_\_\_\_
  - i) Decrease productivity with decreasing production cost.
  - ii) Decrease productivity with increasing production cost.
  - iii) Increase productivity with increasing production cost.
  - iv) Increase productivity with decreasing production cost.
- d) \_\_\_\_\_ is the key information in agricultural decision making policy formulation policy.
  - i) GIS
  - ii) Geo-information
  - iii) Agro-geoinformation
  - iv) GPS
- e) Which of the following is an automatic technology?
  - i) GIS
  - ii) GPS
  - iii) VRT
  - iv) None

**Q. 5. Do as directed**

- a) Give long form of i)SSCM. ii)DGPS
- b) Write use of DGPS
- c) What are the two steps of precision farming?
- d) Define Precision agriculture.
- e) Give any two comments of precision farming.
- f) Give any two applications of geo-informatics.

**Ans Key:**

**Q. 1.**

- a) Satellite
- b) GPS
- c) Application map
- d) 84.3 kg/ha
- e) Geographic information system

**Q. 2.**

- a) ii)
- b) V)
- c) iv)
- d) iii)
- e) i)

**Q. 3.**

- a) True
- b) False (100 to 0.01m)
- c) True
- d) True
- e) False (can not used in every crop)

**Q. 4.**

- a) i)
- b) ii)
- c) iv)
- d) iii)
- e) iii)

**Q. 5.**

- a) i)Site Specific Crop Management  
ii)Differential Global Positioning System
- b) Precise location of activities
- c) 1)Identification &assessment of variability  
2) Management of variability.
- d) Precision agriculture is technique of applying right amount inputs at right location at right time to enhance production.
- e) GIS, GPS.
- f) i)crop yield management  
ii)pest and disease management.

## 2) Geo-informatics system- Concept, tools & techniques

### Q. 1. Fill in the blanks.

- a) \_\_\_\_\_ helps to conversion of raw data of GIS into maps
- b) \_\_\_\_\_ & \_\_\_\_\_ are forms of geo-spatial data
- c) The imagine file format originally created by \_\_\_\_\_
- d) A popular public domain raster data is the \_\_\_\_\_
- e) \_\_\_\_\_ define the range of distinct value the Raster can store

### Q. 2. Match the pairs.

- |         |                           |
|---------|---------------------------|
| a) .dbf | i) Attribute index        |
| b) .shp | ii) Attribute information |
| c) .shx | iii) Spatial index        |
| d) .ain | iv) Feature geometry      |
| e) .sbn | v) Feature geometry index |

### Q. 3. True or false.

- a) Geographical data describe Building
- b) GIS is computer based tool
- c) GIS helps to make maps
- d) GIS have ability to link data sets together by geographically
- e) Raster are in parts and define by their pixel depth

### Q. 4. Choose correct option.

- |                                              |                                                |
|----------------------------------------------|------------------------------------------------|
| a) a) Mapmakers use GIS to                   |                                                |
| i) store geographical information            | ii) use geographical information               |
| iii) view geographical information           | iv) store ,use & view geographical information |
| b) The information GIS entered and stored as |                                                |
| i) panels                                    | ii) layers                                     |
| iii) single panel                            | iv) dual panel                                 |
| c) The users Use GIS to                      |                                                |
| i) complex analysis only                     | ii) Display maps only                          |
| iii) complex analysis and display maps       | iv) none of above                              |
| d) GIS deals with which kind of data         |                                                |
| i) Numerical                                 | ii) Binary                                     |
| iii) spatial                                 | iv) complex                                    |
| e) Spatial Data also called as               |                                                |
| i) Geodatabase                               | ii) Mono database                              |
| iii) current Data base                       | iv) None of above                              |

### Q. 5. Do as directed

- a) Write down any one use of GIS?
- b) Full Form Of GIS?
- c) Write down three main system of GIS?
- d) Write down component of GIS?
- e) Define GIS ?
- f) Define Geo-spatial Data ?

**Prepared by Prof. S. R. Suryavanshi, DYP AC Talsande**

**Ans Key:**

**Q. 1.**

- a) GIS software
- b) Raster based & vector based
- c) ERDAS
- d) GeoTIFF
- e) Pixel depth

**Q. 2.**

- a) ii
- b) iv
- c) v
- d) i
- e) iii

**Q. 3.**

- a) True
- b) True
- c) True
- d) True
- e) True

**Q. 4.**

- a) iv
- b) ii
- c) iii
- d) iii
- e) i

**Q. 5.**

- a) Used in map making
- b) Geographical Information System
- c) Data acquisition system, Database management system, Visualization & reporting system
- d) Software, Hardware, Spatial database, Producers, Expertise
- e) Geographic Information System (GIS) is a computer system build to capture, store, manipulate, analyze, manage and display all kinds of spatial or geographical data.
- F) Geographical data that has geographical aspect to it , or positioning is called as geospatial data

**3) Crop discrimination & yield monitoring**

**Q. 1. Fill in the blanks.**

- a) ..... is an important step for development and management of crop monitoring systems
- b) Most valuable sources of spatial data for precision agriculture is .....
- c) The ratio of the actual yield to the field average is called as .....
- d) ..... is essential in dividing a large farm into management zones.
- e) ..... can be used to develop digital maps that transform spatial information.

**Q. 2. Match the pairs.**

- |                      |                        |
|----------------------|------------------------|
| a) Yield mapping     | i)Graphic document     |
| b) Grain flow sensor | ii)Satellite signal    |
| c) GPS antenna       | iii)Georeferenced data |

b) Yield maps cannot be used in precision agriculture.

c) GPS is used for calculating yield at each location.

d) Soil mapping provides a structured representation of knowledge about the distribution of soil across the landscape.

e) Yield maps represent the input of crop production.

**Q. 4. Choose correct option.**

a) Yield monitoring equipment was introduced in the early.....

i) 1999 ii) 2000

iii) 1992 iv) 1990

b) Which sensor is used by some mapping systems to improve accuracy of grain flow measurements.

i) Grain moisture sensor ii) clean grain elevator speed sensor

iii) Grain flow sensor iv) Travel speed sensor

c) Typical values of grain crops ranging from .....

i) 10-12 sec ii) 15-16 sec

iii) 14-16 sec iv) 18-20 sec

d) .....is powerful set of tools for collecting, storing, and retrieving the data .

i) Precision agriculture ii) Yield monitoring

iii) GIS iv) GPS

e) Automated farm machineries are operated with the help of .....

i) SVM ii) NGIS

iii) MLC iv) SSNM

**Q. 5. Do as directed**

- Define yield mapping.
- Which sensor distinguishes measurements logged during turns.
- Define soil mapping.

**Prepared by Prof. S. R. Suryavanshi, DYP AC Talsande**

**Course Title: Geo-informatics and Nanotechnology and Precision Farming**

- d) Which system is used to operating automated farm machineries.
- e) Write full form of NDVI.
- f) Which map is one of the most valuable sources of spatial data for precision agriculture.

**Ans Key:**

**Q. 1.**

- a) Crop discrimination
- b) Yield map
- c) Normalized yield
- d) Remote sensing
- e) GIS software

**Q. 2.**

- a) Georeferenced data
- b) Grain volume
- c) Satellite signal
- d) GPS receiver
- e) Graphic document

**Q. 3.**

- a) True
- b) False
- c) False
- d) True
- e) False

**Q. 4.**

- a) 1990
- b) Clean grain elevator speed sensor
- c) 10-12 sec
- d) GIS
- e) NGIS

**Q. 5.**

- a) It is the process of collecting georeferenced data on crop yield and characteristics, such as moisture content, while the crop is being harvested.
- b) Header position sensor.
- c) It is an approximation of the reality of the land, and one whose accuracy increases at higher densities of observation and more detailed scales.
- d) NGIS ( Navigation Geographic Information system)
- e) Normalized Difference Vegetation Index.
- f) Yield map.

## 6) Remote sensing- Concepts, applications

### Q. 1. Fill in the blanks.

- a) ..... Data provides the actual synoptic view of large area at a time .
- b) The collection of information relating to object without being physical contact with them is called as.....
- c) The full form of GIS..... and GPS.....
- d) ..... Sensor detects natural radiation that is emitted or reflected by the object
- e) Map maker is called as.....

### Q. 2. Match the pairs.

- |                          |                                    |
|--------------------------|------------------------------------|
| a) Passive Sensor        | i) Map maker                       |
| b) Active Remote Sensing | ii) Infra-red                      |
| c) Cartographer          | iii) Geographic Information System |
| d) Microwave Sensing     | iv) RADAR                          |
| e) GIS                   | v) Very long Wavelength            |

### Q. 3. True or false.

- a) Sound waves are used in sonar types of remote sensing.
- b) Radar is used to detect things under water.
- c) Radar is example if active remote sensing.
- d) Remote sensing is not good to use when comparing an area after tsunami and then after tsunami.
- e) Passive sensor detects artificial radiation that is emitted or reflected by the object.

### Q. 4. Choose correct option.

- a) A Map maker is called as
  - i) Cartographer
  - ii) Photographer
  - iii) Geographer
  - iv) Map quester
- b) The first-time Remote sensing were
  - i) Paintings From air balloon
  - ii) TV remote control
  - iii) Sketches from french map maker
  - iv) aerial photos
- c) Sound waves are used in what type a of remote sensing
  - i) Radar
  - ii) microwave
  - iii) Infra-red
  - iv) sonar
- d) What sensing is used under water to detect things
  - i) Infra-red
  - ii) Radar
  - iii sonar
  - iv) Microwave
- e) Types of remote sensing
  - i) Passive sensor
  - ii) Active Remote sensing
  - iii) Both i & ii
  - iv) None of these



Course Title: Geo-informatics and Nanotechnology and Precision Farming

**Q. 5. Do as directed**

- a) Definition of Remote sensing?
- b) Enlist Application of Remote sensing ?
- c) Full form of GPS and GIS
- d) What is passive sensing ?
- e) What is Active Sensing ?
- f) Enlist types of Remote sensing ?

**Ans Key:**

**Q. 1.**

- a) Satellite
- b) Remote sensing
- c) Geographical information systems and global positioning system
- d) Passive sensor
- e) Cartographer

**Q. 2.**

- a) Infrared
- b) RADAR
- c) Map maker
- d) Very long Wavelength
- e) Geographic information system

**Q. 3.**

- a) True
- b) True
- c) True
- d) False
- e) False

**Q. 4.**

- a) Cartographer
- b) Aerial photos
- c) Sonar
- d) Sonar
- e) Both I & ii

**Q. 5.**

- a) The collection of information relating to object without being physical contact with them is called as remote Sensing
- b) Metrology, forest, Botany, hydrology, Planting application, urban ,sea ,rock etc.
- c) Global positioning system and global information systems
- d) Detect natural radiation that is emitted or reflected by the object or surrounding area being observed.
- e) On the other hand, emits energy in order to scan objects and areas where upon a sensor then detects and measures the radiation that is reflected or backscattered from the target.
  - A) Active remote sensing
  - B) passive sensor

## 7) Image processing

### Q. 1. Fill in the blanks.

- a) \_\_\_\_\_ is an act of examining image for the purpose of the identifying object and judging their significance.
- b) \_\_\_\_\_ is used to correct uneven sensor over whole image and \_\_\_\_\_ to correct the geometric distribution due to earth's rotation.
- c) Image can be enhanced by simple \_\_\_\_\_.
- d) In \_\_\_\_\_ classification the computer programs automatically group the pixels in image into separate clusters, depending on their spectral features.
- e) Each class of land cover is referred as a \_\_\_\_\_ and each product of classification is known as \_\_\_\_\_.

### Q. 2. Match the pairs.

- |                              |                                   |
|------------------------------|-----------------------------------|
| a) Pre-processing            | i) shadow                         |
| b) Image enhancement         | ii) theme                         |
| c) Bio-geophysical parameter | iii) linear gray level stretching |
| d) Class of land cover       | iv) stratospheric zone            |
| e) Identification of object  | v) Initial processing of raw data |

### Q. 3. True or false.

- a) Initial processing of raw data is usually carried out in pre-processing step of image processing.
- b) GCP is stand for global control point.
- c) Supervised classification, the computer program automatically groups the pixels in image into separate clusters depending on their spectral features.
- d) A multi resolution approach is also a useful strategy when dealing with high resolution imagery.
- e) Each class of land cover is referred as map.

### Q. 4. Choose correct option.

- a) An image enhancement pixel values ranges between \_\_\_\_\_ and \_\_\_\_\_.
  - i) 1 and 200
  - ii) 0 and 250
  - iii) 0 and 255
  - iv) 0 and 1
- b) Which of the following are the types of classification
  - i) supervised
  - ii) unsupervised
  - iii) Both
  - iv) none
- c) Which of the following is not the element of image Interpretation ?
  - i) colour
  - ii) size
  - iii) structure
  - iv) texture
- d) LCCS stands for.....
  - i) Large colour composites
  - ii) less colour composites
  - iii) liner class composites
  - iv) liner colour composites
- e) ..... is the smallest element image.
  - i) point
  - ii) pixel
  - iii) polygon
  - iv) non

## Course Title: Geo-informatics and Nanotechnology and Precision Farming

### Q. 5. Do as directed

- a) Define image processing.
- b) Give the types of image classification.
- c) Give the types of image processing.
- d) Give the full form of FCC.
- e) Write the basic maps used in thematic map presentation.
- f) Define thematic map.

### Ans Key:

#### Q. 1.

- a) Image processing
- b) Radiometric correction and geometric correction
- c) Linear gray level stretching
- d) Unsupervised
- e) Theme and thematic map

#### Q. 2.

- a) v
- b) iii
- c) iv
- d) ii
- e) i

#### Q. 3.

- a) True.
- b) False. (GCP stands for ground control point)
- c) False. (In unsupervised classification)
- d) True
- e) False. (Theme)

#### Q. 4.

- a) 0 and 255
- b) Both
- c) Structure
- d) Less colour composites
- e) Pixel

#### Q. 5.

- a) Image processing=the act of examination images to identify objects and judge their significance by Concedering their their location is known as image processing.
- b) a) Supervised b)unsupervised
- c) a) Digital image . B) Analog image .
- d) False colour composites
- e) Topographic map, plan/ortho photomap.
- f) Thematic map =A map that displays the spatial distribution of an attribute that relates to a single topic, theme, or subject of discours.

**8) Global positioning system- Components & its functions**

**Q. 1. Fill in the blanks.**

- a) \_\_\_\_\_ tool of precision agriculture is used in determination of boundaries.
- b) Master control station is located at \_\_\_\_\_ country.
- c) GNSS stands for \_\_\_\_\_.
- d) Mapping is one of important function of \_\_\_\_\_.
- e) GPS is started by \_\_\_\_\_ in 1973.

**Q. 2. Match the pairs.**

- |                                     |                    |
|-------------------------------------|--------------------|
| a) Satellite                        | i) Colorado        |
| b) Remote tracking station          | ii) 1970s          |
| c) Master control station           | iii) Space segment |
| d) GPS                              | iv) California     |
| e) Alternate master control station | v) Hawaii          |

**Q. 3. True or false.**

- a) User segment of GPS includes satellites.
- b) India have Alternate master station of control segment of GPS at Guvahati.
- c) Airplane and boat pilots use GPS for navigation.
- d) GPS was invented before independence of India.
- e) GPS works mainly through three segments.

**Q. 4. Choose correct option.**

- |                                      |                                |
|--------------------------------------|--------------------------------|
| a) Mapmakers use GPS to verify the.. |                                |
| i) Boundaries                        | ii) Towns                      |
| iii) Roads                           | iv) Places                     |
| b) GPS was invented in..             |                                |
| i) 1960s                             | ii) 1980s                      |
| iii) 1970s                           | iv) 1990s                      |
| c) GPS includes..                    |                                |
| i) Space segment                     | ii) User segment               |
| iii) Control segment                 | iv) All of the above           |
| d) GPS stands for                    |                                |
| i) Geo positioning system            | ii) Geographic position system |
| iii) Global positioning system       | iv) Global people survey       |
| e) GPS can be applicable for         |                                |
| i) Population count                  | ii) Both i and iii             |
| iii) Military                        | iv) None of the above          |

**Course Title: Geo-informatics and Nanotechnology and Precision Farming**

**Q. 5. Do as directed**

- a) Give the segments of GPS.
- b) Give two functions of GPS.
- c) Mention any of receivers of global positioning system on basis of accuracy.
- d) Give full form of – GIS, GNSS.
- e) What is GPS?
- f) Give minimum two major sectors in which GPS is applied.

**Ans Key:**

**Q. 1.**

- a) GPS
- b) United states of America
- c) Global Navigation Satellite System
- d) GPS
- e) Defense department of USA

**Q. 2.**

- a) iii
- b) v
- c) i
- d) ii
- e) iv

**Q. 3.**

- a) False
- b) False
- c) True
- d) False
- e) True

**Q. 4.**

- a) i
- b) iii
- c) iv
- d) iii
- e) iii

**Q. 5.**

- a) 1. space segment 2. control segment, 3. user segment.
- b) 1. navigation 2. mapping
- c) 1.DGPS, 2.RTK GPS, 3.dual frequency GPS.
- d) GIS :- Geographic information system, GNSS :- Global Navigation Satellite System.
- e) The Global Positioning System (GPS) is a space-based satellite navigation system that provides location and time information in all weather condition, anywhere on or near earth.
- f) 1.Defense 2.Agriculture

### 9) Introduction to crop simulation model

**Q. 1. Fill in the blanks.**

- a) \_\_\_\_\_ is a simplified representation of a system or a process.
- b) \_\_\_\_\_ is considered as act of mimicry.
- c) The full form of IBSNAT is \_\_\_\_\_.
- d) The full form of DSSAT is \_\_\_\_\_.
- e) The full form of CERES is \_\_\_\_\_.

**Q. 2. Match the pairs.**

- |                      |                                                |
|----------------------|------------------------------------------------|
| a) Mechanistic model | i) defines behavior in a simple manner         |
| b) Static model      | ii) time is not included as variable           |
| c) Dynamic model     | iii) based on physical selection               |
| d) Descriptive model | iv) outputs are given along with probabilities |
| e) Stochastic model  | v) Time is included as variable                |

**Q. 3. True or false.**

- a) Mechanical models system use statistical techniques.
- b) Verification is used for evaluation of truthfulness or correctness.
- c) Validation is used for evaluation of model for its usefulness.
- d) Stochastic models include time as variable.
- e) Statistical models are expressed as regression equations

**Q. 4. Choose correct option.**

- a) Modelling and simulation concepts were given by?
  - i) Zeigler
  - ii) Zedler
  - iii) Dalton
  - iv) none of the above
- b) \_\_\_\_\_ is the hypothetical, abstract representation of the objects properties.
  - i) Base Model
  - ii) modelling
  - iii) simulation
  - iv) crop model
- c) \_\_\_\_\_ is used to design crop Ideotypes.
  - i) GIS
  - ii) GPS
  - iii) Crop simulation models
  - iv) Precision agriculture
- d) \_\_\_\_\_ model has been used to evaluate erosion risks due to cropping practices.
  - i) EPIC
  - ii) APSIM
  - iii) COTTAM
  - iv) DSSAT
- e) Most crucial steps in preparing simulation models are?
  - i) validation
  - ii) calibration
  - iii) data input
  - iv) both (I) and (ii)

**Q. 5. Do as directed**

- a) Expand: APSIM
- b) Expand: AAS
- c) Define model.
- d) Define simulation.
- e) Name the simulation model used in sugarcane.
- f) Define crop model.

**Ans Key:**

**Q. 1.**

- a) Model
- b) Simulation
- c) The International Benchmark Site Network For Agrotechnology Transfer
- d) Decision Support System for Agrotechnology transfer
- e) The Crop Environment Resource Synthesis

**Q. 2.**

- a) iii
- b) ii
- c) v
- d) i
- e) iv

**Q. 3.**

- a) False
- b) True
- c) True
- d) False
- e) True

**Q. 4.**

- a) Zeigler
- b) Base model
- c) Crop simulation models
- d) EPIC
- e) Both (I) and (II)

**Q. 5.**

- a) Agricultural production system simulator
- b) Agromet advisory system
- c) A model is a simplified representation of a system or a process.
- d) A simulation is the imitation of the operation of real world process or system over time.
- e) APSIM
- f) Crop model is a simple representation of a crop.

**10) Uses of crop stimulation model for optimization of agricultural inputs**

**Q. 1. Fill in the blanks.**

- a) ..... Is a new discipline & back ground literature is scarce.
- b) Researchers used the modelling approach to design .....for specific environment .
- c) The ..... Model has been used a long the same line in South African Sugar industry.
- d) For crop stimulation model knowledge of .....&.....is essential .
- e) .....&.....towards modelling is the limitations of crop stimulation modelling .

**Q. 2. Match the pairs.**

- |                         |                            |
|-------------------------|----------------------------|
| a) Environmental impact | i)Erosion risk             |
| b) EPIC model           | ii)Genetic improvement     |
| c) CANEGRO model        | iii)percolation N losses   |
| d) APSIM software       | iv)Sugar industry          |
| e) NTKenaf model        | v)Integration of knowledge |

**Q. 3. True or false.**

- a) Model performance is limited to quality of output data.
- b) Model estimate potential of yield
- c) Models can help to formulate hypothesis &improve efficiency of field experiment.
- d) Model is applied as a research tool
- e) A model is not a tool for improving critical thought not substitute of it.

**Q. 4. Choose correct option.**

- a) .....model has been used to evaluate erosion risk due to cropping practices & tillage.
  - i)EPIC model
  - ii) CANEGRO model
  - iii)NTKenaf model
  - iv)DSSAT model
- b) Choose correct application of Crop Stimulation Model.
  - i)As a research tools
  - ii) As a crop system management tool
  - iii)As a policy analysis
  - iv) All of above
- c) Which software allows integration of knowledge across crop as well as across discipline for particular crop.
  - i)CANEGRO
  - ii)NTKenaf
  - iii)APSIM
  - iv)EPIC
- d) Stimulation model applied in.....purpose
  - i)As a research
  - ii)village
  - iii)industry
  - iv)None of these
- e) Application of as a research tool includes.....
  - i)research understanding
  - ii)Genetic improvement
  - iii)Integration of knowledge
  - iv) All of above



**Q. 5. Do as directed**

- a) Who developed the Agricultural model.
- b) Where the stimulation model is applied?
- c) Which are the non climatic causes by which yield is reduced .
- d) Detailed & mechanistic model.
- e) Model used in south African sugar industry
- f) For fertilizers recommendation which model is given.

**Ans Key:**

**Q. 1.**

- a) Crop modelling
- b) Crop ideotypes
- c) CANEGRO
- d) Computer & Computer language
- e) Awareness & acceptance

**Q. 2.**

- a) Percolation, N losses
- b) Erosion risk
- c) Sugar industry
- d) Integration of knowledge
- e) Genetic improvement

**Q. 3.**

- a) False
- b) True
- c) True
- d) True
- e) False

**Q. 4.**

- a) EPIC model
- b) All of these
- c) APSIM
- d) As a Research
- e) All of these

**Q. 5.**

- a) Agricultural scientist
- b) Research, teaching, farm & resource management, policy analysis & production forecasts.
- c) Delayed sowing, soil fertility, pest and diseases .
- d) Genetic improvement
- e) CANEGRO model
- f) STCR model

## 11) STCR approach for precision agriculture

### Q. 1. Fill in the blanks.

- a) \_\_\_\_\_ is important tool to monitor the soil health and resilience.
- b) Critical level concept was developed by \_\_\_\_\_
- c) Soil fertility status is high, when nutrient index is \_\_\_\_\_
- d) Basic cation saturation approach was useful for \_\_\_\_\_
- e) STCR stands for \_\_\_\_\_

### Q. 2. Match the pairs.

- |                                     |                                                       |
|-------------------------------------|-------------------------------------------------------|
| a) DRIS approach                    | i) To maintain soil fertility status for future years |
| b) Zinc                             | ii) Ca:K ratio is very high                           |
| c) Calcareous soil                  | iii) Ca, Mg and K                                     |
| d) Basic cation saturation approach | iv) List the nutrients in order of their importance   |
| e) Build up and maintenance         | v) $<0.6$                                             |

### Q. 3. True or false.

- a) Sufficiency approach aims to maximize the profitability in a future years.
- b) Assessment of specific soil condition which can be improved by using soil amendments.
- c) During general recommendation variation in soil fertility is taken into consideration.
- d) DRIS is the holistic approach to the mineral nutrition of the soil.
- e) Quantitative approach is irrespective of yield goal and variation in soil type.

### Q. 4. Choose correct option.

- a) Soil fertility status is low, when nutrient index is
  - i)  $<0.25$
  - ii)  $<1.3$
  - iii)  $<1.5$
  - iv)  $<1.0$
- b) Which of the following approach is irrespective of yield goal and variation in soil type
  - i) Basic cation saturation
  - ii) Build up and maintenance
  - iii) Sufficiency
  - iv) Quantitative approach
- c) Ca:K ratio was very high in
  - i) Sandy soil
  - ii) Calcareous soil
  - iii) Red soil
  - iv) Black soil
- d) The SSNM recommendation could be evolved on the basis of
  - i) Chemical analysis
  - ii) Biological analysis
  - iii) Soil cum plant analysis
  - iv) None of the above
- e) Critical limit of Fe is
  - i)  $<4.3$
  - ii)  $<4.1$
  - iii)  $<4.5$
  - iv)  $<3.9$

### Q. 5. Do as directed

**Prepared by Prof. S. R. Suryavanshi, DYP AC Talsande**

## Course Title: Geo-informatics and Nanotechnology and Precision Farming

- a) Define soil testing.
- b) Give formula of NI.
- c) What is the goal of sufficiency approach?
- d) Give full form of SSNM & DRIS.
- e) Define SSNM.
- f) Write critical limits of micronutrients.

**Ans key:**

### Q. 1 Fill in the blanks.

- a) Soil testing
- b) Cate & Nelson
- c)  $>2.5$
- d) recommendation of Ca, Mg, K
- e) Soil Test Crop Response

### Q. 2 Match the pairs.

- a) List the nutrients in order of importance
- b)  $< 0.6$
- c) Ca:k ratio is very high
- d) Ca, Mg, K
- e) to maintain soil fertility for future year

### Q.3 True or False

- a) False
- b) True
- c) False
- d) True
- e) False

### Q. 4 Choose correct option

- a) Sufficiency approach
- b)  $<1.5$
- c) Calcareous Soil
- d) Soil cum plant analysis
- e)  $<4.5$

### Q. 5 Do as directed

- a) Soil testing is the scientific diagnostic tool to evaluate soil fertility for recommending balanced nutrients to crops to achieve profitability, higher production, improving fertilizer use efficiency & reduces the environment pollution.
- b)  $\text{Nutrient Index} = (\text{NL} \times 1) + (\text{NM} \times 2) + (\text{NH} \times 3) / \text{NT}$
- c) To maximize the profitability in a given years.
- d) SSNP- Site Specific Nutrient Management  
DRIS- Diagnosis and Recommendation Integrated system
- e) SSNM is a new approach nutrient recommendation is mainly based on indigenous nutrient supply of the soil and nutrient demand of crop for achieving targeted yield.
- f) Fe-  $<4.5$ , Zn-  $<0.6$ , B-  $<0.05$ , Mn-  $<2.0$ , Cu-  $<0.2$ , Mo-  $<0.05$ .

**Prepared by Prof. S. R. Suryavanshi, DYP AC Talsande**

## 12) Nanotechnology- Concepts and techniques

### Q. 1. Fill in the blanks.

- a) A nanometer is \_\_\_ the diameter of a human hair.
- b) \_\_\_ is a multidisciplinary science.
- c) One mole of water for instance weighs \_\_\_ gr.
- d) Nanometer is conventionally defined as \_\_\_.
- e) 1 nanometer is \_\_\_ of one metre.

### Q. 2. Match the pairs.

- |                             |                                    |
|-----------------------------|------------------------------------|
| a) Nanoscale                | i) nano-gift                       |
| b) Nanoparticle             | ii) 1 to 100nm                     |
| c) Seed                     | iii) $6.022 \times 10^{23}$        |
| d) One mole of any material | iv) used to detect pathogens       |
| e) Nanosensors              | v) Arrangement into ordered layers |

### Q. 3. True or false.

- a) Nanotechnology isn't art and science of manipulating matter at the nanoscale.
- b) Size of nanoparticle is 10 to 100nm
- c) In nanoparticle production two methods.
- d) Nano technology is a multi-disciplinary science.
- e) Smart seed cannot be used for germination.

### Q. 4. Choose correct option.

- a) Method of Nanoparticle production.
  - i) Bottom up
  - ii) down
  - iii) top up
  - iv) low
- b) In bottom up method which types of steps .
  - i) parallel
  - ii) perpendicular
  - iii) rectangle type
  - iv) triangle
- c) A disturbing fact is that the fertilizer use efficiency is \_\_\_N?
  - i) 10%
  - ii) 15%
  - iii) 30%
  - iv) 20-50%
- d) A disturbing fact is that the fertilizer use efficiency is \_\_\_P?
  - i) 10-25%
  - ii) 32%
  - iii) 35%
  - iv) 5-10%

Course Title: Geo-informatics and Nanotechnology and Precision Farming

- e) CMC stands for \_\_\_\_\_
- i) Carbon Monoxide cellulose                      ii) Carboxy Methyl Cellulose
- iii) Carbon Methyl Cellulose                      iv) Corboxy Methyl Carbon

**Q. 5. Do as directed**

- a) Definition of nanotechnology.
- b) Nanotechnology used in?
- c) One mole of any material Contains ?
- d) Nanosensor can be used to detect?
- e) Nanometer scale?
- f) State use of nano-sensor.

**Ans Key:**

**Q. 1.**

- a) 1/80000
- b) Multidisciplinary
- c) 18 gm
- d) 1 to 100 nm
- e) One billionth

**Q. 2.**

- a) ii
- b) v
- c) i
- d) iii
- e) iv

**Q. 3.**

- a) False
- b) False
- c) True
- d) True
- e) False

**Q. 4.**

- a) i
- b) i
- c) iv
- d) i
- e) ii

**Q. 5.**

- a) It is defined as science & technology of such tiny things, of that materials less than 100nm in size.
- b) Used in physical and chemical properties of a substance to explore & medicine in agriculture.
- c)  $6.022 \times 10^{23}$
- d) Pathogens
- e) 1 to 100nm
- f) To detect pathogens.

**Prepared by Prof. S. R. Suryavanshi, DYP AC Talsande**

**13) Brief introduction about nano-scale effect**

**Q. 1. Fill in the blanks.**

- a) The term nano is adapted from the \_\_\_\_\_ word meaning \_\_\_\_\_
- b) \_\_\_\_\_ is a top down fabrication technique where a bulk material is reduced in size to Nano scale pattern
- c) \_\_\_\_\_ is important technique for both characterization and synthesis of Nano material
- d) A fascinating and powerful result of quantum effect of the nanoscale is the concept of \_\_\_\_\_ of properties
- e) \_\_\_\_\_ nanoparticle used as plant fertilizer mung bean to enhance crop production

**Q. 2. Match the pairs.**

- |                          |                                    |
|--------------------------|------------------------------------|
| a) Hydrazine             | i) stabilizing agent               |
| b) Polyvinyl pyrrolidone | ii) reducing agent                 |
| c) Chitosan              | iii) prevent conidiophores develop |
| d) Silver nanoparticles  | iv) antifungal agent               |
| e) ZnO nanoparticles     | v) antimicrobial agent             |

**Q. 3. True or false.**

- a) Nanoscale gold appear as a red or purple
- b) When particle size is made to nano scale properties such as melting point, fluorescence, electrical conductivity, chemical reactivity changes as a function of the size of particle
- c) Sodium Nano fertilizer used to enhance crop production of pennisetum amaranthum
- d) Importance of nano scale delivery system in agriculture is because of its improve solubility and stability to degrade in the environment
- e) Carbon nanotubes can be used as a regulator of seed germination and plant growth

**Q. 4. Choose correct option.**

- |                                                              |                       |
|--------------------------------------------------------------|-----------------------|
| a) Size of nano particles is                                 |                       |
| i) 1-100nm                                                   | ii) 1-10nm            |
| iii) 1-1000nm                                                | iv) none of these     |
| b) 1nm = _____ meter                                         |                       |
| i) 10 <sup>-8</sup>                                          | ii) 10 <sup>-9</sup>  |
| iii) 10 <sup>-7</sup>                                        | iv) 10 <sup>-6</sup>  |
| c) Nano particles can be produced by                         |                       |
| i) bottom up approach                                        | ii) top down approach |
| iii) both 1&2                                                | iv) none of these     |
| d) Carbon nanotube discovered by S Ligima in                 |                       |
| i) 1991                                                      | ii) 1995              |
| iii) 1998                                                    | iv) 2000              |
| e) Scanning acoustic microscope developed by Calvin Quate in |                       |
| i) 1950                                                      | ii) 1960              |
| iii) 1970                                                    | iv) 1980              |

## Course Title: Geo-informatics and Nanotechnology and Precision Farming

### Q. 5. Do as directed

- Define nanoparticle.
- Give two drawback of bottom up approach of synthesis of nano particles
- Write two uses of nano material in agriculture
- Write two principle factor causes the properties of nano material to differ significantly from other materials
- Who give the idea of nanotechnology
- Which method is used for physical synthesis of metallic nanoparticles

### Ans Key:

#### Q. 1.

- Greek & dwarf
- Lithography
- Scanning probe microscopy
- Tunability
- TiO<sub>2</sub>

#### Q. 2.

- ii
- i
- iv
- v
- iii

#### Q. 3.

- True
- True
- False (zinc)
- True
- True

#### Q. 4.

- i
- ii
- iii
- i
- iii

#### Q. 5.

- Nanoparticle is defined as a particle of matter that is between 1 and 100 nm in diameter
- 1-contamination from precursor chemicals, 2-generation of hazardous by product
- Bio sensors for aqua culture, Analysis of gene expression and regulation, Nano sensors
- Increased relative surface area and quantum effect
- The idea of nanotechnology was first time introduce in 1959 by Richard Feynman a physicist at Caltech, Attrition and pyrolysis

**14) Nano-pesticides, nano-fertilizers and nano-sensors**

**Q. 1. Fill in the blanks.**

- a) Nano fertilizers are nutrient carriers of nanodiamens ranging from \_\_ to \_\_.
- b) \_\_\_\_\_ can be used to detect pathogens as well as micro and nano conditions in the field.
- c) \_\_\_\_\_ act as a reservoir for nutrients that are slowly released on demand.
- d) \_\_\_\_\_ have been developed as carriers of pesticides at low cost, for extended release and better contact with plants.
- e) \_\_\_\_\_ is an object that has at least one dimension in nanometer scale.

**Q. 2. Match the pairs.**

- |                     |                               |
|---------------------|-------------------------------|
| a) Nano pesticide   | i) Nutrient use efficiency    |
| b) Encapsulation    | ii) Polymer film              |
| c) Nano sensor      | iii) Clay nanotubes           |
| d) Zeolite          | iv) Honey comb like structure |
| e) Nano fertilizers | v) Nano cantilevers           |

**Q. 3. True or false.**

- a) Nano fertilizers are ecofriendly in nature.
- b) Urea fertilized zeolite chips can be used as fast release nitrogen fertilizer.
- c) Nano pesticides will increase the rate of application.
- d) Zeolite holds nutrients in the root zone of plants to use when required.
- e) Nano fertilizers decreases the nutrient use efficiency.

**Q. 4. Choose correct option.**

- a) CRF refers to
  - i) Continuous Releasing Fertilizer
  - ii) Constant Rate of Fertilizer
  - iii) Controlled Rate of Fertilizer
  - iv) Controlled Release Fertilizers
- b) Nano sensors are used to detect
  - i) Pathogens
  - ii) Temperature of soil
  - iii) Pesticide level of soil
  - iv) All of these
- c) Nano fertilizers are nutrient carriers of nanodiamensions ranging from...
  - i) 10 to 20 nm
  - ii) 30 to 40 nm
  - iii) 15 to 30 nm
  - iv) 20 to 30 nm
- d) \_\_\_\_\_ can be used as slow released nitrogen fertilizer.
  - i) Ammonium chloride
  - ii) Both
  - iii) Urea fertilized zeolite chips
  - iv) None of these
- e) One mole of water for instance weights \_\_\_\_ gm.
  - i) 10
  - ii) 18
  - iii) 20
  - iv) 15



## Course Title: Geo-informatics and Nanotechnology and Precision Farming

### Q. 5. Do as directed

- a) Define Nano sensors.
- b) Name the nano fertilizer used as slow Release fertilizer in sulphur deficient soil.
- c) Give the full form of CDA.
- d) Give any two devices used as nanosensors.
- e) Give any two formulation types of nanopesticides.
- f) Give the full form of CRFs.

### Ans Key:

#### Q. 1.

- a) 30 to 40 nm
- b) Nanosensors
- c) Zeolite
- d) Clay nanotubes
- e) Nano-material

#### Q. 2.

- a) iii) Clay nanotubes
- b) i) Polymer film
- c) v) Nano cantilevers
- d) iv) Honey comb like structure
- e) i) Nutrient use efficiency

#### Q. 3.

- a) True
- b) False (Urea fertilized zeolite can be used as slow release N fertilizer)
- c) False (It decrease the rate of application)
- d) True
- e) False (It increases the NUE)

#### Q. 4.

- a) iv) Controlled Release Fertilizer
- b) iv) All of these
- c) ii) 30 to 40 nm
- d) iii) Urea fertilized zeolite chips
- e) 18 gm

#### Q. 5.

- a) 'Nano sensors' are any biological, chemical or surgical sensory points used to convey information about nanoparticles to macroscopic world.
- b) Sulphur Nano coating fertilizers
- c) CDA - Controlled Droplet Application
- d) Nanocantilevers, carbon nanotube, nanowires
- e) Formulation types of nanopesticides- Nanoemulsions, nanocapsules.
- f) Control Release Fertilizer.

**15) Use of nanotechnology in seed and water for scaling up farm productivity**

**Q. 1. Fill in the blanks.**

- a) Use of \_\_\_\_\_ can help to alert the pollen contamination.
- b) Tracking of sold seeds could be done with \_\_\_\_\_.
- c) Full form of CNTs \_\_\_\_\_.
- d) \_\_\_\_\_ as new pores for water permeation by penetration of seed coat and act as a passage to channelize the water from the substrate into the seed.
- e) \_\_\_\_\_ are used for analytical detection of contaminants in water samples.

**Q. 2. Match the pairs.**

- |                                   |                                                        |
|-----------------------------------|--------------------------------------------------------|
| a) Nanocoating                    | i) Smart seed                                          |
| b) Natarajan and Siva Subramanian | ii) Quantum dots                                       |
| c) Nano filtration                | iii) Zn, Mn, Pb, Pt, Au, Ag                            |
| d) Nanosensors                    | iv) Carbon nanotubes and alumina fibers                |
| e) Su and Li                      | v) Titanium oxide nanowires or palladium nanoparticles |

**Q. 3. True or false.**

- a) Conventional methods can clean water by back flushing.
- b) Smart seeds reduce seed rate.
- c) Carbon nanotubes can be used to facilitate germination in rainfed crops.
- d) Nanofibrous alumina filter helps to remove negatively charged contaminants.
- e) Carbon nanotube membrane removes water contaminants.

**Q. 4. Choose correct option.**

- a) CNTs stand for
  - i) Carbon nano technique
  - ii) Carbon nanotube
  - iii) Carbon nanotechnology
  - iv) All of these
- b) Seeds imbibed with nanoencapsulations with specific bacterial strain called as
  - i) Seed encapsulation
  - ii) Nano barcodes
  - iii) Smart seed
  - iv) All of these
- c) Su and Li (2004) developed a technique known as
  - i) Quantum dots
  - ii) Nanotechnology
  - iii) Nanoparticle technique
  - iv) Both (i) & (ii)

## Course Title: Geo-informatics and Nanotechnology and Precision Farming

- d) Removal of toxic elements and liquid impurities can be done by
- i) Nanotechnology
  - ii) Nanosensors
  - iii) Nanoparticles
  - iv) Nanomembrane
- e) Water purification using nanotechnology exploits
- i) Nanoscopic materials for nanofiltration
  - ii) Nanoscopic pores for zeolite filtration membranes
  - iii) Nanocatalyst and magnetic particles
  - iv) All of these

### Q. 5. Do as directed

- a) Which elements are used for nanocoating of seeds?
- b) Give the use of carbon nanotubes.
- c) Give function of carbon nanotube membrane.
- d) Two applications of nanotechnology in agriculture.
- e) Give the advantages of nanofilters.
- f) Give some applications of nanotechnology in seed science.

### Ans Key:

#### Q. 1.

- a) Bionanosensors
- b) Nanobarcodes
- c) Carbon nanotubes
- d) Carbon nanotubes
- e) Nanosensors

#### Q. 2.

- a) iii
- b) i
- c) iv
- d) v
- e) ii

#### Q. 3.

- a) False
- b) True
- c) True
- d) True
- e) True

#### Q. 4.

- a) ii
- b) iii
- c) i
- d) i
- e) iv

**Q. 5.**

- a) Zn,Mn,Pa,Pt,Au,Ag
- b) They serve as new pores for water permeation by penetration of seed coat and act as passage to channelise the water from the substrate into the seeds.
- c) They can remove all kinds of water contaminants including turbidity, oil, bacteria, viruses and organic contaminants.
- d) Nanotechnology in seed science, Nanotechnology in water use
- e) They require less pressure to pass water across the filter, they are more efficient.
- f) Nanocoating of seeds, Nanobarcodes, Bionanosensors, Coating seeds with nanomembrane, Carbon nanotubes.

Prof. S. R. Suryavanshi, DYP AC TALSANDE

**16) Use of nanotechnology in fertilizer & plant protection for scaling up farm productivity**

**Q. 1. Fill in the blanks.**

- a) Nanotechnology has provided the nanostructure material as controlled vector known as
- b) Naturally occurring minerals having a honey comb like layered crystal structure known as
- c) ..... act as reservoir for nutrients that are slowly released on demand
- d) Fertilizers can be coated with ..... that facilitate slow and steady release of nutrients.
- e) ..... are used for herbicide application which claim to include nano materials.

**Q. 2. Match the pairs.**

- |                              |                     |
|------------------------------|---------------------|
| a) Nanosurfactant            | i) smart fertilizer |
| b) Nanomaterial              | ii) 40-70%          |
| c) Nitrogen                  | iii) 50-90%         |
| d) Phosphorus                | iv) glyphosate      |
| e) Controlled release Vector | v) kaolin           |

**Q. 3. True or false.**

- a) Smart fertilizers enhance nutrient use efficiency and increase cost of cultivation
- b) Nanofertilizer and nanocomposites are excellent alternative to soluble fertilizer
- c) Nano pesticide will reduce the rate of application
- d) Size of CDA is (4-28  $\mu\text{m}$ )
- e) CDA is controlled droplet Applicant

**Q. 4. Choose correct option.**

- |                                                                                    |                             |
|------------------------------------------------------------------------------------|-----------------------------|
| a) controlled release vector known as                                              |                             |
| i) Smart fertilizer                                                                | ii) complex fertilizer      |
| iii) mixed fertilizer                                                              | iv) simple fertilizer       |
| b) Nano pesticide should be applied time classical formulation                     |                             |
| i) 10-15                                                                           | ii) 20-25                   |
| iii) 3-4                                                                           | iv) 5-10                    |
| c) fertilizer with Sulphur nano coatings are used as                               |                             |
| i) Slow release fertilizer                                                         | ii) fast release fertilizer |
| iii) volatile fertilizer                                                           | iv) captan                  |
| d) Nanosize fungicide is                                                           |                             |
| i) mancozeb                                                                        | ii) AXX                     |
| iii) propiconazole                                                                 | iv) carbendazim             |
| e) ..... is used for pre-emergence and post-emergence application for grassy weeds |                             |
| i) pendimethalin                                                                   | ii) fluchloralin            |
| iii) paraquat                                                                      | iv) Atrazine                |

**Prepared by Prof. S. R. Suryavanshi, DYP AC Talsande**

## Course Title: Geo-informatics and Nanotechnology and Precision Farming

### Q. 5. Do as directed

- a) clay nanotubes are also known as
- b) CDA stands for
- c) Examples of Nano sized fungicide.
- d) Examples of Nano material which can be used as potential application.
- e) CMC stands for
- f) approach used to improve insecticidal value

Ans key:

### Q. 1.

- a) Smart fertilizer
- b) Zeolites
- c) Zeolites
- d) Nano membranes
- e) Adjuvants

### Q. 2.

- a) iv
- b) v
- c) ii
- d) iii
- e) i

### Q. 3.

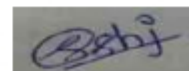
- a) False
- b) True
- c) True
- d) False
- e) False

### Q. 4.

- a) i
- b) i
- c) i
- d) ii
- e) iv

### Q. 5.

- a) Halloysite
- b) Controlled droplet Application
- c) Banner M , AXX , Syngent
- d) Kaolin, Polymeric biocompatible NPs, Polymeric chitosan NPs
- e) Carboxy-methyl cellulose
- f) Nanoencapsulation



Prof. S. R. Suryavanshi,  
Asst. Prof. of Agronomy,  
DYP AC Talsande  
Mob. No. 9890495037

**Prepared by Prof. S. R. Suryavanshi, DYP AC Talsande**

