OBJECTIVES AGRO-3612

1. Full form of PF/PA – Precision Farming / Agriculture.
2. Full form of BMPs – Best Management Practices.
3. RS, GIS, GPS, Soil testing, Yield Monitors & VRT are components of Precision farming.
4. Full form of DGPS- Differential global positioning system.
5. Accurate application of agriculture inputs for crop growth, considering relevant factors such as soil, weather and crop management practices called as Precision farming.
6. Precision farming system (PFS) is based on the recognition of spatial and temporal variability in crop production.
7. Precision farming system within a field is also referred to as Site-specific crop management (SSCM).
8. Site specific management include Application of map, Variable rate technology & GPS.
9. Spatially referenced data collection includes yield map, GPs, Field scout, crop & soil data, Remote sensing data.
10. Data analysis and interpretations include – Geostatistics, Variably maps, Image processing, Database, GIS, Decision support system.
11. Agro-geoinformatics – it is a branch of geoinformatics, is the science and technology about handling, digital agro groinformation, such as collecting, processing, storing, archiving, preservation, retrieving, transmitting, accessing, visualisation, analysing, synthesizing, presenting and dissemating agro-groinformation.
12. A step in PF is ---
    1) Identification and assement of variability & 2) Management of Variability.
13. The goal of grid soil sampling is to generate a map of nutrient / water requirement.
14. Yield mapping is the first step to determine the precise location of the highest and lowest yield areas of the field and to analyse the factors causing yield variation.
15. Crop Scouting – In-season observations of crop conditions like weed patches; insect & fungal infestation and crop tissue nutrients status can be helpful later when explaining variation in yield maps.
16. Variable rate application: grid soil samples are analyzed in the laboratory and an interpretation of crop input needs is made for each soil sample.

17. Advantages of PFS to farmers – Overall yield increase, Efficiency improvement, Reduced production cost, Better decision-making in Agril. Management, Reduced environment impact & Accumulation of farmer's knowledge for better management.
18. Sensor Technologies include electromagnetic, Conductivity, Photo-electricity, Ultrasound are use to measure Humidity, Temp, Vapour and Air etc.
19. Use of Geographic Information System (GIS) began in 1960.
20. GIS system comprises hardware, software and procedures designed to support the compilation, storage, retrieval and analysis of feature attributes and location data to produce maps.
21. Variable rate technologies (VRT) are automatic and may be applied to numerous farming operations.
22. The VRT is most widely used PFS Technology.
23. Grain yield monitor mounted on a combine continuously measures and records the flow of grain in the grain elevator.
24. Describe variability include – coat & Yields, Soil & Plants , Pest & Blight, Environments, Management,
25. Undesirable variability includes – Spatial, Temporal and Prediction.
26. Mechanisation (Safety & Environment) includes Navigation & control, Variable rate operation and management of IT networks.
27. GPS + Sensors monitoring the application of inputs.
28. India spends only 0.3 % of its Agril. GDP in research and Development.
29. In India, broadly two types of Agril – 1)High input Agril & 2) Subsistence farming.
30. Full form of SDSS – Spatial Decision Support System.
31. Site specific farming is managing areas within fields, rather than using the same management on the entire field.
32. Full form of SSNM- Site specific nutrient management.
33. The SSNM enables farmers to tailor nutrient management to the specific condition of their field and provides a framework for best management practices.
34. Right Management means site specific management.
35. Employing GPS technology to geo-reference input and yield data is a good first step.
36. The International Rice Research Institute developed a SSNM Program.
37. The concept of SSNM tested on farms in 8 rice growing regions in 6 countries.
38. The required fertiliser N is distributed in several application during the crop growing season using tools like LCC (Leaf Colour Chart).

39. Natural resources provide the basis for human survival & Development.
40. Geoinformatics deals with handling digital groinformation, processing, storing, archiving, preservation retrieving, and transmitting, accessing, visualisation, analysing, synthesising, presenting and disseminating groinformation.
41. The groinformation is the science and technology of communicating the evidences about the state of earth's surface.
42. Geoinformatics defined as combination of technology and science dealing by means of the spatial information, its qualification and classification, its processing, storage and dissemination.
43. Geoinformatics is an appropriate blending modules like remote sensing (RS), Global positioning system (GPS), Geographical information system (GIS) and rational data base management system (RDBMS).
44. The GIS is an acronym that stands for Geographical information system.
45. Geoinformatics widely believed that it can play an increasingly important role in natural resource management in Face of Climate change, Global climate change.
46. Agro-groinformation is the key information in the agricultural decision making and policy information process.
47. Geoinformatics is a new discipline concerned with modelling of spatial data and the processing techniques in spatial information system.
48. A cartographic principle involves map, map design and map visualisation and production in analogue or digital computer environment.
49. Remote sensing techniques have the unique capability of recording in visible as well ads invisible parts of the electromagnetic spectrum.
50. Remote sensing techniques are also useful in the determination the spatial distribution of plant status and corollary expected yield by measuring the greenness of the field.
51. Remote sensing techniques are Applicable to Crop Survey, Range Survey & Livestock Survey.
52. Geographical information system (GIS) can be defined as a system for capturing, storing, checking, manipulating, analysing and displaying data, which are spatially referenced to earth.
53. Software for the acquisition, manipulation & management of data in the database.
54. Expertise in terms of skilled human operators.
55. Geo-referencing is location serves as a means to link terrain data collected by different mapping disciplines through overlay analysis.

56. Spatial data collected by GPS can be automatically recorded with GIS programme.
57. Differential Global positioning system (DGPS) is used for precise location of activities.
58. Variable rate applicator (VRA) is used to operationalise precision farming at the farm level.
59. The Control computer co-ordinates field operation with the aid of database in its memory.
60. The new paradigm is being adopted in the United States and Europe since in the middle of 1990s.
61. In Crop Discrimination computes used for automation and to expand Decision support system (DSS).
62. Recently GIS & RST has come up with capable role in Agril. Research.
63. Agricultural crops are significantly better characterised, classified, modelled and mapped using Hyperspectral data.
64. Feature extraction is the process of defining image characteristics or features which effectively provide meaningful information for image interpretation or classification.
65. For Crop type discrimination spatial features are useful.
66. Commercial high resolution multispectral satellite imaginary such as Geoeye-1, IKONOS-2, Quick Bird-2 with less than 4 m spatial resolution.
67. Grey level co-occurrence matrix (GLCM) methods describing the grey value relationship.
68. Local Binary Pattern (LBP) is simple & very efficient texture operator which labels the pixels of an image by thresholding the neighbourhood of each pixel and considers the results as a binary number.
69. Chlorophyll absorbs strongly in the blue (0.4-0.5um) and red (0.68um).
70. Chlorophyll is the primary photosynthetic pigment in the green plant.
71. The spectral reflectance signature has dramatic increase in the reflection for healthy vegetation around 0.7 um.
72. In the Near Infrared (NIR) between 0.7-1.3 um, a plant leaf will naturally reflect between 40-60%.
73. Band selection is one of the important steps in Hyperspectral remote sensing.
74. Approaches of band selection like Supervised & Unsupervised.
75. The simplest form of index is Simple Ratio (SR).
76. Vegetation properties measured with Hyperspectral vegetation indices (HIVs) can be divided into 3 main categories 1) Structure, 2) biochemistry, 3) Plant physiology / stress.

77. Structural properties include Fractional cover, Green leaf biomass, Leaf area index (LAI), Senesced biomass and fraction absorbed photosynthetically active radiation (FAPR).
78. Narrowband vegetation indices can be used as potential variables or crop type discrimination.
79. Greenness / Leaf pigment indices like ARVI, EVI, NDVI & SGI.
80. Chlorophyll red edge indices like RENDVI & VOG-1.
81. Light use efficiency indices like SIPI & PRI.
82. Leaf water indices like DWSI & NDWI.
83. Hyperion imaging spectrometer onboard the earth observing one (EO-1) satellite has provided significantly enhanced data cover conventional multi spectral remote sensing system.
84. HNBs & HVIs derived from EO-1 and field spectral measurements in the 400-2500 nm.
85. A Narrowband vegetation index plays a important role for mapping plant biophysical and biochemical properties of agril. crops (BB-PACs).
86. Crop yield estimation plays a significant role in economy development.
87. After World War II Aerial Photography is use to obtain information of crop yield.
88. Multispectral Scanners (MSS) is an important consideration in the task of species identification is the stage of growth of the crop.
89. Utilisation of Remote sensing data for agril. development was investigated in the USA in 1971 under Corn Blight Watch Experiments (CBWE).
90. Normalized difference vegetation index (NDVI) has been used to estimate the yield of rice.
91. Chronological growth of crop inventory using Geoinformatics.

Period	Technology	Features
Before 1940	Crop cutting experiments	Qualitative analysis
1950-1950	Aerial photography & Computers	Regression models based on Statistical data
1970-1990	Satellite imagery	Crop yield at global scale
1990-2000	High resolution satellite imagery	Statistical as well as vegetation indices
2000 onwards	Amalgamation of RS, GIS & GPS	Crop inventor based on crop stimulation models & crop growth models

92. Soil maps are required on different scales varying from 1:1 million to 1:4,000 to meet the requirement of planning at various levels.
93. Soil maps at 1:250000 scales provide information for planning at regional or state level.
94. Large scale maps a 1:8000 or 1:4000 scale are specific purpose maps.
95. Remote sensing data from Landsat MSS are use for mapping soils and degraded lands.
96. Government of India – "Integrated Mission for Sustainable Development" – the soil mapping has taken up at 1:50000 scales for about 175 block/district in the country.
97. Salt affected soils are mapped at 1:50000 scale on limited scale using satellite data.
98. Multispectral satellite data are being used for mapping soil up to family association level (1:50000).
99. Visual interpretation is based on shape, size, tone, shadow, texture, pattern size and Association.
100. Computer Aided techniques utilise the spectral variation for classification.
101. Satellite series – IRS, LANDSAT, SPOT & IKONOS and some future mission are EYE GLASS, ORB VIEW & GREENSAT.
102. Information technology such as internet is good means for some Agri-business companies to deliver their services and product.
103. SSNM (Site Specific Nutrient Management) is a new approach foe nutrient recommendation.
104. The SSNM recommendations could be evolved on the basis of solely plant analysis.
105. Y max is defined as the maximum possible grain yield limited only by the climatic condition of the site, where there are no other factors limiting crop growth.
106. Crop growth models (DSSAT) can be used to work out max of crop variety under particular condition.
107. The nutrient uptake requirement of a crop depends both on Yield goal & Y max.
108. SSNM, nutrient requirement are estimated with the help of quantitative evaluation of fertility of tropical soils (QUFFTS) MODELS.
109. Indigenous nutrient supply (INS) is defined as the total amount of a particular nutrient that is available to the crop from the soil during cropping cycle, when othe nutrients are non limiting.
110. Fertilizer Recovery Efficiency (RE, kg of fertilizer nutrient taken up by crop per kg of the applied nutrients.
111. N rates and application schedule can be fertiliser adjusted as per crop demand using Chlorophyll meter (popularly known as SPAD) or Leaf colour chart (LCC).

112. Agronomic efficiency was also higher in the crop.
113. SPAD based winter maize (less than 37) & wheat (Less than 42).
114. Field specific fertiliser rates are then suggested to meet the nutrient demand of the crop without depleting soil reserves.
115. In Decision support system Nutrient Expert is an easy to use, interactive and computer-based decision tool that can rapidly provide nutrient recommendation.
116. The algorithm for calculating fertilizer requirement in NE is determined from set of on-farm trial data using SSNM guidelines.
117. The parameters needed in SSNM are usually measures in Nutrient Omission Trial conducted in farmer's field.
118. Nutrient expert for hybrid maize is NEHM for tropical environment was developed in 2009 in Philippines.
119. In 2011, beta versions of NE for wheat were developed for South East Asia, China, Zimbabwe.
120. In 2013, field evaluated versions of NE maize and NE wheat have been released for public use in South Asia and China.
121. Geospatial data has significantly different structure and function.
122. A GIS is a computer based tool for mapping and analysing things that exist and events that exist and events that happen on earth.
123. GIS is a multibillion-dollar industry employing hundreds of thousands of people worldwide.
124. GIS is a tool used by individuals and organisations, school, government and business seeking innovative ways to solve their problems.
125. The process of making maps with GIS is much more flexible than are traditional manual or automated Cartography approaches.
126. An automated process called Geocoding is used to create explicit geographic reference from implicit references.
127. In the Vector models information about lines, points and polygons is encoded and stored as a collection of x, y coordinates.
128. Polygon features such as sales territories and river catchments.
129. GIS works with two fundamentally different types of geographic Vector & Raster models.
130. Components of GIS are Hardware, Software, Data, People & Method.

131. Importance of GIS is 1) Perform Geographic Queries and Analysis, 2) Improve Organisational Integration, 3)Make better Decisions & 4) Making Maps.
132. Geodesy also known as Geodetics, Geodetic Engineering or Geodetics Engineering – a branch of mathematic and earth sciences.
133. Geodesists study geodynamical phenomena such as crustal motion, tides and polar motion.
134. A coordinate system (CS) describes the mathematical rules governing the coordinate space including number of axes, their names, their direction, their units and their order.
135. A Coordinate reference system (CRS) is a coordinate system which is referenced system.
136. The Open geospatial consortium (OGC) is an international, not for profit organisation, committed to making quality open standard for the global geospatial community.
137. The Open geospatial consortium (OGC) standards are used in a wide variety of domains including environment, defence, Health, Agril., Meteorology, Sustainable development and many more.
138. Geodesy is defined as the science of measurements and mapping of earth surface.
139. The equipotential surface is known as Geoid.
140. The Ellipsoid is effectively a best fit to the geoid.
141. A geodetic datum's defines position and orientation of the reference relative to the centre of earth and meridian used as zero longitude- prime meridian.
142. A geodetic datum's is inextricably linked to generation of Geographical coordinates.
143. WGS 84 (World Geodetic Sysyem-84) and ED 50 (European Datum) coordinates of Eiffel Towers in Paris.
144. Use of GPS is now wide spread within the Exploration & Production (E&P Industry).
145. The Coordinate reference system used by the GPS system is also known as WGS-84.
146. Remote sensing technique play a important role in crop identification, crop area and production estimation, disease and stress detection, soil and water recourses.
147. Remote sensing is the science of accruing information about the earth surface without actually being in contact with it.
148. Remote sensing is also involves the sensing of emitted energy and the use of non imaging sensors.
149. Satellite and airborne images are used as mapping tools to classify crops, examine their health and variability and monitor farming practices.

150. Soil properties sensing – Soil texture, structure, physical condition, soil moisture and soil nutrients.
151. Crop sensing – Plant population, crop stress and nutrient status.
152. Yield monitoring system–Crop yields, harvest swath width and moisture content of grain
153. Variable rate technology systems – Fertilizer flow & Weed detection etc.
154. Remote sensing offers an efficient and reliable means of collecting the information required, in order to map crop type and area.
155. Examining the of reflected infrared to red wavelength is an excellent measure of vegetation index.
156. Healthy plants have high NDVI values.
157. Image Processing and Interpretation /analysis can be defined as the "act of examining images for the purpose of identifying object & judging their significance".
158. Grey level stretching to improve the contrast and spatial filtering for enhancing the edges.
159. The image can be enhanced by simple linear grey level stretching.
160. In supervised classification, the spectral features of some areas of known land covers types are extracted from the image.
161. In Unsupervised classification the computer programmes automatically group the pixel in the image into separate clusters, depending on their spectral features.
162. Each class of land covers is referred to as a theme and product of classification is known as thematic map.
163. Specific instrument carried out on board the satellite can be use to make measurement of Biophysical parameters.
164. Thematic information derived from the remote sensing images is often combined with other auxiliary data to form basis for a GIS.
165. GPS is a satellite based navigation system, consisting of more than 20 satellites and several supporting ground facilities, which provide accurate, 3 D position, velocity and time, 24 hours a day.
166. Components of GPS is 1)Ground control station, 2) GPS satellite, 3) GPS receiver.
167. The GPS satellite carries atomic clock that measure time to high degree of accuracy. Universal Transverse Mercator's (UTMs) are used to pinpoint a location of map.
168. Plot navigation is feature of GPS allows combining multiple way points and moving point to point.
169. Tracks are the some of most useful function of portable navigation system.

170. Function of GPS is 1) Giving a location, 2) Point to point navigation, 3) Plot navigation, 4) Keeping track of your track.

171. GPS application include –

1) Guidance – a) Point guidance b) swath guidance

2) Control – a) VRA b) Variable tillage depth, c) Variable irrigation.

3) Mapping – a)Soil properties, b)Chemical application, c) Chemical prescription d) Yield mapping e) Pest mapping f)Topographic maps g) Planting maps.

174. Azimuth is an angle between 0^{o} & 360^{o}mesured clockwise from north.

175. Cartography is the study & Science of representing real world.

176. Database is logical collection of interrelated information managed and stored as a unit.

177. Geocode is process of identify one a location by one or more attributes from a base layer

178. Geoid is the figure that represents the irregular spheroid shape of earth.

179. Hypsography – measurement and mapping of the variation in earth surface elevation in elevation in reference to sea level, which is represent by contour lines on maps.

180. Multispectral images optically acquired in more than one spectral or wavelength interval.

181. A raster is a data model used in GIS which are usually regularly-size rectangular or square shaped grid cells arranged in rows in columns.

182. Radiometry – the measurement of electromagnetic radiation, including visible & invisible light waves.

183. Real time Agronomy – The use of constantly updated data from the source such as a sensor to inform decision making while working, for example decisions on application rates.

184. Variable rate application (VRA) Application of seeds, fertilizers or Agrochemicals at different rates as required by the condition in the different part of a field.

185. Yield Mapping – The process o using GPS and yield monitoring data to show the variation in yield across a field.