Model Answer

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SEMESTER END THEORY EXAMINATION

B.Sc. (Hons.) Agriculture

Semester	**:**	**VI (New)**	**Term**	**:**	II	**Academic Year**	**:** 2020-21
Course No.	**:**	**AGRO-3612**	**Title**	**:**	**Geo-informatics, precision farming and nanotechnology**		
Credits	**:**	2 (1+1)					
Day & Date	**:**	**8/6/2021**	**Time**	**:**	1.00 Hr	**Total Marks**	**:** 40

Note : 1) Solve ANY FOUR questions from SECTION-A
2) Solve ANY SIX questions from SECTION-B
3) ALL questions from SECTION-C are compulsory
4) Send the PDF file of answer sheet to the email id of respective course teacher

SECTION-A

(Write the answers in 4-5 sentences only. Each question carries 4 marks)

Q. 1 **Define GIS and write in brief about the major components of GIS.**

Ans: **GIS:** A system for capturing, storing, checking, manipulating, analysing and displaying data, which are spatially referenced to the earth.

Main components of geographic information systems are:

1. **The hardware** which include a host computer, data acquisition device(s) such as digitiser, scanner, digital image processing system, digital theodolite, analytical and digital photogrammetric plotter and output device(s) such as plotter, printer, high resolution screen among others.
2. The **spatial database**, containing the objects of interest, including the objects' geometric (position and spatial relationships) and thematic data in structured form.
3. **Software** for the acquisition, manipulation and management of data in the database.
4. **Procedures** (conventions and algorithms to guide its operations).
5. **Expertise** in terms of skilled human operators.

Q. 2 **In which situation simulations can be used?**

Ans: **Ans:** There are several situations in which simulations can be used as indicated below:

1.Study internals of a complex system e.g. biological system.
2.Optimise an existing design e.g. routing algorithms, assembly line.
3.Examine effect of environmental changes e.g. weather forecasting.
4.Study importance of variables.
5.Verify analytic solutions (theories).
6.Test new designs or policies.
7.Impossible to observe/influence/build the system.
8.Simulation verifies analysis of a complex system or can be used as a teaching tool to provide insight into analytical techniques.

Q. 3 **Enlist any eight crop models as reported in recent literature.**

Ans:

SPICE	Whole plant water flow
REALSOY	Soybean
IRRIGATE	Irrigation scheduling model
COTTAM	Cotton
APSIM	Modelling framework for a range of crops
GWM	General weed model in row crops
GOSSYM-COMAX	Cotton
CropSyst	Wheat and other crops
SIMCOM	Crop (CERES crop modules) and economics
TUBERPRO	Potato and disease
SIMPOTATO	Potato

	WOFOST	Wheat and maize, Water and nutrient
	WAVE	Water and agrochemicals
	SUCROS	Crop models
	ORYZA1	Rice, water
	SIMRIW	Rice, water
	CERES-Rice	Rice, water
	EPIC	Erosion Productivity Impact Calculator
	CERES	Series of crop simulation models
	DSSAT	Framework of crop simulation models including modules of CERES, CROPGRO
	PERFECT QCANE	Sugarcane, potential conditions
	AUSCANE	Sugarcane, potential and water stress conds.,erosion
	CANEGRO	Sugarcane, potential and water stress conds.
	APSIM-Sugarcane	Sugarcane, potential growth, water and nitrogen stress

Q. 4 **Elaborate the practical problems of precision farming in Indian agriculture.**

Ans: Precision agriculture has been mostly confined to developed countries.Limitations for its implementation in developing countries like India are:

1.Small land holdings.

In India, major problem is the small field size. More than 58 per cent of operational holding:, in the country have size less than 1 ha. Only in the states of Punjab, Rajasthan, Haryana and Gujarat more than 20 per cent of agricultural lands have operational holding size of more than 4 ha.

2.Heterogeneity of cropping systems and market imperfections.

3.Complexity of tools and techniques requiring new skills.

4.Lack of technical expertise knowledge and technology (India spends only 0.3 per cent of its agricultural GDP in research and development).

5.Infrastructure and institutional constraints including market imperfections.

6.High cost.

Q. 5 **What are the components of GPS?**

Ans: **Ans: Global positioning system (GPS)** is a satellite-based navigation system, consisting of more than 20 satellites and several supporting ground facilities, which provides accurate, three-dimensional position, velocity and time, 24 hours a day, everywhere in the world and in all weather conditions.The global positioning system consists of three main components.

Basic components of global positioning include:

I. GPS ground control stations.
II. GPS satellites.
III. GPS receivers.

SECTION-B

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

Q. 6 **Give the full form of following abbreviations**

Ans:

a) NDVI -- Normalized Difference Vegetation Index.

b) SSNM -- Site Specific Nutrient Management

c) SPAD -- Soil Plant Analysis Development.

d) STCR -- Soil Test Crop Response.

e) VRT -- Variable Rate Technology

f) DGPS -- Differential global Positioning System

g) GIS -- Geographic Information System

SECTION-C	
(Choose the correct option. Each question carry 1 mark)	
Q. 7	1) In precision farming, inputs are applied at ----- rate to crop in the field.
	Ans: variable (c)
	2) Modelling and simulation concepts, is introduced by ----.
	Ans: Zeigler (b)
	3) Carboxy Methyl Cellulose nanoparticles can degrade/detixify herbicide ----- residue**.**
	Ans: Atrazine (d)
	4) Nanopesticide ---- cloggs the spraying nozales.
	Ans: never (a)
	5) REALSOY crop model is used in ----- crop.
	Ans:Soybean (d)
	6) Urea-fertilized zeolites chips can be used as ---- release nitrogen fertilisers.
	Ans: Slow (b)
	7) One nanometer (nm) is one ----- of a meter.
	Ans: billionth (d)
	8) The word "nano" comes from ----- word.
	Ans: Greek (a)
	9) In -----, nutrient requirements are estimated with the help of quantitative evaluation of fertility of tropical soils by (QUEFTS) models.
	Ans: SSNM (a)
	10) GPS provides accurate, three-dimensional position, velocity and time, ---- hours a day, every-where in the world and in all weather conditions.
	Ans: 24 (c)
	11) A ---- is a computer-based tool for mapping and analysing things that exist and events that happen on earth.
	Ans: GlS (b)
	12) Healthy plants have a high NDVI value because of their --- reflectance of infrared light and relatively ----- reflectance of red light.
	Ans: high / low (c)

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