Chhatrapati Shahu Ji Maharaj University, Kanpur

Answer Script Details
Barcode 10095305

Roll No. 22031000195
Total Mark 32/50.00

Exam B.SC IN AGRICULTURE BSCAG_ODD-EXAM-DEC-24
Subject AG5011 - GEO INFORMATICS AND NANO TECHNOLOG

Question wise Mark Summary

Q.No	Mark	Q.No	Mark	Q.No	Mark	Q.No	Mark
1A	3/5						
1B	3/5						
1C	3/5						
1D	3/5						
1E	3/5						
1F	3/5						
2	NA/10						
3	NA/10						
4	NA/10						
5	7/10						
6	NA/10						
7	NA/10						
8	7/10						
9	NA/10						

Chhatrapati Shahu Ji Maharaj University
Kanpur, Uttar Pradesh

PART-I

Date of Exam: 11/02/25 Shift: III rd Room No. 55

Paper Code: AG-501 Subject: Geo-Informatics & Nanotechnology Sem.: 5th

Name of Candidate: KUMAR VAIBHAV

Roll No.: 2 2 0 3 1 0 0 0 1 9 5

Signature of Candidate: कुमार वैभव

Signature of Invigilator: B. Mishra

COE Facsimile

PART-II

MARKS OBTAINED										
Q.	1	2	3	4	5	6	7	8	9	10
(a)										
(b)										
(c)										
(d)										
(e)										
(f)										
(g)										
(h)										
(i)										
(j)										
Total										
Total Marks in Figures									Max. Marks	
Total Marks in Words										

Paper Code: AG 5 0 1 1

Signature of Evaluator

PART-III

Course: B.Sc.(Ag.)

Session: 2024-25 Year/Semester: 5th

Subject: Geo-Informatics & Nanotechnology

Paper Code: AG 5 0 1 1

Exam Date: 1 1 0 2 2 0 2 5

Name of Candidate: KUMAR VAIBHAV

Father's Name: VINOD KUMAR VERMA

महाविद्यालय का कोड College Code: A U 0 2

परीक्षा केन्द्र का कोड Exam Centre Code: A U 0 2

परीक्षा का प्रकार Type of Exam: Regular ● Ex. Student ○ Private ○ Back paper Exam ○

ANSWER BOOKLET NO.: 10095305

Paper Code: AG 5 0 1 1

नामांकन संख्या Enrollment Number: C S J M A 2 2 0 0 0 0 4 0 7 1 2

परीक्षार्थी अनुक्रमांक संख्या Candidate's Roll Number: 2 2 0 3 1 0 0 0 1 9 5

पेपर कोड Paper Code: AG 5 0 1 1

Signature of Candidate: कुमार वैभव

Signature of Invigilator: B. Mishra

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नोट : 1. परीक्षार्थी को निर्देशित किया जाता है कि आवरण पन्ने के पृष्ठ भाग पर अंकित सभी निर्देशों को सावधानी पूर्वक पढ़ें।
2. बॉक्स में भरी जाने वाली प्रविष्टियाँ काली स्याही से भरी जायें। 3. गोलों को काले या नीले बॉलपेन से भरा जायें।

INSTRUCTIONS TO THE CANDIDATE FOR FILLING PART-I

1. Read the instructions carefully given on the answer script and admit card.
2. Write Date of Exam, Shift, Paper Code & Name of Subject Correctly.
3. Write Name & Roll No. Correctly.
4. Write Semester & Branch Correctly.

INSTRUCTIONS TO THE CANDIDATE FOR FILLING PART-III

1. Use blue or black ball point pen for writing alphabets & numerals in ☐ Boxes.
2. Carefully study the example before you start marking.
3. As shown in the example below blacken the circles completely.

4. Make no Stray marks on this sheet.
5. **DO NOT WRITE OR MARK ON THE BAR CODE.**

परीक्षार्थी के लिए निर्देश

1. प्रवेश पत्र एवं उत्तर पुस्तिका पर दिये गये निर्देशों को ध्यान से पढ़ें।
2. कवर पृष्ठ के दूसरी तरफ कुछ न लिखें।
3. उत्तर पुस्तिका के पृष्ठों पर दोनों तरफ लिखें।
4. प्रश्न पत्र पर अपने अनुक्रमांक के अतिरिक्त कुछ न लिखें।
5. प्रश्न पत्र कोड एवं प्रश्न पत्र कोड सावधानी पूर्वक लिखें।
6. अपनी स्थिति स्पष्ट लिखें।
7. उत्तर पुस्तिका के पृष्ठों की संख्या देखें। अगर उत्तर पुस्तिका में पृष्ठ (1–24) से कम है या फटे हुए है, तो परीक्षा शुरू होने के पूर्व दूसरी उत्तर पुस्तिका ले लें।
8. प्रश्नपत्र को देख, यदि प्रश्नपत्र के विषय कोड, विषय का नाम तथा प्रश्न में कोई त्रुटि है तो उसके परीक्षा शुरू होने के 30 मिनट के अन्दर कक्ष निरीक्षक को तत्काल सूचित करें, उसके बाद विश्वविद्यालय द्वारा कोई कार्यवाही नहीं की जायेगी।
9. प्रश्नों के उत्तर लिखने के लिये पैंसिल का प्रयोग न करें।
10. B कोपी या अतिरिक्त ग्राफ नहीं दिया जायेगा।

IN ORDER TO AVOID UFM (UNFAIR MEANS) :

1. The Roll No. and Answer Book no. found elsewhere or any other symbol found in the answer book will be treated as unfair means.
2. Any tempering of Bar Code and Booklet no shall be treated as Unfair Means.
3. Do Not bring the materials like slip of paper/mobile/digital diaries/ study material/ revision notes in examination hall. Possession of the mobiles/ digital diaries/ electronic watch and any other electronic gadget except memory less scientific calculator shall be considered as UFM case.
4. Do not keep or paste currency note in answer script it shall be consider as UFM.

INSTRUCTIONS TO THE CANDIDATE

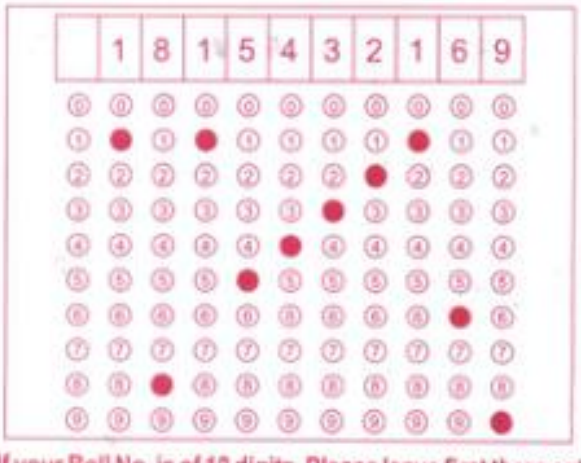
1. Read the instructions carefully given on the Question Paper Admit Card & Answer Script.
2. Do not write anything on back side of the cover page.
3. Write on both sides of pages of answer book.
4. Do not write anything on question paper except Roll Number.
5. Write Paper Code & Question Paper Id carefully.
6. CHECK the number of pages (1-32) or any other kind of damage in your answer script, if found than change the answer script immediately before the commencement of examination.
7. CHECK the Question Paper for any kind of discrepancy e.g. Subject Code. Subject Name and Question of the Question Paper during first THIRTY MINUTES of the commencement of the exam, so that it can be corrected in TIME. After that no corrections shall be entertained by the university.
8. Do not use pencil for answering the question.
9. Write status correctly e.g. those appearing in carry over paper should fill in status as Carry Over. Those appearing as Ex Students should fill in status as ex.
10. No supplementary answer book & graph paper will be provided.

अनुचित साधन से बचने हेतु:

1. उत्तर पुस्तिका के निर्दैशित स्थान को छोड़कर अनुक्रमांक एवं उत्तरपुस्तिका का क्रमांक कहीं और न लिखें तथा कोई भी चिन्ह न बनायें क्योंकि यह अनुचित साधन प्रयोग की परिधि में आता है।
2. उत्तर पुस्तिका के बारकोड अथवा उत्तर पुस्तिका संख्या पर छेड़ करने पर अनुचित साधन प्रयोग माना जायेगा।
3. परीक्षा कक्ष में निम्न वस्तुएं साथ न लायें, जैसे लिखे हुए कागज के टुकड़े, मोबाईल, डिजिटल डायरी, कोपी, पुस्तक यह सभी वस्तुएं जो अनुचित साधन के अन्तर्गत आती है। केवल संबंधित प्रश्नपत्र में ही मेमोरी लैस साइंटफिक केल्कुलेटर ले जाने की अनुमन्यता होगी।
4. उत्तर पुस्तिकाओं में रूपये न रखें न ही उत्तर पुस्तिका में चिपकायें। ऐसा करना अनुचित साधन प्रयोग की परिधि में आता है।

INSTRUCTIONS TO THE CANDIDATE FOR FILLING PART-IV

1. Use blue or black ball point pen for writing alphabets & numberals in ☐ Boxes.
2. Use blue or black ball point pen for filling the circles.



Note - If your Roll No. is of 10 digits. Please leave first three colum

Paper Code AG 5 0 1 1 01

-: Section-A :-

-: Ans-1 (A) :-

Components of Geoinformatics :-

Geoinformatics include various components, are as following :-

1). **Computer Science :-**

For the use of any information, the information is first analyse & processed, & these activities comes under computer science & done by the computer algorithms.

2). **Cartography :-**

Cartography is art, science & technology of creating maps & visual representation of geographic informations.

3). **Photogrammetry :-**

It is an science of acquiring data about environmental & physical objects & data are used to create maps.

Which is used to measure co-ornination of objects, distance between 2 points, area & volume etc.

4) **Web- Mapping :-**

It is scienc of creati & distributing maps on worldwide wel (WWW), usually throu use of webGIS

5). **Remote Sensing :-**

Remote sensing is an scienc of acquiring information about an object kept at a distance.

6) **Geographic Information System :-**

GIS may be difind as a system, that involves collecting, storage, analyzs, processing, interpretating data which is specially referenced to the geographic information.

7). **Global Positioning System :-**

GPS is a navigation system based on the network of satellite that allows user to detect the object in altitude, longitude & elevation with the effecienc of 100 - 0.01 %.

GPS containg 24 satellite

Paper Code
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03

-: Ans-1(B) :-

Image Processing :-

Image processing may be difined as an art of examining images for the purpose of identifying objects and significance their pattern.

or

Image processing is science & technology of collecting, storage, manipulating, improving, restoration of images to extract the attributes of images by manully or digitally.

Steps In Image Processing :-

Image acquisition

↓

Image enhancement

↓

Image restoration

↓

Colour Image processing

↓

Multi resolution processing

↓

Compression

↓

Segmentation

representation & distribution
↓
Feature Matching
↓
Extraction of attributes

:- Ans- 5 (c) :-

Fertilizer Recommendation :-

Fertilizer recommendation using geo-spatial technologies is an important application of precision agriculture.

Fertilizer recommendation using spatial technologies such as remote sensing, GIS and GPS, sensors etc are used to gather the information about soil characteristics, environmental conditions nutrient and input requirement of crops for making information based decision management application of fertilizer.

This helps to optimize the use of fertilizer use efficiency & reduce the losses of fertilizer either loss to environment or getting fixed in soil.

Paper Code: AG S O 1 1 ... 4

05

Methods of Fertilizer Recommendation :-

1). Site-specific nutrient management
2) Soil test crop-response.

Advantages of Fert. Recom. :-

i). It helps to increase the fertilizer use efficiency.
ii). Reduce the environmental impacts of losses of fertilizers.
iii) Improve profitability.
iv) Improve soil health & quality.
v) Increase in yield.
vi). Reduce the amount of application of fertilizer due to SSNM.

:- Ans-1(d) :-

Application of Nanotechnology in Agriculture :-

i). Nalomaterials (TiO_2, SiO_2 etc.) are used to improve the soil structure & helps in increasing soil pH.

ii). Nanomaterials increase the waterholding capacity & improve nutrient use efficiency.

iii). Nano-pesticides are used to effectively control of disease & pest occurrence. & required less amount to convential pesticide.

iv). Nano-fertilizer are used to slow steady release of fertilizers, improve efficiency.

* nano-fertilizer requires 30-100 times less than convential fertilizer
* They increase 17-54% yield in field
* Complete bio-source, so eco-friendly.

v). Nano-sensors are used to various metals, mobility, occurence of disease & pests etc.

vi) Nano-sensors include application of medical science & serve as a pathway of creating another particles such as computer chips used in nano-robots.

vii) Nano-biosensors serve as a agent of promoting sustainable agriculture.

viii) Nano-biosensors are as a diagnostic tool to crop disease assessment & post occurrence.

ix) Nano-C-tube help in germination in rainfed crops & improve effeciency by making a passage of water.

x) Smart seed (nano encapsulated bacterial strain, imbibed seed) required less quantity than normal seed and protect seed from stresses.

Ans-1(E):-

STCR :-

Soil test crop response is also called rationalized fertilizer prescription approach.

It is a method of fertilizer recommendation in which recommendation is done on inherent soil quality & yield level of crop.

It's main aim to determine the relationship between soil tests value & crop yield.

Objectives of STCR :-

i). STCR determine the relationship between soil test value & crop yield.

ii). Evaluation of targeted yield equation of different important crops to recommend the nutrient requirement of crop to achieve the targeted yield.

iii). Fertilizer recommendation is done on soil test value.

iv). After evaluating of gradient experiment & field crop experiment. Fertilizer recommendation is done for different

crops in different soils.

iv) Soil test value is essential to know the actual response of crop under field condition.

v). Improve the efficiency of fertilizer.

vi) Only required quantity of fertilizer would applied to soil.

Ans-2 (F) :-

Raster Data :-

Raster data model में data को छोटे छोटे grid cells में प्रदर्शित किया जाता है। यह data pixels में प्रदर्शित होता है।

* इस data को co-ordinate में व्यक्त किया जाता है जो वास्तविक मानों को प्रदर्शित करता है।
* Raster data मुख्यतः continuous data होता है। eg -
  - satellite imagery
* Raster data मुख्यतः simple data होता है जिससे raster data model बनाया जाता है।

  इस data model में 1 cell एक मान को रखती है व एकल मान को ही प्रदर्शित करती है।
* Raster data से तैयार map ज्यादा सुन्दर नहीं होते हैं और इनमें (model में) data को store करने में ज्यादा space की need होती है।

Vector Data :-

Vector data प्रमुखतः x, y co-ordinate के collection के रूप में प्रस्तुत व store व encode किया जाता है।

* Vecto data मुख्यतः discrete data

होता है

eg- Roads & River.

* Vector data में data को points, lines के रूप में Polygons के Collection के रूप में information x, y - coordinates के store करते है।

* Vector data compound data & complex होता है।

* Vector data से Vector data model तैयार किया जाता है। जिससे बने maps आकर्षक व सुन्दर होते है।

* इस model में data को कम storage space की need होती है।

:- Section - B :-

:- Ans - 5 :-

Global Positioning System :-

GPS is a navigation system based on satellite network that allows user to locate the object in altitude, longetude & elevation with the effeciency of 100 - 0.01%.

This helps to farmers to locate the actual field characteristics as- soil type, soil moisture etc. to make information based decision of application of input.

Definition :-

GPS is a satellite based navigation system consisting of more than 20 satellite & having several grand supporting facilities to provide 3 dimensional information, velocity, time 24 hours in a day throughout the world and in every type of environmental condition.

or

GPS allows to locate the exact position of object & phenomenon.

Component of GPS :-

i). GPS antennae
ii) GPS receiver.
iii) GPS storage & displaying
iv) Interface
v). DGPS
vi) GPS ground control station
vii) GPS pace segment
viii) User.

1). GPS Antennae :-

Its main function is to detect / capture the signal.

2) GPS Receiver :-

Collect the geo-graphic information of specific location. Its main function is to decode the data retrieved by antennae.

3) GPS Storage & Displaying :-

Records & reports are displayed & stored, by the use of computer & laptop.

4) DGPS :-

Differential GPS is a system to accurate the efficiency of GPS. It improve GPS system.

5) Ground ctrl station :-

Vsers measurements are stored by ground ctrl. stations & predict the behaviour of satellite orbit & atomic clocks.

There are total 5 ground ctrl. stations.

* Master ground ctrl station :- FALCON Airforce Base (USA)

6) Space Segment :-

Space segment includes satellite & rockets that launch the satellite in space from cape canaveral.

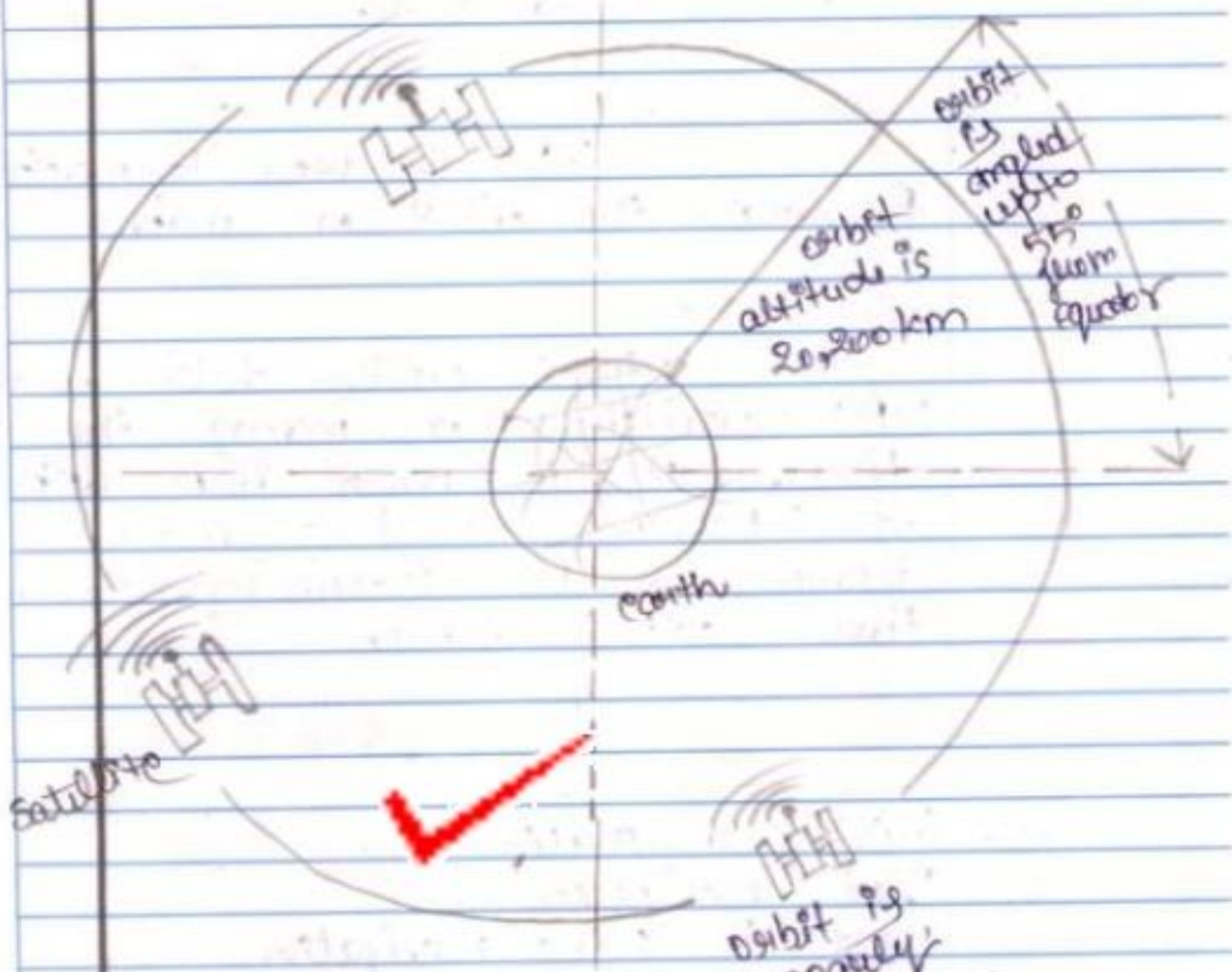
Each satellite has 4 atomic clock.

* total satellite of GPS → 24 Satellite & 6 satellite are used in adverse or damaged condition of permanent satellite.

7) Vser :-

Vsers used the device to locate the object, by information obtained from GPS space segments

GPS System :-



:- GPS :-

Application :-

1). Location :- Determining the position of object & phenomenon

2). **Navigation :-**
Monitor & steel, & movement of craft or vehicle from 1 place to another.

3). **Mapping :-**
GPS is used to mapping & locate the object on map.

4). **Timing :-**
Atomic clocks fields with GPS satellite that manage the time. It is most imp. app. of GPS in final financial transcation & telecommunication, that adjust time.

Function of GPS :-

I). Giving a location
II) Plot navigation
III) Point to point navigation
IV) Keep track of your route

:- Section - C :-

:- Ans - Q :-

Nanotechnology :- "Nanotechnology is an art & science of manipulating material at molecular or atomic & macromolecular level, whose properties are differ from larger structures."

* Nanotechnology ranges from 1 - 100 nm.
* Nano technology is imp. application in agriculture, engineering, medical, other fields.
* Nanotechnology are used to create nano-materials.

Tools of Nano-Technology :- The tools of nano-technology include various agricultural important tools that are following -

1). Nano-materials :- Nano-materials are ultrafine entities, whose dimensions is measured in nanometer. They exists in the natural world and created artificially.

The creation of nano-material advance the science of various fields such as-

agriculture, medicine, industry, engineering etc.

* Nanomaterial are highly reactive in free state
* Nano-material have enormous surface area.
* They have or exhibit quantum scale effects

2). Nano-pesticidy :-

Nano-pesticidy are any formulation which contains the material having nanometery & include the properties associated with thye small size particles.

OR

Nano pesticide are plant protection chemicaly in which either a.i. or carrier material is developed through the process of nanotechnology.

* Nano-[illegible] release slow a.i of chemical
* Improve pesticide effeciency
* Improve mobility

* Improve soil quality by reducing waste.

3) **Nano-fertilizer :-**

Nano-fertilizers are nutrient carriers of nanosize, have capability to holding handful of nutrient due to their larger surface area & release it slowly & steadily that commensurate with crop demand.

4) **Nano-Sensors :-**

Nano-sensors are any biological, chemical, physical sensory [illegible] that used to convey the information about nanoparticle to macro-scopic world.

5) **Nano-Biosensors :-**

Nano-sensors with immobilized biosreceptors probes who have specific for target analyte molecule are called nano-bio sensors.

6) **Zeolite :-**

It is mineral attached with biosensor to commensurate & optimum release of a.i. of feed & from soil.

Techniques is :-

1). Bottom up Approach :-

It is the process of creating nano-particles from molecule/atoms by assembling that leads to last macro-structures.

* the starting phase of bottom up approaches is either gas or liquids

atom/molecule
↓
cluster
↓
nanoparticles

2). Top-Down Approaches :-

It is the process of making nano-particles from large entities or bulk materials, size of bulk materials is reduced by successive cutting until it reaches to desired scale

Bulk
↓
fragments / powder
↓
Smaller fragments

↓ → exploitation from large to nanolayer nano-particles.

* The diamond is made by top-down approaches.
* mechanical milling
* Anodigation
* High pressure torsion, used in top down approach

Paper Code

22

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23

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