MARKING SCHEME
SAMPLE PAPER
CLASS XII
GEOSPATIAL TECHNOLOGY (740)

Time - 3 hours **Maximum Marks- 60**

INSTRUCTIONS-

1. Question paper will be divided into **two sections**:

   (i) SECTION A:
   - **PART 1- Multiple Choice Questions/ Fill in the blanks/ Direct questions**: There will be 12 questions of **1** mark each. A candidate needs to attempt any **10** questions **(Marks 10 x 1 = 10).**
   - **PART 2- Very short answer type questions**: There will be 7 questions of **2** marks each. A candidate needs to attempt any **5** questions. **(Marks 5 x 2 = 10).**
   - **PART 3- Short answer type questions**: There will be 7 questions of **3** marks each. A candidate needs to attempt any **5** questions **(Marks 5 x 3 = 15).**

   (ii) SECTION B:
   - **Long answer/ Essay type questions**: There will be **7** questions of **5** marks each. Students need to attempt any **5** questions **(Marks 5 x 5 = 25).**

2. All the questions of that section must be placed in the correct order.

3. Please check that this question paper contains 33 questions.

4. The maximum time allowed is 3 hours.

SECTION A

PART 1

MULTIPLE CHOICE QUESTIONS/ FILL IN THE BLANKS/ DIRECT QUESTIONS:

Attempt any 10 questions out of 12 questions.

Q1. Which resolution refers to sensing and recording power of the sensor in different bands of EMR? (1)

A. Spatial
B. Spectral
C. Radiometric

D. Temporal

Q2. Which is not a spatial analysis tool? (1)

A. TIN
B. Buffer
C. Merge
D. Resolution

Q3. What is the accuracy of real time kinetic fixed GPS? (1)

A. 15m-100m
B. 0.5m-5m
C. 20cm-1m
D. 1cm-5cm

Q4. Which sensor provides high resolution Pan images? (1)

A. Cartosat 2
B. LISS- III
C. Hyperion
D. TIROS

Q5. Where is Doddahalla watershed located? (1)

A. Delhi
B. Karnataka
C. Bihar
D. Maharashtra

Q6. A person who prepare maps is known as **CARTOGRAPHER** (1)

Q7. **DEFINING TRAINING SITES** is the first step of supervised classification? (1)

Q8.**GALILIO** global navigation satellite system is developed by European space agency? (1)

Q9. The first GPS satellite was launched in the year of **1978** (1)

Q10. **SYMAP** mapping program was developed by the Harvard School of Design? (1)

Q11. What is SiRF? (1)

A MANUFACTURER OF GPS CHIP CELLS

Q12. How many minimum number of satellites are required to calculate 3D positions? (1)

4 SATELLITES

PART 2

VERY SHORT ANSWER QUESTIONS:

Attempt any five questions out of seven questions.

Q13. What is spatial filtering? (2)

A technique of digital processing functions. Used to enhance the appearance of an image to derive valuable information. These are computer algorithm.

Q14. Name the two categories of vector data structure? (1+1)

Spaghetti and topological

Q15. What are the benefits of using GPS technology in surveying? (½ + ½ + ½ + ½)

Can enhance the quality and increase the productivity of conventional survey team, reduces time and effort, improves accuracy.

Q16. Mention any two advantages of Web GIS. (1+1)

Latest and up to date information, easy to use, low cost and faster. (Any two)

Q17. Explain the basic principle of remote sensing. (2)

Different objects reflect or emit radiations in different wavelengths and intensities depending upon properties of the objects serves as the main communication link between the sensor and the objects.

Q18. What is Digitization? Mention its two methods. (1+½ + ½)

Transformation of information from analog format to digital format to store and displayed with a computer. Data transfer, Key board entry.

Q19. What is 3D visualization? (2)

2D objects only have length and width but 3D objects have an extra dimension called depth. In a 2D GIS, a feature is represented as an area of grid cells but 3D GIS deals with volumes and information about what includes inside the cube.

PART 3

SHORT ANSWER QUESTIONS:

Attempt any five questions out of seven questions.

Q20. What is Lidar? Explain its types based on physical process. (3)

An active remote sensing technique of light detection and ranging. It uses the pulses of laser light coming to ground measuring the time of pulse returning to sensor. Range finders, DIAL, Doppler (explain)

Q21. What is supervised image classification? Mention the basic steps of this classification. (3)

In this classification, Geospatial analyst recognize classes in an image based on prior knowledge and assign them class names which are called training sites. Image processing software categorizes the reflectance of each class, called signature analysis. Algorithmsare used for this purpose. Give basic steps (any three)

Q22. What is a geographic coordinate system? How is it different from projected coordinate system? (3)

Geographic coordinate system is a three-dimensional reference system that locates points on the Earth's surface in decimal degrees. A point at earth has two coordinate values, latitude and longitude which are angles. Points north of the Equator have positive latitude values and south have negative values. Projected coordinate is a two-dimensional coordinate system defined by two axis. At right angles to each other, they forma XY-plane.

Q23. What is Topology? Explain the process of building and editing topology. 1+2=3

Mathematical representation of the physical relationships that exists between the geographical elements. Building topology means setting rules and behaviors that model how points, lines and polygons share geometry. Topological editing process begins with constructing the topology of the map to be edited. Explain giving examples.

Q24. How GIS has helped in the flood hazard mapping of Kosi river basin? (3)

Flood hazard mapping is a vital component for appropriate land use planning in flood prone areas. It creates easily-read, rapidly-accessible charts and maps which facilitate the administrators and planners to identify areas of risk and prioritize their mitigation/response efforts.

Q25. What is stereo photography? Explain. 3

A technique to make two photographs of the same subject, from slightly different positions. These two positions should differ approximately 10 cm. These images are called stereo

images and can be viewed using stereoscope or by stereo computer graphics devices. The resultant image appears to be 3 dimensional and depth can be seen.

Q26. To know the extent of area affected by a cyclone, which spatial analysis tool will be used? Explain with diagram. 1+2=3

Buffer analysis. Used for identifying areas surrounding geographic features. To be explained with diagrams.

SECTION B

LARGE ANSWER QUESTIONS:

Attempt any five questions out of seven questions.

Q27. What is image classification? Differentiate between the two methods of image classification. 2+3=5

A process to categorize all pixels in a digital image into one or several land cover classes or themes. It uses the spectral information represented by the digital numbers in one or more spectral bands and classify each individual pixel based on this spectral information(DN). Based on DN values we can create the classes like vegetation, water body, barren land, build up area etc. Differentiate between Supervised and unsupervised classification (three distinctions)

Supervised classification	Unsupervised classification
a) The analyst recognizes classes in any image based on prior knowledge. These are known as training sites. b) It frequently uses parallelepiped, minimum distance and maximum likelihood algorithms c) It is more accurate for mapping classes.	a) Spectral classes are grouped first based on the numerical information in the data. It does not utilize training data. b) The most used algoristhm is “K means” approach also called ISODATA c) It is not complete without human involvement.

Q28. What is a histogram? How histogram stretching and equalization enhances the quality of an image? (1+4=5)

It is a graph showing the number of pixels in an image at each different intensity value.Eg. 256 different possible intensities for an eight-bit grayscale image.

Histogram equalization

- It is the technique by which the dynamic range of the DN values of an image is increased.

- It assigns the intensity values of pixels in the input image to show a uniform distribution of intensities.
- It improves contrast and obtains a uniform histogram

Histogram Stretching

- It is a simple image enhancement technique that improves the contrast image.
- It uses methods like linear and nonlinear contrast stretching for image enhancement.

Q29. Raster data structure is more suitable for analytical operations. Explain with its advantages and disadvantages. 5

Raster model divides entire area into regular grids in a specific sequence. Each grid cell contains a single value. It is relatively a simple approach for data integration both conceptually and operationally. Explain advantages and disadvantages in detail.

Advantages	**Disadvantages**
It is easier to interface with remote sensing images. It quickly processes queries. It is easy to understand, to read, to write and to draw on the screen. It represents continuous surfaces.	It requires more storage space. It faces mixed pixel problem It includes redundant and missing data which affects interoperation.

Q30. Use of GIS leads to better decision making in government. Elaborate the statement. 5

Explain how the GIS help in taking decisions in almost every field from day to day governance to internal security and defense. Mention at least five areas and explain with examples i.e. a) Disaster management b) Urban area planning c) Transport servicing d) Utility Services e) Implementation and Monitoring of Municipal infrastructure.

Q31. Internal and external security threats are very common for a country in today's world. How can geomatics help in resolving these problems? 5

Explain the call tracking systems for internal security and weapon alarming systems, missiles and keeping eyes on borders to check infiltrations etc.

Q32. Explain the benefits and applications of satellite images and aerial photographs. 2.5+2.5=5

Synoptic view, repetitive coverage, continuous acquisition of data, coverage of inaccessible areas, time and manpower saving etc. Explain.

Q33. What are map projections? Explain in detail diverse types of projections 2+3=5

A procedure which transforms the features and locations from a 3D platform to a 2D platform that on paper in a defined and consistent way. Map projections are used to transfer geographical coordinates onto a flat surface. Explain in detail with diverse types of projections and common GIS projections (cylindrical, conical, azimuthal, Mercator etc.).