GOVERNMENT OF TAMILNADU

DIRECTORATE OF TECHNICAL EDUCATION, CHENNAI

**STATE PROJECT COORDINATION UNIT**

*(Established Under Canada India Institutional Cooperation Project)*

**CURRICULUM**

| **Course Name** | **ARCGIS** |
|---|---|
| Course Code | CE / 2020 / 008 |
| Course Duration | 40 Hours |
| Minimum Eligibility Criteria and Pre-requisites (if any) | 10th / +2/Diploma/Graduates |
| | |
| Course Objectives | Training Module has been designed for the Participants to<br>• Learn about GIS and ArcGIS Desktop.<br>• Use ArcMap, Arc CatLog and Arc Toolbox.<br>• Learn how to organize spatial data and query a GIS database.<br>• Perform calculations using field calculator, design and develop a file geodatabase and Explore spatial analysis |
| | |
| Course Outcomes | At the end of the training, participants will be able to<br>• Think about geographic information and apply knowledge in research activities.<br>• Design geodatabase through the use of logical models<br>• Identify issues involved in exploring spatial data by means of spatial analysis. |
| Expected Job Roles | • GIS specialist, Spatial data analyst, ARCGIS trainer;<br>GIS engineer |

| **TEACHING AND SCHEME OF EXAMINATION** | | | | | | |
|---|---|---|---|---|---|---|
| **Course Code** | **Course Name** | **Hours** | | **Assessment Marks** | | **Duration of Examination** |
| | | | | **Min** | **Max** | |
| CE / 2020 / 008 | **ARCGIS** | Theory | 14 | 10 | 20 | **3 Hours** |
| | | Practical | 26 | 40 | 80 | |
| | | **Total** | **40** | **50** | **100** | |

# DETAILED SYLLABUS

| Unit No | Modules | No. of Hours | |
|---|---|---|---|
| | | Theory | Practical |
| **1** | **INTRODUCTION TO GIS** | 02 | --- |
| 1.1 | GIS- Remote Sensing – Application of GIS | | |
| 1.2 | Digital image processing – Spatial Data Model – Over view of GIS architecture | | |
| **2** | **GIS DATA** | 02 | 05 |
| 2.1 | Starting ArcMap | | |
| 2.2 | Opening an existing map document | | |
| 2.3 | Moving around the map- Displaying a layer | | |
| 2.4 | Changing the display symbol - Identifying a feature- Adding graphics | | |
| 2.5 | Laying out a map- Zooming in on the page- Inserting map elements- Printing map- Saving map | | |
| **3** | **GEOGRAPHIC FEATURES** | 02 | 05 |
| 3.1 | Changing the page layout- Creating a new data frame- Adding layers | | |
| 3.2 | Setting properties of the data frame | | |
| 3.3 | Copying layers- Displaying features by category- Using style | | |
| 3.4 | Selecting features geographically- Exporting a layer - Creating summary statistics | | |
| 3.5 | Geo Processing | | |
| **4** | **SPATIAL DATA** | 02 | 04 |
| 4.1 | Geo database – Tables – Geo codes – Table Joints | | |
| 4.2 | Spatial data – Map Projection – Geographic Coordinate Systems – Rectangle Coordinate System | | |
| 4.3 | Geo Processing – Attributes – Classifying by Quantity | | |
| **5** | **RASTER GIS** | 01 | 03 |
| 5.1 | Raster Processing - Functions | | |
| 5.2 | Network Analysis – Routine - Services | | |
| 4.3 | Adding tubular data- Joining tables | | |
| **6** | **GIS TABLES** | 01 | 05 |
| 6.1 | Creating a new data frame | | |
| 6.2 | Adding data from Arc Catalog | | |
| 6.3 | Adding tubular data- Joining tables | | |
| 6.4 | Calculating attributes values- Classifying by quantity | | |

| | | | |
|---|---|---|---|
| **7** | **FEATURES EDITING** | 02 | 02 |
| 7.1 | Exporting data- Create features- Snapping | | |
| 7.2 | Digitizing a feature- Adding attributes to new features | | |
| **8** | **WORKING WITH MAP** | 02 | 02 |
| 8.1 | Adding a background – Titles – Legends - Scale bars | | |
| 8.2 | Finishing the layout of the data - Adding an extent rectangle- Adding drop shadows- Adding a neat line- Printing a map | | |
| **TOTAL THEORY AND PRACTICAL HOURS** | | **14** | **26** |
| **TOTAL HOURS** | | **40** | |

| **PRACTICAL EXERCISES (26 HOURS)** | |
|---|---|
| **S.NO.** | **List of Experiments** |
| 1. | Creating, Editing and Viewing data in a GIS |
| 2. | Perform analysis using ARCGIS pro |
| 3. | Querying data using ArcGIS |
| 4. | Terrain analysis and distance analysis using ArcGIS Pro |
| 5. | Create Points from Table |
| 6. | Analyze data with Geo Processing tools |
| 7. | Assess Spatial Relationship |
| 8. | Creating Optimized route through ArcGIS |
| 9. | Calculation of density using ArcGIS |
| 10. | 3D visualization using ArcGIS |
| 11. | Add data and transfer files from one geodatabase to another |
| 12. | ArcGIS for public safety works |

## HARDWARE REQUIREMENT

| SL. NO. | LIST OF TOOLS / EQUIPMENTS / MATERIALS |
|---|---|
| 1. | CPU - 64 bit Intel® or AMD® multi-core processor |
| 2. | RAM - 2 GB of RAM minimum (8 GB or more recommended) |
| 3. | DISK SPACE - 6 GB of free disk space for install |
| 4. | VGA MONITOR |
| 5. | USB KEYBOARD |
| 6. | USB OPTICAL MOUSE |

## SOFTWARE REQUIREMENT

| SL. NO. | NAME OF THE SOFTWARE |
|---|---|
| 1. | ARCGIS (Esri) |
| 2. | GEOMEDIA (Hexagon Geospatial) |
| 3. | MAPINFO PROFESSIONAL (Pitney Bows) |

## REFERENCE BOOKS

| SL. NO | NAME OF THE BOOK | AUTHOR | PUBLISHER |
|---|---|---|---|
| 1. | ArcGIS 9- ArcMap Tutorial | --- | US Copywrite |
| 2. | Learning ArcGIS Pro | Tripp Corbin, Gisp | PACKT |
| 3. | Manual for working with ArcGIS 10 | Amy hiller | School of Design, University of Pennsylvania |
| 4. | Lab book(s): GIS Tutorial 1 for ArcGIS Pro - A Platform Workbook | W.L. Gorr& K.S. Kurland(2017). | --- |
| 5. | Advanced Surveying: Total Station, GIS and Remote Sensing | Satheesh Gopi, | Pearson Education 2006 |

## ASSESSMENT AND CERTIFICATION

| S.No | Criteria for Assessment |
|---|---|
| 1. | A trainee will be assessed based on the performance in End Examination for Theory and Practical conducted internally in the CIICP Project Polytechnic College for a duration of 3 hours |
| 2. | A trainee must have 75% of attendance to appear for End examination in Theory and Practical. |
| 3. | The assessment for theory part will be based on the marks scored in the end examination on the knowledge bank of questions (1 Word/ Objective type questions). |
| 4. | The assessment for practical part will be based on the marks scored in the end examination conducted by the CIICP Project Polytechnic and assessed by the Examiners approved by Strategic Plan Implementation Committee (SPIC) of the project polytechnic. |
| 5. | The passing criteria for successful completion of training is every trainee should score 50% of marks in the End Theory and Practical examination. |
| 6. | On successful completion of training, Certificate will be issued to the participants by the Directorate of Technical Education through the Project Polytechnics. |

## END EXAMINATION

### ALLOCATION OF MARKS

| S. No. | Description | Maximum Marks |
|---|---|---|
| 1. | THEORY EXAM | 20 |
| 2. | PRACTICAL EXAM | |
| | a. PROCEDURE | 10 |
| | b. ANALYZE | 10 |
| | c. APPLY / EVALUATE | 15 |
| | d. CALCULATION | 15 |
| | e. RESULT / OUTPUT | 10 |
| | f. RECORD | 20 |
| | **Total** | **100** |

## THEORY MODEL QUESTION PAPER - I

**CE / 2020 / 008 – ARCGIS**
(Maximum Marks: 20)

(N.B: Answer any **Twenty** Questions) **20 x 1 = 20 Marks**

1. Expand GIS.
2. What are the main components of a GIS?
3. Define remote sensing.
4. What is the difference between GIS commands and GIS tools?
5. What is geo coding?
6. Give example of small scalemap.
7. Which type of signals are generated by Satellite?
8. What is the difference between slope and aspect?
9. What is spatial interpolation?
10. What is reclassification?
11. Give the examples of geographic fields.
12. Name the two data structures that have the capacity to hold spatial data.
13. List the types of raster data.
14. Which is not the type of spatial analysis?
15. What is spatial-correction?
16. What is Metadata?
17. List the types of attribute data.
18. Expand TIN.
19. List any four advantages of GIS.
20. Give any two Methods of overlay.
21. In how many dimensional coordinates, GIS represents a location?
22. What is the program that is used in digitization technique?
23. CAD in CAD tool stands for?
24. How the process of capturing satellite image is called?
25. What is the function of geoprocessing?

## THEORY MODEL QUESTION PAPER - II

**CE / 2020 / 008 – ARCGIS**
(Maximum Marks: 20)

(N.B: Answer any **Twenty** Questions) **20 x 1 = 20 Marks**

**1. From which of the following sources GIS uses the information?**

a) Non spatial information system
b) Spatial information system
c) Global information system
d) Position information system

**2. Among the following,……. can be expressed as an example of hardware component.**

a) Keyboard
b) Arc GIS
c) Auto CAD
d) Digitalization

**3. Which of the following formats can be used for GIS output?**

a) DXF
b) PDF
c) GIF
d) HTML

**4. In the process of GIS, digitalization is done for better output.**

a) True
b) False

**5. Which among the following is not related to GIS softwares?**

a) CAD
b) Arc GIS
c) Arc View
d) STADD pro

**6. Among the following, which do not come under the components of GIS?**

a) Hardware
b) Software
c) Complier
d) Data

**7. Data can be shared in the process of GIS.**

a) True
b) False

**8. Which of the following acts as a benefit of GIS?**

a) Maintaining geo spatial data
b) Data sharing
c) Accurate data information
d) Presence of data retrieval service

**9. Which among the following is a server based hardware platform of GIS?**

a) Autodesk Revit
b) STADD Pro
c) Arc GIS
d) Google-maps

**10. Which of the following does not determine the capability of GIS?**

a) Defining a map
b) Representing cartographic feature
c) Retrieving data
d) Transferring data

**11. The process of distilling points, lines and polygons from a scanned image is called ……..**

a) Digitizing
b) Scanning
c) Vectorization
d) Imaging

**12. GI science majorly contributes …….**

a) Data
b) Graph
c) Network
d) Logic

**13. SDT means ……**

a) Specific data type
b) Special data type
c) Spatial data type
d) System data type

**14. …… is the smallest unit measurement to which the data can be recorded by aninstrument used for surveying.**

a) Accuracy
b) Precision
c) Millimetre
d) Feet

**15. …… are the errors due to mal adjustment of instruments**

a) Human errors
b) Instrumental or systematic errors
b) Random errors
d) Root mean square error

**16. Once the data is entered, it must be ……. and …….**

a) Capture and organised
b) Verified edited
c) Verified and generalized
d) Edited and organized

**17. RMSE stands for**

a) Random measure square error
b) Random mean square error
c) Root mean square error
d) d) Relative measure square error

**18. GIS deals with which kind of data**

a) Numeric data
b) Binary data
c) Spatial data
d) Complex data

**19. GIS package provides facilities to link with …… and ex-change attribute data with it**

a) DBMS
b) Cluster
c) File
d) File system

**20. ……. representation is efficient for image processing**

a) Manual
b) Raster
c) Vector
d) Formal

**21. GIS applications are …… tools**

a) Mobile
b) Computer
c) Machinery
d) None of the above

**22. GIS represents Z-coordinates in ……. direction**

a) Horizontal
b) Vertical
c) Tangentially
d) None of the above

**23. GIS was coined by …….**

a) Roger Tomlinson
b) Roger James
c) Richard
d) None of the above

**24. The process of capturing satellite image is called**

a) Ortho photo
b) Ortho photograph
c) Ortho image
d) All the above

**25. Digitizing is of ……. types**

a) 2
b) 3
c) 4
d) 5

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