GOVERNMENT OF INDIA
MINISTRY OF SKILL DEVELOPMENT & ENTREPRENEURSHIP
DIRECTORATE GENERAL OF TRAINING

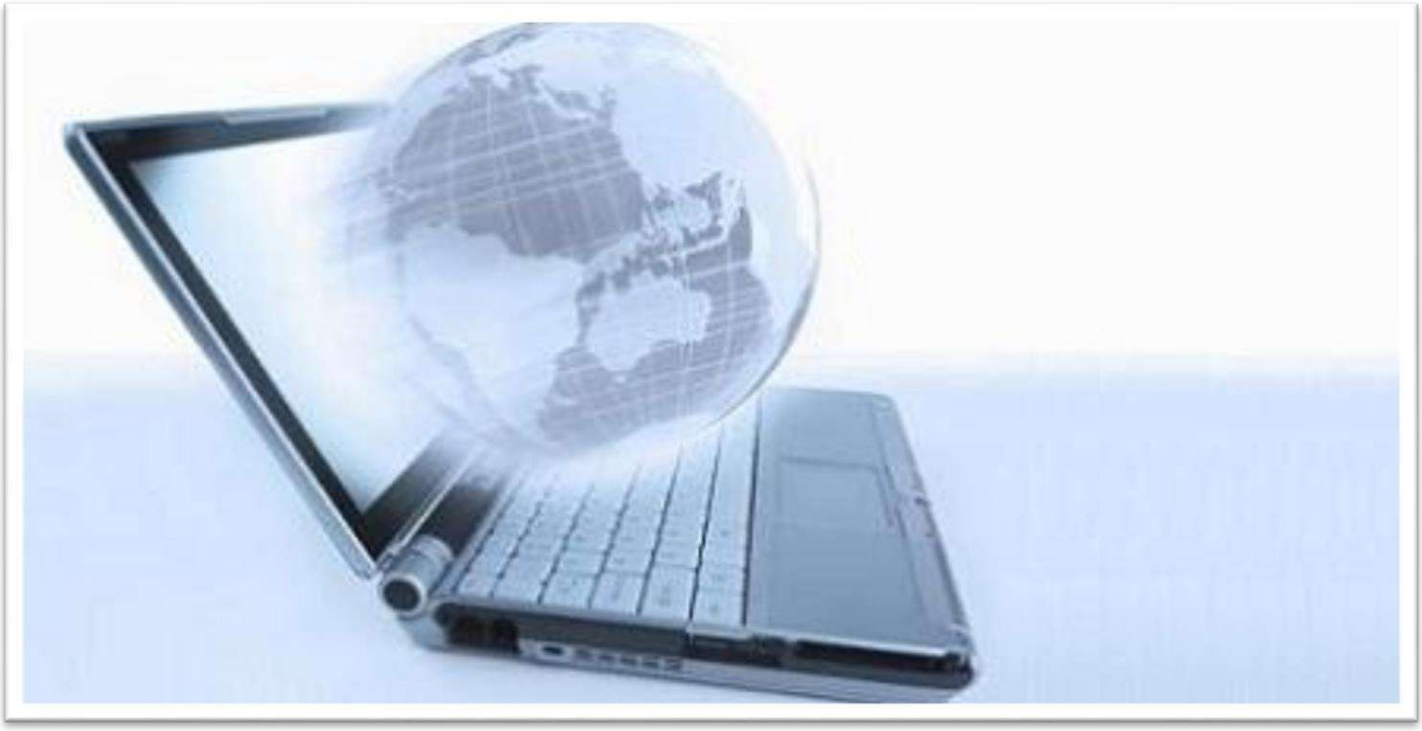
COMPETENCY BASED CURRICULUM

GEO-INFORMATICS ASSISTANT

(Duration: One Year)

CRAFTSMEN TRAINING SCHEME (CTS)

NSQF LEVEL- 5



SECTOR – IT & ITES

Directorate General of Training

GEO-INFORMATICS ASSISTANT

(Non-Engineering Trade)

(Revised in 2019)

Version: 1.2

CRAFTSMEN TRAINING SCHEME (CTS)

NSQF LEVEL - 5

Developed By

Ministry of Skill Development and Entrepreneurship

Directorate General of Training

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1. COURSE INFORMATION

During the one-year duration of “Geo-Informatics Assistant” trade, a candidate is trained on Professional Skill, Professional Knowledge and Employability Skill related to job role. In addition to this, a candidate is entrusted to undertake project work, extracurricular activities and on-the-job training to build up confidence. The broad components covered in one year duration is as below:

The trainee will apply safe working practices. They will identify various components of a desktop computer and familiar with computer operating system. They will also Install and set up operating system and related software in a computer. Create, format and edit document using word processing application software and also Create, format, edit and develop a workbook by using spreadsheet application software & prepare and customize slides for power point presentation. They will be able to Create, Design, format and edit images using Photoshop software they will also Create and manage database file by using MS Access. The trainees will be Installing, setup/ configure, and secure computer network including Internet. The trainee will also identify, install and operate various remote sensing software and record the data. The trainee will identify different platforms & various data products, sensor used in different platforms and their use. They will also apply Digital image processing techniques by observing appropriate procedure, interpret images and feature extraction.

The trainee will Install, operate, collect data through GIS and analyze the data. They will also able to Capture, store, manipulate, manage, analyze and present spatial or geographic data by using GIS. They will also Apply Digital Cartography process for collection of data and produce maps. The trainees will acquire knowledge of Identifying GPS, Signal, code, Biases and measurement of the location. They will also identify various components of DGPS, use DGPS for Calculating position, measuring distance, data downloading and processing in software. Use Web GIS for Publishing File on Geo server.

2. TRAINING SYSTEM

2.1 GENERAL

The Directorate General of Training (DGT) under Ministry of Skill Development & Entrepreneurship offers a range of vocational training courses catering to the need of different sectors of the economy/ labour market. The vocational training programs are delivered under the aegis of Directorate General of Training (DGT). Craftsman Training Scheme (CTS) with variants and Apprenticeship Training Scheme (ATS) are two pioneer programsofDGT for propagating vocational training.

'Geo-Informatics Assistant'tradeunder Craftsman Training Scheme (CTS) is one of the newly designedcourses.CTS courses are delivered nationwide through a network of ITIs. The course is of one yearduration. It mainly consists of Domain area and Core area. In the Domain area (Trade Theory & Practical) impart professional skills and knowledge, while core area(Employability Skill) imparts requisite core skills, knowledge and life skills. After passing out the training program, the trainee is awarded National Trade Certificate (NTC) by DGTwhich is recognizedworldwide.

Candidates broadly need to demonstrate that they are able to:

- Read and interpret technical parameters/documents, plan and organize work processes, identify necessary materials and tools;
- Perform tasks with due consideration to safety rules, accident prevention regulations and environmental protection stipulations;
- Apply professional skill, knowledge & employability skills while performing jobs.
- Document the technical parameters related to the task undertaken.

2.2 PROGRESSION PATHWAYS

- Can join industry as Technician and will progress further as Senior Technician, Supervisor and can rise up to the level of Manager.
- Can become Entrepreneur in the related field.
- Can join as GIS Technician/GIS Data Specialist/GIS Application Specialist/ GIS Consultant/ GIS Operator/ GIS Technical Assistant in Geo – informatics industry.
- Can join Crafts Instructor Training Scheme (CITS) in the trade for becoming instructor in ITIs.
- Can join advanced Diploma (Vocational) courses under DGT as applicable.

2.3 COURSE STRUCTURE

Table below depicts the distribution of training hours across various course elements during a period of one year: -

S No.	Course Element	Notional Training Hours
1.	Professional Skill (Trade Practical)	1200
2.	Professional Knowledge (Trade Theory)	240
3.	Employability Skills	160
	Total	**1600**

2.4 ASSESSMENT & CERTIFICATION

The trainee will be tested for his skill, knowledge and attitude during the period of course through formative assessment and at the end of the training programme through summative assessment as notified by the DGTfrom time to time.

a) The Continuous Assessment(Internal) during the period of training will be done by **Formative Assessment Method** by testing for assessment criteria listed against learning outcomes. The training institute has to maintain individual *trainee portfolio* as detailed in assessment guideline. The marks of internal assessment will be as per the formative assessment template provided on www.bharatskills.gov.in

b) The final assessment will be in the form of summative assessment. The All India Trade Test for awarding NTC will be conducted by Controller of examinations, DGT as per the guidelines. The pattern and marking structure is being notified by DGTfrom time to time. **The learning outcome and assessment criteria will be basis for setting question papers for final assessment. The examiner during final examination will also check** individual trainee's profile as detailed in assessment guideline before giving marks for practical examination.

2.4.1 PASS REGULATION

For the purposes of determining the overall result, weightage of 100% is applied for six months and one year duration courses and 50% weightage is applied to each examination for two years courses. The minimum pass percent for Trade Practical and Formative assessment is 60% & for all other subjects is 33%. There will be no Grace marks.

2.4.2 ASSESSMENT GUIDELINE

Appropriate arrangements should be made to ensure that there will be no artificial barriers to assessment. The nature of special needs should be taken into account while undertaking the assessment. Due consideration should be given while assessing for teamwork, avoidance/reductionofscrap/wastage and disposal of scrap/waste as per procedure, behavioral attitude, sensitivity to the environment and regularity in training. The sensitivity towards OSHE and self-learning attitude are to be considered while assessing competency.
Assessment will be evidence based comprising the following:

- Job carried out in labs/workshop
- Record book/ daily diary
- Answer sheet of assessment
- Viva-voce
- Progress chart
- Attendance and punctuality
- Assignment
- Project work

Evidences and records of internal (Formative) assessments are to be preserved until forthcoming examination for audit and verification by examination body. The following marking pattern to be adopted while assessing:

Performance Level	Evidence
(a) Weightage in the range of 60%-75% to be allotted during assessment	
For performance in this grade, the candidate should produce work which demonstrates attainment of an acceptable standard of craftsmanship with occasional guidance, and due regard for safety procedures and practices	• Demonstration of good skills and accuracy in the field of work/ assignments. • A fairly good level of neatness and consistency to accomplish job activities. • Occasional support in completing the task/ job.
(b)Weightage in the range of 75%-90% to be allotted during assessment	
For this grade, a candidate should produce work which demonstrates attainment of a reasonable standard of craftsmanship, with	• Good skill levels and accuracy in the field of work/ assignments. • A good level of neatness and consistency

little guidance, and regard for safety procedures and practices	to accomplish job activities. • Little support in completing the task/job.
(c) Weightage in the range of more than 90% to be allotted during assessment	
For performance in this grade, the candidate, with minimal or no support in organization and execution and with due regard for safety procedures and practices, has produced work which demonstrates attainment of a high standard of craftsmanship.	• High skill levels and accuracy in the field of work/ assignments. • A high level of neatness and consistency to accomplish job activities. • Minimal or no support in completing the task/ job.

3. JOB ROLE

GISTechnician; Capable of installing Windows and all type of computer software's including Digital image processing and GIS. Downloading free Indian Satellite data available on *Bhuvan*/other freely available on websites and procurement of satellite data from different agencies.

GIS Data Specialist;Create, develop, and maintain Geo-databases and other databases. Work on spatial databases to store GIS data. Create and maintain the structures necessary for GIS data storage.

GIS Application Specialist;Digitization of spatial data in the form of point, line, polygon using desired projection system. Entering data into GIS databases, using techniques such as coordinate geometry, keyboard entry of tabular data, manual digitizing of maps, scanning to vectors, or conversion of other sources of digital data. Create data in various GIS systems, Assigning addresses for new construction projects and perform field verifications of existing addresses, Prepare GIS layers and data sets for various department, will perform various database operations required in GIS mapping, Geo referencing any map on satellite images. Creation / Conversion of data acquired from various sources to create new map layers, Editing of GIS data, Symbology and linking of attribute data to GIS layers. Analyze GIS data to identify spatial relationships using proximity analysis, overlapping, buffering, network analysis etc and display results of analysis. Review existing or incoming data for concurrency, accuracy, usefulness, quality, or completeness of documentation. Desk-based data capture (digitizing) to convert paper maps to GIS datasets. Loading/transferring of GIS data between different systems. Manipulate, analyze and present geographical information by creating maps to and converting GIS information from one format to another. Ability to perform data quality review on both raster and vector data formats to ensure data quality and integrity. Capable of Digitization on Google earth. Explore various geoportals and use of data and services available on these geoportals.

GIS Consultant;Field Survey using GPS.Use a range of GPS tools in the field to capture the location of 'assets' such as schools, colleges, hospitals, *anganwadis*, banks, stadiums, bridges, street lights, transformers and sites and spot like historical/ archaeological / religious and tourist sites. Collect ground data for various GIS projects such as Forestry, Land use Land Cover, Cadastral Mapping, Precision Farming, Property tax,Irrigation. GPS based sampling of soils, water, nutrients, pollutants etc. Verify integrity and accuracy of data collected from the ground.Mapping of linear features like roads, rails, canals, electric/telephone lines, water sewer lines etc.Gathering of field data for use in various mapping applications. Geo referencing of high resolution digital maps and satellite imageries. Gathering latitude longitude and altitude of any

location and transferring the same to any geo referenced map. Site suitability analysis for any activity, analyzing all map information from external sources such as Google Maps and Google Earth and recommend solutions to special problems.

GIS Operator;Creation of maps and layouts for preparation of thematic and other maps. Composition and printing of maps following standard formats. Verifying survey data and map information.

GIS Technical Assistant;Extraction of information related to natural resources like Agriculture, Forestry, Water resources, Geology, Urban areas, Land use etc. through image Interpretation of Satellite Imageries, Drone Imageries, Aerial photographs. Classification of Satellite Imageriesfor preparation of thematic maps. Using of spatial data to assess land cover, forest change and developments occurring in any areas throughout the country. Merge scanned images or build photo mosaics of large areas using image processing software. Integrate remotely sensed data with other geospatial data. Verify integrity and accuracy of data contained in remote sensing image analysis systems. Compile spatial data sets for a variety of sources, including census data, Global Positioning System (GPS) data, field observations, satellite images, and environmental monitoring data.

Reference NCO: Not Available

4. GENERAL INFORMATION

Name of the Trade	**GEO-INFORMATICS ASSISTANT**
Trade Code	DGT/2012
NCO - 2015	Not Available
NSQF Level	Level- 5
Duration of Craftsmen Training	One Year (1600 hours)
Entry Qualification	Passed 12th class examination with Mathematics in matriculation
Minimum Age	14 years as on first day of academic session.
Eligibility for PwD	LD, LC, DW, AA, LV, AUTISM, DEAF
Unit Strength (No. of Student)	24 (There is no separate provision of supernumerary seats)
Space Norms	35 Sq. m
Power Norms	3.45 KW
Instructors Qualification for:	
(i) Geo-Informatics Assistant Trade	B.Voc/B.Tech/ M.Tech/ M.Sc in Geo Informaticsfrom AICTE/UGC recognized university with one year experience in relevant field. **OR** Bachelors/ Masters in any stream with one year diploma in Remote Sensing and GIS with 50% marksfrom UGC recognized university with one year experience in the relevant field. **OR** B.Voc/B.Tech/ MCA/ M.Sc. from AICTE/UGC recognized Universitywith 50% marks and Diploma in RS & GIS from recognized University with one year experience in the relevant field. **OR** Diploma (Minimum 2 years) in Geo Informatics/ Remote Sensing and GIS from recognized board of education or relevant Advanced Diploma (Vocational) from DGT with two-year experience in the relevant field. **OR** NTC/ NAC passed in the trade Geo-Informatics Assistant with three-year experience in the relevant field.

	<u>Essential Qualification:</u> Relevant National Craft Instructor Certificate (NCIC) in any of the variants under DGT. ***NOTE: Out of two Instructors required for the unit of 2(1+1), one must have Degree/Diploma and other must have NTC/NAC qualifications. However both of them must possess NCIC in any of its variants.***
(ii) Employability Skill	MBA/ BBA / Any Graduate/ Diploma in any discipline with Two years' experience with short term ToT Course in Employability Skills from DGT institutes. (Must have studied English/ Communication Skills and Basic Computer at 12th / Diploma level and above) **OR** Existing Social Studies Instructors in ITIs withshort term ToT Course in Employability Skills from DGT institutes.
(iii) Minimum Age for Instructor	21 Years
List of Tools and Equipment	As per Annexure – I

Distribution of training on hourly basis: (Indicative only)

Total Hrs/ Week	Trade Practical	Trade Theory	Employability Skills
40 Hours	30 Hours	6 Hours	4 Hours

5. LEARNING OUTCOME

Learning outcomes are a reflection of total competencies of a trainee and assessment will be carried out as per the assessment criteria.

5.1 LEARNING OUTCOMES (TRADE SPECIFIC)

1. Identify various components of a desktop computer and familiarise with computer operating system following safety precaution.
2. Install and set up operating system and related software in a computer.
3. Create, format and edit document using word processing application software.
4. Create, format, edit and develop a workbook by using spreadsheet application software & prepare and customize slides for power point presentation.
5. Design, Create, format and edit images using Photoshop software.
6. Plan, create and manage database file by using MS Access.
7. Plan, install setup/ configure, and secure computer network including Internet.
8. Analyze and manage data using GIS software.
9. Plan, capture, store, manipulate and present spatial or geographic data by using GIS.
10. Select, install and operate various remote sensing software and record the data.
11. Select different platforms & various data products, sensors used in different platforms and their use.
12. Plan and implement Digital image processing techniques by selecting appropriate procedure, interpret images and feature extraction.
13. Plan and implement Digital Cartography process for collection of data and produce maps.
14. Select datum units and scale, identify GPS, Signal, code, Biases and measure the location.
15. Select and set up DGPS for Calculating position, measuring distance, data downloading and processing in software.
16. Publish Files on Geo server using Web GIS.

6. ASSESSMENT CRITERIA

LEARNING OUTCOME	ASSESSMENT CRITERIA
1. Identify various components of a desktop computer and familiarise with computer operating system following safety precaution.	Disassemble given desktop computer.
	Identify components of given desktop computer
	Re assembling given desktop computer.
	Change desktop background of given computer.
	Customize the desktop of given computer.
	Manage files and folders.
	Move files using removable drives.
	View system properties and Control panel details.
	Follow the manual and observe safety precaution.
2. Install and set up operating system and related software in a computer.	View the BIOS setting.
	Change the Boot order.
	Identify common hardware issues and software issues.
	Rectify common hardware and software issues.
	Format the hard disk of given computer.
	Load OS and necessary application software in the given computer.
	Burn CD/DVD applying appropriate techniques.
	Follow the manual.
3. Create, format and edit document using word processing application software.	Open MS word and create a new document.
	Insert a picture; create a table on MS word document.
	Insert and formatting tables and other objects.
	Edit the word document using various menus of MS word.
	Working with Page layout settings and printing documents.
	Typing practice using open source typing tutor tools.
	Use shortcut keys for managing document.
4. Create, format, edit and develop a workbook by using spreadsheet application software &prepare and customize	Create, Save and Format Excel Spreadsheets.
	Use Absolute and Relative referencing/linking sheets/Conditional formatting etc
	Using various data types in Excel, Sort/ filter/validate data.
	Create different charts.

slides for power point presentation.	Format charts.
	Create Slide in MS power point.
	Create slide shows.
	Insert objects in MS power point slides.
	Animate Slide transitions and Objects.
	Create a simple presentation.
5. Design, Create, format and edit images using Photoshop software.	Zoom/ Pan an Image.
	Adjust Colour with the New Adjustments Panel.
	Crop & Straighten an Image.
	Adjust Canvas Size & Canvas Rotation.
	Selecting object with the Elliptical Marquee Tool.
	Use the Magnetic Lasso Tool for editing picture.
	Creating,/Select/Link/Delete Layers.
	Create / Modify Text.
6. Plan, create and manage database file by using MS Access.	Create a database using MS Access.
	Enforce Integrity constrains.
	Modify the properties of tables and fields.
	Create Relationships and Tables.
	Queries with various criteria and calculations.
	Importing and exporting data to and from Access.
	Compress/Encrypt database.
7. Plan, install setup/ configure, and secure computer network including Internet.	Show network connections.
	Connect the given computer to anetwork.
	Share Devices files and Folders through network.
	Identify various Network devices/ Connectors / Cables.
	Troubleshoot Network.
	Set IP address of a computer.
	Browse the Internet for information.
	Create a e-mail id.
	Protect the computer for various internet threats.
8. Analyze and manage data using GIS software.	Install GIS system.
	Collect sample data through GIS.
	Explore data and compose maps.

	Create/Edit/Manage/export data.
	Analyze data receive through GIS.
	Identify features Annotation Tools.
9. Plan, capture, store, manipulate and present spatial or geographic data by using GIS.	Create a shape file by adding attributes.
	Create Database (Data Entry, Editing)/ Topology Creation.
	Link Spatial data with non-Spatial data sets.
	Analyze spatial data (Raster/Vector).
	Analyze Proximity Thematic mapping and Over lay.
	Digitize maps and imageries.
	Generate Attribute data.
	Create non spatial data sets into DBF format.
	Transform datum by default.
10. Select, install and operate various remote sensing software and record the data.	Install Remote sensing software.
	Start/Stop remote sensing software.
	Create/edit/manage/export data using remote sensing software.
	Create a user interface with DIP software (ILWIS).
	Compose maps using remote sensing software.
	Load digital data into DIP software.
11. Select different platforms & various data products, sensors used in different platforms and their use.	Identify different remote sensing platforms.
	Use appropriate sensors according to platforms.
	Identify different types of satellite orbits.
	Identify different type of data products available.
	Take images through satellite.
	Follow the manual.
12. Plan and implement Digital image processing techniques by selecting appropriate procedure, interpret images and feature extraction.	Image Geo-referencing, Registration /Rectification.
	Create mosaic.
	Visualize single band images.
	Display Individual pixel Values/pixel values of more than one band.
	Display Colour Composites.
	Supervise classification -Defining clusters/Accuracy assessment.
	Identify features on Single vertical photographs.
	Show Spectral response pattern of different Land Cover objects.

	Visually interpret Satellite Imagery in Different bands
	Apply method/techniques of image interpretation.
13. Plan and implement Digital Cartography process for collection of data and produce maps.	Identify and select essentials of map making.
	Revert and Restore tools.
	Atlas generation.
	Generate maps by projection and symbolization.
	Identify different features of toposheets.
14. Select datum units and scale, identify GPS, Signal, code, Biases and measure the location.	Demonstrate GPS.
	Select datum units/scales.
	Measure location using GPS.
	Organize GPS segment.
	Select and Apply survey method of GPS.
	Identify receivers of GPS.
15. Select and set up DGPS for Calculating position, measuring distance, data downloading and processing in software.	Identify types of DGPS.
	Identify various components of DGPS.
	Set up Base/ Rover RTK.
	Download data and processing the same using appropriate software.
	Find the errors of DGPS.
16. Publish Files on Geo server using Web GIS.	Create shape files in QGIS.
	Import data to post gres.
	Connect post gres to Geo server.
	Publish file on Geo server.
	Create Map services.
	Demonstrate Bhuvan portal usage.

7. TRADE SYLLABUS

SYLLABUS FOR GEO-INFORMATICS ASSISTANT TRADE			
DURATION: ONE YEAR			
Duration	**Reference Learning Outcome**	**Professional Skills (Trade Practical) With Indicative Hours**	**Professional Knowledge (Trade Theory)**
Professional Skill 60 Hrs; Professional Knowledge 12 Hrs	Identify various components of a desktop computer and familiarize with computer operating system following safety precaution.	**Trade and Orientation** 1. Visit to various sections of the institute and identify location of various installations. (6 hrs.) 2. Identify safety signs for danger, warning, caution & personal safety message. (5 hrs.) 3. Use of personal protective equipment (PPE). (4 hrs.) 4. Practice elementary first aid. (5 hrs.) 5. Preventive measures for electrical accidents & steps to be taken in such accidents. (6 hrs.) 6. Use of Fire extinguishers. (4 hrs.)	Familiarization with the working of Industrial Training Institute system. Importance of safety and precautions to be taken in the industry/shop floor. Introduction to PPEs. Introduction to First Aid. Response to emergencies e.g. power failure, fire, and system failure. Importance of housekeeping & good shop floor practices. Occupational Safety & Health**:** Health, Safety and Environment guidelines, legislations & regulations as applicable. (06 hrs)
		Computer Components and Windows Operating System 7. Identify computer peripherals and internal components of a disassembled desktop computer. (4 hrs.) 8. Assemble components of desktop computer. (5 hrs.) 9. Practice on Windows	**Computer Components** Introduction to computer system. Concepts of Hardware and Software. • Function of motherboard components and various processors. • Various Input/ Output devices in use and their features.

		interface and navigating windows. (6 hrs.) 10. Practice on managing files and folders using removable drives. (5 hrs.) 11. Customize the desktop settings and manage user accounts. (3 hrs.) 12. View system properties and control panel details. (3 hrs.) 13. Work with keyboard shortcut commands. (2 hrs.) 14. Print and scan document using different commands. (2 Hrs.)	**Windows Operating System** • Introduction to operating System • Main features of Windows OS • Concept of various shortcut commands. (06 hrs)
Professional Skill 30 Hrs; Professional Knowledge 06 Hrs	Install and set up operating system and related software in a computer.	**Computer Hardware basics and Software installation** 15. View the BIOS settings and their modifications. (4 hrs.) 16. Identify and rectify common hardware and software issues. (6 hrs.) 17. Install Windows operating system. (4 hrs.) 18. Format hard disk and create partition. (4 hrs.) 19. Install necessary application software for Windows i.e. Office Package, PDF Reader, Media Player etc. (5 hrs.) 20. Configure Bluetooth and Wi-Fi settings. (2 hrs.) 21. Install Drivers for printer, scanner, webcam and DVD etc. (3 hrs.) 22. Burn data, video and audio files on CD/DVD using application software. (2 hrs.)	**Computer Hardware basics and Software installation** • Introduction to the booting process. • BIOS settings and their modification, introduction to various types of memories and their features. • Basic hardware and software issues and their solution. • Formatting and loading OS and Application software and antivirus.(06 hrs)

Professional Skill 30 Hrs; Professional Knowledge 06 Hrs	Create, format and edit document using word processing application software.	**Word Processing Software** 23. Familiarization with the Word Window Components. (2 hrs.) 24. Creating, saving and editing documents using Word. (5 hrs.) 25. Inserting and formatting tables and other objects. (4 hrs.) 26. Using templates, autocorrect tools, and mail merge tool. (5 hrs.) 27. Working with Page layout settings and printing documents. (4 hrs.) 28. Typing practice using open source typing tutor tools. (5 hrs.) 29. Practice of using shortcut keys. (5 hrs.)	**Word Processing Software** • Introduction to various applications in MS office. • Introduction to Word features, Office button, Toolbars. • Concept of Creating, saving and formatting documents. • Concept of inserting objects Macro, mail-merge, templates and other tools in Word. • Page setup and printing documents using Word. (06 hrs)
Professional Skill 30 Hrs; Professional Knowledge 06 Hrs	Create, format, edit and develop a workbook by using spreadsheet application software & prepare and customize slides for power point presentation.	**Spread Sheet Application & Power Point Presentation** 30. Opening MS Excel and familiarize with basic application components. (2 hr.) 31. Creating, Saving and Formatting Excel Spreadsheets. (3 hrs.) 32. Using Absolute and Relative referencing, linking sheets, Conditional formatting etc. (3 hrs.) 33. Using Excel functions of all major categories.(4 hrs.) 34. Using various data types in Excel, Sorting, filtering and	**Spread Sheet Application** Introduction to Excel features and Data Types. • Cell referencing. Use of functions of various categories, linking Sheets. • Introduction to various functions in a categories of Excel • Concepts of Sorting, Filtering and Validating Data • Analyzing data using charts, data tables, pivot tables. **Power Point Presentation** • Introduction to Power Point and its advantages

		validating data. (3 hrs.) 35. Creating and formatting charts. (2 hrs.) 36. Importing & Exporting Excel Data. (2 hrs.) 37. Modifying Excel Page setup and printing. (2 hr.) 38. Open power point presentation and familiarize with basic application components. (3 hrs.) 39. Creating Slide shows, Inserting objects. (2 hrs.) 40. Animating Slide transitions and Objects. (2 hrs.) 41. Creating a simple presentation. (2 hrs.)	• Creating slide shows. • Fine tuning the presentation and good presentation technique. (06 hrs)
Professional Skill 60Hrs; Professional Knowledge 12Hrs	Design, Create, format and edit images using Photoshop software.	**Image Editing using Photoshop** 42. Practice on various tools- Brush Tool. Pencil & Eraser Tools, the Red Eye Tool. (6 hrs.) 43. Zooming & Panning an Image, Working with Multiple Images, Rulers, Guides & Grids, Undoing Steps with History, Adjusting Colour with the New Adjustments Panel, the Image Size Command. (12 hrs.) 44. Cropping & Straightening an Image, Adjusting Canvas Size & Canvas Rotation, Selecting with the Elliptical Marquee Tool, Using the Magic Wand & Free Transform Tool, Selecting with the Regular	**Image Editing using Photoshop** • Introduction to Photoshop • Introduction to the properties and editing of images. • Navigating Photoshop • Menus and panels • Opening new files • Opening Existing files. (12hrs)

		&Polygonal Lasso Tools.(10hrs.) 45. Using the Magnetic Lasso Tool, Using the Quick Selection Tool's Refine Edge, Modifying Selections. (8 hrs.) 46. Understanding the Background Layer, Creating, Selecting, Linking & Deleting Layers, Locking & Merging Layers, Copying Layers, Using Perspective & Layer Styles, Filling & Grouping Layers. (10 hrs.) 47. Blending Modes, Opacity & Fill. Creating & Modifying Text. (8 hrs.) 48. Working with Colours and Swatches, Creating & Using Gradients, Creating & Working with Brushes. (6 hrs.)	
Professional Skill 90Hrs; Professional Knowledge 18Hrs	Plan, create and manage database file by using MS Access.	**Database Management Systems using MS Access** 49. Creating database and designing a simple tables in Access. (15 hrs.) 50. Practice enforcing Integrity constrains and modifying the properties of tables and fields. (15 hrs.) 51. Creation of Relationships and join Tables. (12 hrs.) 52. Queries with various criteria and calculations. (12 hrs.) 53. Modifying form design with controls, macros and events.	**Database Management Systems** • Concepts of Data, Information and Databases. • What is database system, purpose of database system, view of data, relational database, database architecture. • Rules for designing good tables. • Integrity rules and constrains in a table. • Introduction to view, data independence, security,

		(12 hrs.) 54. Importing and exporting data to and from Access. (12 hrs.) 55. Compressing and Encrypting database. (12 hrs.)	updates on views, comparison between tables and views. • Relationships in table. • Introduction to various types of queries and their uses. (18 hrs)
Professional Skill 120Hrs; Professional Knowledge 24Hrs	Plan, install setup/ configure, and secure computer network including Internet.	**Configuring and using Networks** 56. Viewing Network connections. (6 hrs.) 57. Connecting a computer to a network and sharing of Devices files and Folders. (12 hrs.) 58. Familiarization with various Network devices, Connectors and Cables. (12 hrs.) 59. IP Addressing and Subnet for lpV4 /IPV6, Masking, pinging to test networks. (12 hrs.) 60. Network basic and configuration (18 hrs.) • Setting IPaddresses. • Sharing files and folders. • Network Troubleshooting. • PING Test, IP configuration Etc.	**Computer Networks** • Introduction to Computer Networks Necessity and Advantages. • Client Server and peer to peer networking concepts. • Network topologies. Introduction to LAN, WAN and MAN • Network components, viz. Modem Hub, Switch, Router, Bridge, Gateway etc. • Network Cables, Wireless networks and Blue Tooth technology. • Logical and physical Addresses, Classes of Networks. • Network security & firewall concepts. (12hrs)
		Using Internet 61. Browsing the Internet for information. (10 hrs.) 62. Creating and using e-mail for communication. (8 hrs.) 63. Communication using text, video chatting and social networking sites. (17 hrs.) 64. Identifying various threats to	**Internet Concepts** • Introduction to WWW, Concept of Internet, Web Browsers, Internet Servers and Search Engines • Concepts of Domain naming Systems and E-mail communication • Introduction to video

		the system connected to the net. (13 hrs.) 65. Protecting the computer against various internet threats. (12 hrs.)	chatting tools, Social Networking concepts. • Concept of Cloud storage and Open Web Server • Introduction to Internet Security Threats and attacks, Malicious Software types, Internet security products and their advantages. (12hrs)
Professional Skill 60 Hrs; Professional Knowledge 12 Hrs	Analyze and manage data using GIS software.	**Introduction to GIS Software** 66. Familiarization with GIS Software Installation, Sample Data, starting and Stopping QGIS. (14 hrs.) 67. Explore various toolbars for data and compose maps, Create, Edit, Manage and View data. (12 hrs.) 68. Identify various toolbars to Analyze data, Digitizing, Map Composer, Symbology. (12 hrs.) 69. Familiarization with User Interface, Menu Bar, toolbar, Map Legend, Map View, Status Bar, Keyboard shortcuts. (12 hrs.) 70. How to use Context help Rendering, Measuring, Identify features Annotation Tools. (10 hrs.)	**Introduction to GIS** • Definition and scope of GIS. • Functional requirements of GIS, GIS components. • Cartography-GIS interface. • Recent trends and applications of GIS. • Open source GIS. (12 hrs)
Professional Skill 120Hrs; Professional Knowledge 24Hrs	Plan, capture, store, manipulate and present spatial or geographic data by using GIS.	**GIS Data Base/ Digitization** 71. Introduction to Creation of a shape file, adding attributes. (6 hrs.) 72. Introduction to Database Creation (Data Entry,	• Geographic data: Spatial and non-spatial. • Data models: Raster and vector. • Database Management System (DBMS).

		Editing) & Topology Creation. (8 hrs.) 73. Introduction to Linking of Spatial data with non-Spatial data sets. (6 hrs.) 74. Introduction to Spatial Analysis (Raster& Vector). (6 hrs.) 75. Introduction to Spatial Analysis GIS analysis: proximity thematic mapping and Over lay. (8 hrs.) 76. Introduction to Spatial data input and Geo referencing Digitization of maps and imageries. (8 hrs.) 77. Introduction to coordinate transformation. (5 hrs.) 78. Attribute data generation. (7 hrs.) 79. Introduction to Spatial data base creation. (6 hrs.) 80. Creation of non-spatial data sets into DBF format. (7 hrs.) 81. Overview of projection Support. (5 hrs.) 82. Practice of Re projection of data. (6 hrs.) 83. Practice of Default datum transformations. (8 hrs.) 84. Explore Supported Data Formats. (5 hrs.) 85. Explore The Vector properties Dialog. (5 hrs.) 86. Explore Editing of shape files. (5 hrs.)	• Data structures: Relational, hierarchical and network. • Data Input: Digitization of maps and imageries. • Coordinate transformation. • Attribute data generation. (24hrs)

		87. Explore Query Builder, Field Calculator. (5 hrs.) 88. Practice of various quires in query builder. (6 hrs.) 89. Explore Raster properties Dialog. (4 hrs.) 90. Practice use of Raster Calculator. (4 hrs.)	
Professional Skill 90 Hrs; Professional Knowledge 18 Hrs	Select, install and operate various remote sensing software and record the data.	**Principles of Remote Sensing :** 91. Familiarization with RS Software (Any open source-ILWIS) - installation, Starting and Stopping ILWIS. (6 hrs.) 92. Introduction to opening and saving and reopening projects in ILWIS. (6 hrs.) 93. Observing Title bar, Menu bar, Standard toolbar, Object. (5 hrs.) 94. Identify various toolbars Selection toolbar, Command line catalog, Status bar and operations/Navigator pane. (8 hrs.) 95. Use of Operation tree, Operation List, Navigator, Output, View data. (10 hrs.) 96. Explore data and compose maps, Create, edit manage and export data. (8 hrs.) 97. Analyzing data Digitizing, Map Composer, Symbology User Interface, Map Legend, Map View. (10 hrs.) 98. Explore Measuring, identify	**Principles of Remote Sensing :** • Definition, History • Types and scope • Advantages of remote sensing, Disadvantage of remote sensing • Stages in remote sensing data acquisition, Components of a Remote Sensing System Electromagnetic Radiation (ER) and electromagnetic spectrum, Ultraviolet, Visible Range, Infra-red Region, Thermal Region, Microwave Region • Interaction of EMR with atmosphere-Reflection, Refraction, Absorption Scattering • Interaction of EMR with Earth's surface features: Absorption, Transmission, Reflection. • Atmospheric windows. (18 hrs)

		features Annotation Tools. (4 hrs.) 99. Identify user interface with DIP software (ILWIS). (4 hrs.) 100. Familiarization with loading of digital data into DIP software. (6 hrs.) 101. Exploring how to convert digital data into image processing software format. (6 hrs.) 102. Practice on how to apply Projection and datum for newly loaded data. (7 hrs.) 103. Practice on changing Projection and datum for newly loaded data. (10 hrs.)	
Professional Skill 90 Hrs; Professional Knowledge 18 Hrs	Select different platforms & various data products, sensors used in different platforms and their use.	**Platforms, Sensors and Data Products** 104. Identify different type of data products available. (18 hrs.) 105. Identify Images from different Satellites and sensors used. (20 hrs.) 106. Identify features of Digital images in Hard Copy. (16 hrs.) 107. Identify the Natural Color Composite satellite image. (18 hrs.) 108. Identify the False Color Composite satellite image. (18 hrs.)	• Definition platforms, Sensors • Remote sensing platforms: Ground based, Airborne, Space borne • Types of satellite orbit: Geostationary Orbit, Near polar Orbit, Sun-synchronous orbit • Sensors: Imaging Sensors, Non imaging sensors, Active, passive MSS(Multi Spectral Scanner) TM (Thematic Mapper), ETM+ (Enhanced Thematic Mapper+), LISS (Linear Imaging Self Scanning), PAN (Panchromatic), HRV (High Resolution Visible), SAR

			(Synthetic Aperture Radar), WiFS(Wide Field Sensor) AWiFS (Advanced Wide Field Sensor) AVHRR (Advanced Very High Resolution Radiometer), OLI (Operational Land Imager) • Remote sensing data products: Hard Copy Maps, Natural Colour Composite (NCC), False Colour Composite (FCC) • Earth Observation Satellites- IRS LANDSAT, SPOT, IKONOS, Quick Bird Types & characteristics of sensors on satellites, resolution, swath etc. (18 hrs)
Professional Skill 180Hrs; Professional Knowledge 36Hrs	Plan and implement Digital image processing techniques by selecting appropriate procedure, interpret images and feature extraction.	**Digital Image processing** 109. Practice of how to Import Data in image processing software. (8 hrs.) 110. Practice of Image Geo-referencing, Registration /Rectification. (10 hrs.) 111. Practice of Mosaic creation, Sub Setting, Visualization of single band images. (10 hrs.) 112. Practice of displaying of Individual pixel Values. (8 hrs.) 113. Displaying pixel values of more than one band. (6 hrs.) 114. Displaying Color	**Digital Image processing** • Digital Image, Digital Data Format, LUT. Radiometric Correction of Data Geometric Correction of Data • **Image Enhancements Techniques.** Band Ratios, Vegetation Indices, Resolution Merge Techniques o'r Image Fusion • **Thematic Information Extraction Procedures:** Multi-spectral patterns, Spectral Discrimination and Signature Bank, Supervised and Unsupervised

		Composites. (6 hrs.) 115. Introduction to supervised classification. (6 hrs.) 116. Practicing the different controls used in supervised classification. Defining clusters, Accuracy assessment. (10 hrs.) 117. Introduction to unsupervised classification. (6 hrs.) 118. Practicing unsupervised classification– Defining, Classes, Recording, Accuracy assessment, Area calculation. (12 hrs.) 119. Understand the difference of Supervised and Unsupervised classification. (8 hrs.)	Classification Methods, Multi-date –Data Analysis and change detection processes. Accuracy assessment.(18 hrs)
		Image interpretation and feature extraction 120. Study of Satellite Imagery in Different bands and Visual interpretation. (40 hrs.) 121. Preparation of land use map from satellite imagery. (30 hrs.) 122. Interpretation of Cultural details from high resolution imagery. (20 hrs.)	**Image interpretation and feature extraction** • Factors affecting image interpretation • Digital image, Resolution- Spectral Spatial, Radiometric, Temporal True colour image, False colour image • Spectral Signature, spectral reflectance curve, Significance of spectral signature in remote sensing Spectral Signature for Vegetation Soil, Water, Snow • Image characteristics and preparation of image

			interpretation keys Elements of Image interpretation Basic Principle of Image Interpretation, Visual image Interpretation: tone, shape, size pattern, texture, shadow and association. • Methods and techniques of image interpretation, Methods Visual and DIP, Types of interpretation Qualitative and Quantitative, Visual image interpretation, Digital Image interpretation. (18 hrs)
Professional Skill 60 Hrs; Professional Knowledge 12 Hrs	Plan and implement Digital Cartography process for collection of data and produce maps.	**Digital Cartography** 123. Identification of Composer items, Manage items. (12 hrs.) 124. Familiarization with Revert and Restore tools, Atlas ' generation. (14 hrs.) 125. Generation of Output Map, Inserting Let Long. (10 hrs.) 126. Map composition using Map projection, Map generalization and symbolization. (12 hrs.) 127. Understanding different features of topo sheets, Numbering system of topo sheets. (12 hrs.)	**Cartography** • Essentials of map making: Scale, type of scales coordinate system, map projection, map generalization and symbolization, map designing • Types and series of maps, topo sheets numbering system(12 hrs)
Professional Skill 60 Hrs;	Select datum units and scale, identify GPS, Signal, code,	**Global positioning System** 128. Identification of different types of GPS. (7 hrs.)	**Global Positioning System** • Introduction to Global positioning System GNSS

Professional Knowledge 12 Hrs	Biases and measure the location.	129. Identification of various buttons of GPS. (6 hrs.) 130. Demonstration on operating GPS. (7 hrs.) 131. Selection of datum units and scale. (6 hrs.) 132. Practice on GPS measurement. (12 hrs.) 133. Collection of GCPs. (5 hrs.) 134. Introduction to Mobile mapping. (5 hrs.) 135. Familiarization to various data colleting apps freely available on internet. (6 hrs.) 136. Transferring of GPS data in to GIS software. (6 hrs.)	• Coordinate and Time system • Satellite and conversional geodetic system • GPS, Signal, code and Biases • GPS segment organization • GPS Survey Methods. Basic geodetic co-ordinate • Ground Support equipment • GPS receiver Types • Modes of measurements and Post processing of data • Accuracy of GPS measurements and application of GPS. (12 hrs)
Professional Skill 60 Hrs; Professional Knowledge 12 Hrs	Select and set up DGPS for Calculating position, measuring distance, data downloading and processing in software.	**Differential Global Positioning System (DGPS)** 137. Introduction to Various components of DGPS. (10 hrs.) 138. Familiarization to operating base and rover. (8 hrs.) 139. Setting up Base and Rover RTK. (8 hrs.) 140. Options and Menu settings. (6 hrs.) 141. Calculating position. (8 hrs.) 142. Measuring Distance. (6 hrs.) 143. Triangulation (Geodetic). (8 hrs.) 144. Data downloading and processing in software. (6 hrs.)	**Differential Global Positioning System (DGPS)** • Introduction to DGPS • Components of DGPS • Types of DGPS • Errors in DGPS • Survey Methods in DGPS: Rapid static method, Traverse method, and Triangulation Method (12 hrs)

Professional Skill 60 Hrs; Professional Knowledge 12Hrs	Publish Files on Geo server using Web GIS.	145. Creation of shape files in QGIS. (6 hrs.) 146. Importing data to post gres. (6 hrs.) 147. Connecting post gres to Geo server. (6 hrs.) 148. Publishing File on Geo server. (6 hrs.) 149. Creating Map services, Feature Services Coverage services. (6 hrs.) 150. Google earth: introduction, digitization-point, line, poly, converting kml to shape file and vice versa, calculating distance.(6 hrs.) 151. Downloading images from google earth and mosaicing them. (6 hrs.) 152. Demonstration and use of Bhuvan portal. (7 hrs.) 153. Downloading satellite data from Bhuvan. (5 hrs.) 154. Use of Bhuvan portal (ISRO) for activity planning at Panchayat Level. (6 hrs.)	• Open source Software- QGIS, post gres, Geo server • Services- WMS, WFS, WCS • Introduction to Bhuvan • Introduction to Google Earth (12hrs)
Project work/ Industrial visit: - Internship at any Space Application Centre e. g., HARSAC labs by working on live projects			

SYLLABUS FOR CORE SKILLS
1. Employability Skills (Common for all CTS trades) (160 Hrs.)

Learning outcomes, assessment criteria, syllabus and Tool List of Core Skills subjects which is common for a group of trades, provided separately in www.bharatskills.gov.in

ANNEXURE-I

List of Tools & Equipment			
GEO-INFORMATICS ASSISTANT (for Batch of 24 Candidates)			
S No.	**Name of the Tools and Equipment**	**Specification**	**Quantity**
A. LIST OF TOOLS &EQUIPMENTS			
1.	Desktop computer	CPU: 32/64 Bit i3/i5/i7 or latest processor, Speed: 3 GHz or Higher. RAM:-4 GB DDR-III or Higher, Wi-Fi Enabled. Network Card: Integrated Gigabit Ethernet, with USB Mouse, USB Keyboard and Monitor (Min. 17 Inch. Licensed Operating System and Antivirus compatible with trade related software.	12 Nos.
2.	Laptop	-Do-	1 No.
3.	Wi-Fi Router/24 Port Switch wireless connectivity option		1+1 Nos.
4.	Structured cabling (to enable working with wired networks too for practical)		1 No.
5.	Network Monochrome Laser Printer & Scanner	A3	1 No.
6.	LCD projector with matte (antiglare) screen		1 No.
7.	UPS		As Required
8.	Standalone Hard Disks 1 TB or Higher		1 No.
9.	DGPS Equipment with software (static and real time kinematic)		1 set
10.	24 inch Plotter ink Printercoloured		1 No.
11.	Digital Camera		1 No.
B. SOFTWARE			
12.	MS office 2010 (Professional) or the latest version available at the time of procurement.		13users

13.	Antivirus for PC with validity of three year which may be renewed upon expiry		13 users
14.	Operating System	Windows 10 (pre-installed)	13 users
15.	Remote Sensing software (with latest configuration)	Minilab Kit (10 User)	1 No.
16.	GIS software(with latest configuration)	GIS Academy Program (maximum 50 Users) Pack	1 No.
17.	Photoshop software Latest version		13 users.
C. LIST OF OTHER ITEMS			
18.	Dual Desk or chair	Without arms on castor wheels, Adjustable height	24 Nos.
19.	Table for trainees with sliding tray for key board.	650 X 500 X 750 MM	12 Nos.
20.	Printer Table	650 X 500 X 750 MM (can be varied as per local specification)	1 No.
21.	Split type Air Conditioners		As Required
22.	White Board		1 No.

ANNEXURE-II

The DGT sincerely acknowledges contributions of the Industries, State Directorates, Trade Experts, Domain Experts, trainers of ITIs, NSTIs, faculties from universities and all otherswho contributed in revising the curriculum.

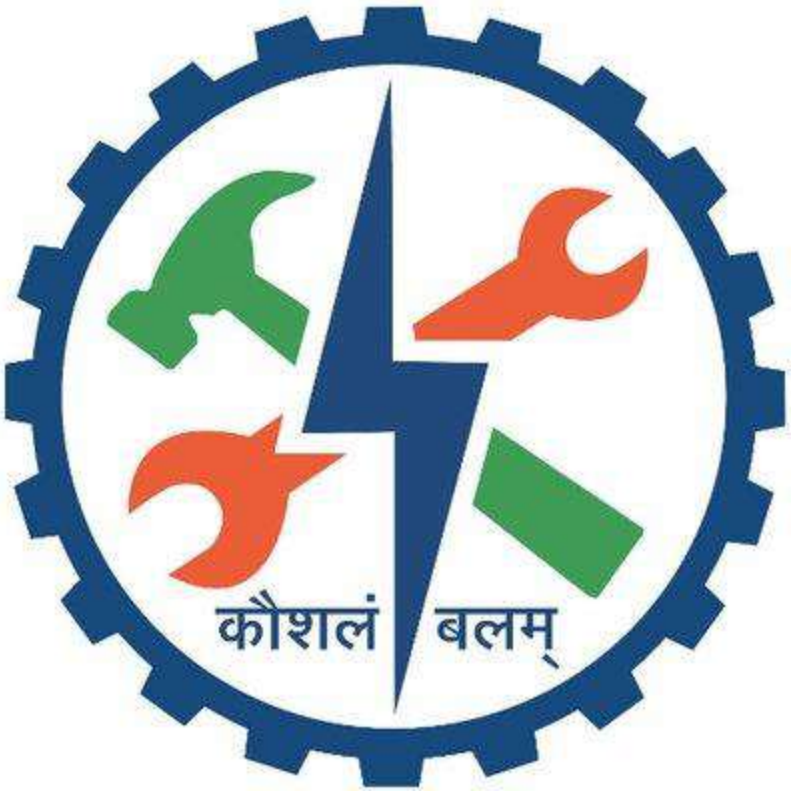
Special acknowledgement is extended by DGT to the following expert members who had contributed immensely in this curriculum.

List of Expert Members participated/ contributed for finalizing the course curriculum of Geo-informatics Assistant trade held on 19.09.2018 at Hissar (Haryana).

SNo.	Name & Designation Sh/Mr/Ms	Organization	Remarks
1.	Dr. R.S. Hooda, Chief Scientist	HARSAC, CES HAV Campus, Hissar	Chairman
2.	L.K. Mukherjee, Dy. Director of Training	CSTARI, Kolkata	Coordinator/ Member
3.	Manoj Saini, Asstt. Director (Tech)	Skill Development & Industrial Training Department, Panchkula, Haryana	Member
4.	Dr. Krishan Kumar, Principal	Govt. ITI, Hansi-Hissar	Member
5.	M.P. Sharma, Sr. Scientist (Geo-Info)	HARSAC, Hissar	Member
6.	NidhiKundu, SSA-SG	HARSAC, Hissar	Member
7.	Dr. V.S. Arya, Principal Scientist	HARSAC, Hissar	Member
8.	Ajeet Singh, Sr. Scientist	HARSAC, Hissar	Member
9.	Tanuj Arora, Group Manager	ESRI India, Noida	Member
10.	Neha Srivastava	ESRI India, Noida	Member
11.	Pradeep Kumar, Technical Specialist	Hexagon Geo systems, Gurgaon	Member
12.	R.N.Manna, Trg. Officer	CSTARI, Kolkata	Member
13.	Kuldeep, Computer Instt.	Govt. ITI, Faridabad, Haryana	Member
14.	Balvinder Singh, COPA Instt.	Govt. ITI, Hansi, Haryana	Member

ABBREVIATIONS

CTS	Craftsmen Training Scheme
ATS	Apprenticeship Training Scheme
CITS	Craft Instructor Training Scheme
DGT	Directorate General of Training
MSDE	Ministry of Skill Development and Entrepreneurship
NTC	National Trade Certificate
NAC	National Apprenticeship Certificate
NCIC	National Craft Instructor Certificate
LD	Locomotor Disability
CP	Cerebral Palsy
MD	Multiple Disabilities
LV	Low Vision
HH	Hard of Hearing
ID	Intellectual Disabilities
LC	Leprosy Cured
SLD	Specific Learning Disabilities
DW	Dwarfism
MI	Mental Illness
AA	Acid Attack
PwD	Person with disabilities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