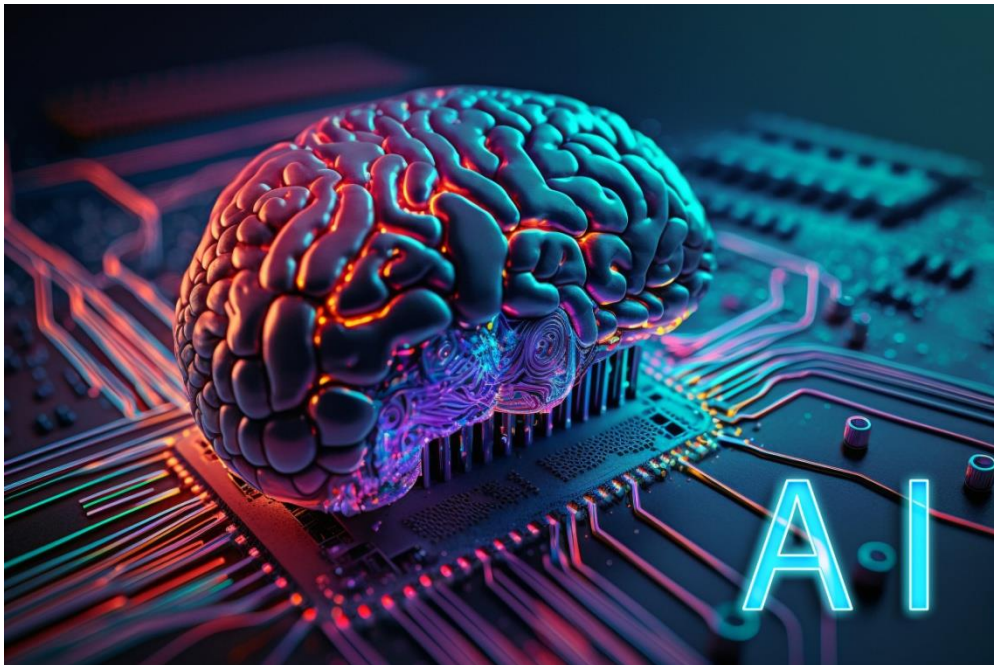GOVERNMENT OF INDIA
MINISTRY OF SKILL DEVELOPMENT & ENTREPRENEURSHIP
DIRECTORATE GENERAL OF TRAINING

COMPETENCY BASED CURRICULUM

ARTIFICIAL INTELLIGENCE PROGRAMMING ASSISTANT

(Duration: One Year)

CRAFTSMEN TRAINING SCHEME (CTS)

NSQF LEVEL- 3.5

SECTOR – IT & ITES

Directorate General of Training

ARTIFICIAL INTELLIGENCE PROGRAMMING ASSISTANT

(Non-Engineering Trade)

(Designed in 2023)

Version: 1.0

CRAFTSMEN TRAINING SCHEME (CTS)

NSQF LEVEL – 3.5

Developed By

Ministry of Skill Development and Entrepreneurship

Directorate General of Training
CENTRAL STAFF TRAINING AND RESEARCH INSTITUTE
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CONTENTS

S No.	Topics	Page No.
1.	Course Information	1
2.	Training System	2
3.	Job Role	6
4.	General Information	7
5.	Learning Outcome	9
6.	Assessment Criteria	10
7.	Trade Syllabus	15
8.	Annexure I (List of Trade Tools & Equipment)	41
9.	Annexure II (List of Trade experts)	45

1. COURSE INFORMATION

During the one-year duration of Artificial Intelligence Programming Assistant trade a candidate is trained on professional skill, professional knowledge &Employability skill related to job role. In addition to this a candidate is entrusted to undertake project work and extra-curricular activities to build up confidence. The broad components covered under Professional Skill subject are as below:

During the period of one year the trainee learns about safety and environment. They will learn computer basics and will perform installation, customization of Operating System, related software in a computer for Data Annotation purpose following safety precaution. The trainee will learn how to write programs using Python language, also able to interpret and working with Database. The trainee will be able to interpret Data Science and predictive analysis and can Illustrate AI, Machine Learning and pre-trained models. Trainee will gain basic Skills and knowledge in Deep Learning and pre-trained models as well as proficiency in integrating natural language processing capabilities into applications, improving data analysis and decision-making, and enhancing the overall user experience. After completion of the course trainee can interpret and understand visual information using Computer vision as well as Generative AI Tools and models.

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/ labor 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 programs of DGT for strengthening vocational training.

'Artificial Intelligence Programming Assistant' trade under CTS is one of the newly designed courses which will be delivered nationwide through a network of ITIs. The course is of one-year duration. It mainly consists of Domain area and Core area. In the Domain area (Trade Theory and Practical) impart professional skills and knowledge, while the 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 DGT which is recognized worldwide.

Candidates broadly need to demonstrate that they are able to:

- Read and interpret technical parameters / documentation, plan and organize work processes, identify necessary materials and tools;
- Perform task with due consideration to safety rules, accident prevention regulations and environmental protection stipulations.
- Apply professional knowledge & employability skills while performing the job and modification & maintenance work.
- Check the system specification and application software as per requirement of the design of job.
- Document the technical parameter related to the task undertaken.

2.2 PROGRESSION PATHWAYS

- Can join industry as Artificial Intelligence Programming Assistant and will progress further as Artificial Intelligence Programmer, Senior Artificial Intelligence Programmer and can rise up to the level of AI Project Manager.
- Can become Entrepreneur in the related field.
- Can join Apprenticeship programs in different types of industries leading to a National Apprenticeship certificate (NAC).
- Can join Crafts Instructor Training Scheme (CITS) in the trade for becoming an 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)	840
2	Professional Knowledge (Trade Theory)	240
3	Employability Skills	120
	Total	**1200**

Every year 150 hours of mandatory OJT (On the Job Training) at nearby industry, wherever not available then group project is mandatory

On the Job Training (OJT)/ Group Project	150
Optional Courses (10th/ 12th class certificate along with ITI certification or add on short term courses)	240

Trainees of one-year or two-year trade can also opt for optional courses of up to 240 hours in each year for 10th/ 12th class certificate along with ITI certification or add on short term courses.

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 program me through summative assessment as notified by the DGT from 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 an 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 DGT from time to time. **The learning outcome and assessment criteria will be the basis for setting question papers for final**

assessment. The examiner during final examination will also check the 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%.

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 / reduction of scrap / 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
- Computer based multiple choice question examination
- Practical Examination

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

Performance Level	Evidence
(a) Marks 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	• Demonstration of good skills and accuracy in the field of work/ assignments.

craftsmanship with occasional guidance, and due regard for safety procedures and practices	• A fairly good level of neatness and consistency to accomplish job activities. • Occasional support in completingthetask/ job.
(b) Marks 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 little guidance, and regard for safety procedures and practices	• Good skill levels and accuracy in the field of work/ assignments. • A good level of neatness and consistency to accomplish job activities. • Little support in completing the task/job.
(c) Marks 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.

Computer Network Professionals, Other; Covers computing professionals not classified elsewhere in Group 213, Computing Professionals.

Reference NCO-2015: -

a) 2523.9900 – Computer Network Professionals, Other

Reference NOS:

    i.   SSC/N9511
    ii.   SSC/N9512
    iii.   SSC/N9513
    iv.   SSC/N9514
    v.   SSC/N9515
    vi.   SSC/N9516
    vii.   SSC/N9517
    viii.   SSC/N9518
    ix.   SSC/N9519

Name of the Trade	**ARTIFICIAL INTELLIGENCE PROGRAMMING ASSISTANT**
NCO - 2015	2523.9900
NOS Covered	SSC/N9511, SSC/N9512, SSC/N9513, SSC/N9514, SSC/N9515, SSC/N9516, SSC/N9517, SSC/N9518, SSC/N9519
NSQF Level	Level-3.5
Duration of Craftsmen Training	One Year (1200 Hours+150 hours OJT/Group Project)
Entry Qualification	Passed 10th class examination
Minimum Age	14 years as on first day of academic session.
Eligibility for PwD	LD, CP, LC, DW, AA, LV, HH, AUTISM, SLD
Unit Strength (No. of Student)	24 (There is no separate provision of supernumerary seats)
Space Norms	60 sq. metre
Power Norms	5.5 KW
Instructors Qualification for:	
1. **Artificial Intelligence Programming Assistant Trade**	B.Voc/Degree in Computer Science/ Information Technology from AITCE/UGC Recognized University with one year experience in the relevant field. OR Post Graduate in Computer Science /Computer Application / IT from UGC Recognized University or NIELIT B Level with one-year experience in the relevant field. OR Bachelor in Computer Science / Computer Application / ITOR PGDCA from UGC recognized University or NIELIT A Level with two-year experience in the relevant field. OR 03 years Diploma in Computer Science / IT from recognized Board/ Institute or relevant Advanced Diploma (Vocational) (ADIT) from DGT with two year experience in the relevant field. OR NTC/NAC in Artificial Intelligence Programming Assistant or any trade

	in IT-ITeS sector trade with three-year experience in the relevant field. **Essential Qualification:** Relevant Regular / RPL variants of National Craft Instructor Certificate (NCIC) 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.***	
2.	**Employability Skill**	MBA/ BBA / Any Graduate/ Diploma in any discipline with Two years' experience with short term ToT Course in Employability. (Must have studied English/ Communication Skills and Basic Computer at 12th / Diploma level and above) **OR** Existing Social Studies Instructors in ITIs with short term ToT Course in Employability.
3.	**Minimum Age for Instructor**	21 Years
List of Tools and Equipment		As per Annexure – I

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

1. Apply Computer basics and perform installation, customization of Operating System, related software in a computer for Data Annotation purpose following safety precaution. (NOS: SSC/N9511)

2. Write programs using Python language. (NOS: SSC/N9512)

3. Interpret and working with Database. (NOS: SSC/N9513)

4. Interpret Data Science and predictive analysis. (NOS: SSC/N9514)

5. Illustrate AI, Machine Learning and pre-trained models. (NOS: SSC/N9515)

6. Gain basic Skills and knowledge in Deep Learning and pre-trained models. (NOS: SSC/N9516)

7. Gain proficiency in integrating natural language processing capabilities into applications, improving data analysis and decision-making, and enhancing the overall user experience. (NOS: SSC/N9517)

8. Interpret and understand visual information using Computer vision. (NOS: SSC/N9518)

9. Interpret and understand Generative AI Tools and models. Learn the ethical challenges of generative AI and Responsible AI. (NOS: SSC/N9519)

LEARNING OUTCOMES	ASSESSMENT CRITERIA
1. Apply Computer basics and perform installation, customization of Operating System, related software in a computer for Data Annotation purpose following safety precaution. (NOS: SSC/N9511)	Identify safety symbols / hazard.
	Perform safe methods of fire fighting in case of electrical fire.
	Use fire extinguishers.
	Demonstrate various parts of computer system.
	Customize the desktop settings and manage user accounts.
	Create, delete, copy, move, rename, view, sort, zip and unzip of files & folders.
	Perform BIOS settings modifications.
	Install Windows operating system.
	Format hard disk and create partition.
	Install application software for Windows i.e. Office Package/ PDF Reader/Media Player/ Antivirus/ Photoshop/ Flash/ Maya/ 3Ds Max etc.
	Install Drivers for printer/ scanner/ webcam /DVD etc.
	Edit document using basic formatting tools in MS Word.
	Inserting and formatting tables/ pictures/ videos / other objects.
	Perform conditional Mail Merge/ External Data Source.
	Perform Letters/ Label & Envelop printing using Mail Merge.
	Implement Excel functions of major categories i.e. Financial, Logical, Text, date & time, Lookup, Math, Statistical etc.
	Modify Excel page setup and print a worksheet.
	Create Slide shows, insert picture and theme in MS Power Point.
	Add new slide/format text/ link with word and excel documents.
	Animate slide transitions and objects.
	Create slide shows by inserting audio & video and synchronise with presentation.
2. Write programs using Python language. (NOS: SSC/N9512)	Install/set up the environment & run Python.
	Use Command Line and IDE to create and execute a python program.
	Write and test a python program to demonstrate print statement/comments/ different types of variables.
	Write and test a python program to perform data and data type operations/ string operations/ date/ input and output/ output

		formatting and operators.
		Construct and analyze code segments that use branching statements.
		Construct and analyze code segments that perform iteration.
		Construct and analyze code segments that include List comprehensions, tuple, set and Dictionary comprehensions.
		Perform basic operations using built
		Solve complex computing problems by using built
		Perform basic operations using functions.
		Perform basic programming using Object Oriented Programming concept.
		Construct and analyze code segments for file handling, folder and datetime handling, exception handling.
		Construct code segment for interacting with web requests, web scraping and web crawling.
3.	Interpret and working with Database. (NOS: SSC/N9513)	Install of MySQL.
		Troubleshoot basic installation issues.
		Create and use database.
		Design tables.
		Apply data integrity rules.
		Use the DDL, DCL and DML statements.
		Enforce constraints, primary key and foreign key.
		Add indices to Tables
		Simple select queries.
		Insert and delete queries Update queries
		Use the Number, Date and Character functions.
		Joins, Group by, Having, Sub query.
		Indexing and Optimizing Query.
4.	Interpret Data Science and predictive analysis. (NOS: SSC/N9514)	Segregate structured data & unstructured data, data integration , data clearing
		Create data dimension.
		Demonstrate data visualization.
		Data representation & Cluster Analysis.
		Different patterns of data.
		Pre-process the data.
		Transform the preprocessed data.

		Segregate pre-processed data into different patterns.
		Evaluate the data patterns.
		Tread Analysis.
		Statistical approach with Bayesian network, Regression Analysis, Correlation Analysis, Cluster Analysis.
5.	Illustrate AI, Machine Learning and pre-trained models. (NOS: SSC/N9515)	Identify Supervised/ Unsupervised / Reinforcement Learning.
		Identify Training Set / Test set with real-life example.
		Calculate mean/ median / mode.
		Calculate measures of central tendency/ population variance/ sample variance/ standard deviation.
		Calculate Skewness / Kurtosis in a graph.
		Identify tools for documenting statistical analysis.
		Select different graphical formats for presenting data.
		Probability with Bayes Theorem.
		Hypothesis/ hypothesis testing with multiple samples.
		Solve problems on Clustering.
		Solve problems on Model Selection.
		Solve problems on Classification.
		Solve problems on Chi-Square test.
		Solve problems on t-Test.
		Solve problems on Correlation analysis.
		Solve problems related to Inferential statistics.
		Identify and understand the components of Machine Learning with pre-trained models.
6.	Gain basic Skills and knowledge in Deep Learning and pre-trained models. (NOS: SSC/N9516)	Implementation and training of Neural Networks.
		Working with Perception, activation function and derivatives.
		Perform Forward and Backward Propagation.
		Working with computing loss, gradient descent, regularization, Optimization, Shallow and deep neural network.
		Identify and understand the components of Deep Learning with pre-trained models.
7.	Gain proficiency in integrating natural language processing capabilities into	Demonstrate Natural Language features – basic NLP requests/ specifying text content.
		Perform sentiment analysis – analyzing sentiment in a string/ from a cloud storage/ sentiment analysis response fields/ interpreting

applications, improving data analysis and decision-making, and enhancing the overall user experience. (NOS: SSC/N9517)	sentiment analysis values.	
	Plan and perform entity analysis –analysing entities in a string/ from cloud/ entity analysis response fields.	
	Execute entity sentiment analysis – entity sentiment analysis requests and response.	
	Perform syntactic analysis – analysing syntax in a string/ from cloud/ syntactic analysis requests and responses.	
	Perform Content classification – performing multiple operations in a single request.	
8. Interpret and understand visual information using Computer vision. (NOS: SSC/N9518)	Perform environmental setup.	
	Read and write an image.	
	Show Matplotlib/ image properties/ Bitwise operations/ drawing shapes and text.	
	Handle mouse event/ add trackbar/ resize and rotate an image.	
	Demonstrate image threshold/ image filtering/ edge detection/ image features and alignment/ image stitching and creating panoramas/ high dynamic range imaging (HDR)/ histogram and histogram using Matplotlib.	
	Demonstrate color spaces/ Morphological transformations/ erosion/ dilation/ image contours – find contours and draw contours.	
	Perform template matching/ image pyramids/ image addition/ image blending with pyramids/fourier transform.	
	Capture video from camera/ play video from file/extract images from video/ video from images/ face detection/meanshift and camshaft.	
	Perform object tracking and detection/ Pose estimation/ feature detection/ feature matching/ digit recognition with KNN.	
9. Interpret and understand Generative AI Tools and models. Understand the ethical challenges of generative AI and Responsible AI. (NOS: SSC/N9519)	Demonstrate with Generative AI Tools and models perform NLP and Computer Vision activities.	
	Perform NLP using Generative AI Tools and models.	
	Perform Computer Vision activities using Generative AI Tools and models.	
	Learn the ethical challenges of generative AI, Promoting responsible AI usage, AI governance and regulation	

SYLLABUS FOR ARTIFICIAL INTELLIGENCE PROGRAMMING ASSISTANT TRADE			
DURATION: ONE YEAR			
Duration	**Reference Learning Outcome**	**Professional Skills (Trade Practical) With Indicative Hours**	**Professional Knowledge (Trade Theory)**
Professional Skill 90 Hrs.; Professional Knowledge 30 Hrs.	Apply Computer basics and perform installation, customization of Operating System, related software in a computer for Data Annotation purpose following safety precaution.	**Safe working practices** 1. Visit IT Lab. of the institutes and locate the power supply to computer and its peripherals. 2. Safety symbols and hazard identification. 3. Practice safe methods of fire fighting in case of electrical fire. 4. Use of fire extinguishers. **Computer Components** 5. Demonstrate of various parts of computer system such as mother board, RAM, CPU, serial and parallel ports. 6. Power on start button of a computer system and check power supply to computer and all the connected peripherals of the system.	**Safe working practices** • Scope of the IT trade. • Safety rules and safety signs. • Types and working of fire extinguishers. **Introduction to 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.
		Using Operating System and Software Installation 7. Practice Windows interface using start menu, task bar, title bar,	**Introduction to Operating System and Software Installation process** • Introduction to Windows Operating System.

		Windows help, My computer, Recycle Bin.	• Main features of Windows OS.
		8. Customize the desktop settings and manage user accounts.	• File Management through Windows explorer.
		9. View system properties and customize the same using control panel details.	• Introduction and applications of essential Accessories, Multimedia players.
		10. Work with keyboard shortcut commands.	• Introduction to the booting process.
		11. Create, delete, copy, move, rename, view, sort, zip and unzip of files & folders.	• Introduction to various types of memories and their features.
		12. Use Multimedia tools and windows media player for image, audio and video.	• Concept of installation process of Operating System and software.
		13. View the BIOS settings and their modifications.	• Basic Hardware and software issues and their solutions.
		14. Install Windows operating system.	• Usage of Application software and Antivirus.
		15. Format hard disk and create partition.	
		16. Install necessary application software for Windows i.e. Office Package, PDF Reader, Media Player, Antivirus etc.	
		17. Install Drivers for printer, scanner, webcam and DVD etc.	
		18. Dongle and Pen drive and SSD handling, range extenders	
		19. Remote Desktop accessibility and handling (Any Desk, team viewer)	
		20. Install Photoshop, Maya and CANVA Fire Fly, AI, Paint Brush	

		Using MS Office/Google work space	**Introduction to Using MS Office /Google work space**
		21. Open MS Word/ Google work space, familiarize with basicword components and practice on creating, saving, closing and renaming of word documents.	• Introduction to the various applications in using MS Office / Google work space.
		22. Edit document using basic formatting tools.	• Introduction to Word features, Office button, toolbars.
		23. Practice Inserting and formatting tables, pictures, videos and other objects.	• Creating, saving and formatting and printing documents using Word.
		24. Use Mail merge tool. Use conditional Mail Merge, External Data Source. Practice Letters, Label & Envelop printing using Mail Merge.	• Introduction to Excel features, data types and various functions in all categories ofExcel.
		25. Open MS Excel, familiarize with basic application components and practice creating, saving and formatting excel spread sheets.	• Concepts of sorting, filtering and validating data.
		26. Practice Excel functions of all major categories i.e., Financial, Logical, Text, date& time, Lookup, Math, Statistical etc.	• Introduction to Power Point Slide Show creation process.
		27. Use various data types in Excel, sorting, filtering and validating data, PIVOT Tables.	• Fine tuning the presentation and good presentation technique.
		28. Modify Excel page setup and print a worksheet.	Stress Management (As per data annotation) Time Management Word Management
		29. Open power point presentation, familiarize	• Precision • Recall • Accuracy • Quality • Efficiency • Labeling Introduction to Cloud (Saas, PAAS, IAAS)

		with basic application components and practice on creating Slide shows, Inserting picture and theme. 30. Add new slide, format text, link with word and excel documents.	GCP, ADS(Azure), AWS
Professional Skill 120 Hrs.; Professional Knowledge 30 Hrs.	Write programs using Python language.	**Programming language (Python)** **Use Python from command line** 31. Install, set up the environment & run Python. 32. Use Command Line and IDE to create and execute a python program. 33. Practice debugging using IDE. **Perform Operations using Data Types and Operators** 34. Write and test a python program to demonstrate print statement, comments, different types of variables. 35. Write and test a python program to perform data and data type operations, string operations, date, input and output, output formatting and operators. 36. Determine the sequence of execution based on operator precedence. **Control Flow with Decisions and Loops** 37. Construct and analyze code segments that use branching statements. 38. Construct and analyze	**Programming language (Python)** • Introduction to Python History • Features, Setting up path Basic Syntax, Comments, Variable • Different Data Types • Casting, string, Boolean • Python Operators • Conditional Statements • Looping • Control Statements, String Manipulation, Lists, Tuple, sets • Dictionaries • Arrays • Iterators, modules, dates, math, • Modules, Input and Output. • OOPS concepts

		code segments that perform iteration. 39. Write a program using single dimensional arrays. 40. Write a program using multi-dimensional arrays/ matrices. **Document and Structure Code** 41. Document code segments using comments and documentation strings. 42. Construct and analyze code segments that include List comprehensions, tuple, set and Dictionary comprehensions. **Perform Operations Using Modules and Tools** 43. Perform basic operations using built-in modules. 44. Solve complex computing problems by using built-in modules.	
		45. Perform basic operations using functions. 46. Perform basic programming using Object Oriented Programming concept. 47. Construct and analyze code segments for file handling, folder and datetime handling, exception handling. 48. Construct code segment for interacting with web requests, web scraping and web crawling.	

| Professional Skill 50 Hrs.; Professional Knowledge 10 Hrs. | Interpret and working with Database. | Demonstrate on
49. Installation of MySQl.
50. Troubleshooting basic installation issues.
51. Creation and use of database.
52. Designing of tables.
53. Applying data integrity rules.
54. Using the DDL, DCL and DML statements.
55. Enforcing constraints, primary key and foreign key.
56. Adding indices to Tables
57. Simple select queries.
58. Insert and delete queries Update queries
59. Demonstrate on
60. Using the Number, Date and Character functions.
61. Joins, Group by, Having, Sub query.
62. Indexing and Optimizing Query. | Database Concepts
• Concept of DBMS, RDBMS.
• Data Models, Concept of DBA, Database Users.
• ER Model & Diagram, Database Schema.
• Designing Database using Normalization Rules.
• Various data types Data integrity,
• DDL DML and DCL statements.
• Enforcing Primary key and foreignkey.
• Adding Indices.
Queries
• Concepts of Transactions
• ACID Property of Transaction
• Constraints
Joins and Functions
• Joining of tables
• Sub Queries
• Functions used in query like sum,
• Average, max, min, count etc.
• Indexing and Query Optimization |
| Professional Skill 90 Hrs.; Professional Knowledge 30 Hrs. | Interpretation of Data and predictive analysis. | Working with the following: (python / pandas / matplotlib)
63. Identify structured data & unstructured data, data integration, data cleaning
64. Working on data visualization.
Working with the following:
65. Data representation &Cluster Analysis.
66. Pre-processing the data. | • Concept of data mining techniques, concepts of data mining model with its development and deployment in business scenario.
• Data mining models– CRISPDM model, understanding of data and its preparation techniques for the better model building, |

		67. Segregating pre-processed data into different patterns. 68. Trend Analysis. 69. Statistical approach with Regression Analysis, Correlation Analysis, Cluster Analysis.	introduction to sampling and data partitioning in data mining project. • Data Dimention. • Linear Algebra, Probability concepts.
Professional Skill 120 Hrs.; Professional Knowledge 30 Hrs.	Illustrate AI, Machine Learning and pre-trained models.	**Machine Learning with Statistics** 70. Identify Training Set and Test set with real-life example. 71. Calculate mean, median and mode. 72. Calculating measures of central tendency, population variance, sample variance, standard deviation. 73. Calculate Skewness and Kurtosis in agraph. 74. Solving problems on Clustering. 75. Solving problems on Model Selection. 76. Solving problems on Classification. 77. Solving problems on Chi-Square test. 78. Solving problems on t-Test. 79. Solving problems on Correlation analysis. 80. Solving problems related to Inferential statistics.	Introduction to AI, history of AI and its types, advantages and disadvantages of AI. • Concept of Machine Learning with Statistics • Discuss types of ML Algorithm: Supervised, Unsupervised and Reinforcement Learning. • Discuss technological trends which have led to AI • Understanding Data set with example: Training Set and Test set. • Discuss Decision Tree, Regression Analysis (Simple, Multiple, Polynomial) • fundamentals of statistics. • List basic analytical techniques such as regressions • Statistics and stages in statistical process, data types in statistics (Categorical vs Numerical types). • Discuss different methodological approaches to statistical analysis. • Descriptive Statistics (Mean, Median and mode) • Central tendency, population

			variance, sample variance, standard deviation.
			• Skewness and Kurtosis. Understanding Inferential statistics.
			• Hypothesis, hypothesis testing with multiple samples.
			• understand the components of Machine Learning with pre-trained models.
Professional Skill 120 Hrs.; Professional Knowledge 30 Hrs.	Gain basic Skills and knowledge in Deep Learning and pre-trained models.	Use Python / Tensorflow / Keras / Numpy / PyTorch. 81. Implementation and training of Neural Networks. 82. Working with Perception, activation function and derivatives. 83. Perform Forward and Backward Propagation. 84. Working with computing loss, gradient descent, regularization, Optimization, Shallow and deep neural network. 85. Identify and understand the components of Deep Learning with pre-trained models.	• What is Deep Learning? Difference between Machine Learning and Deep Learning, Deep learning process, Classification of Neural Networks, Types of Deep Learning Networks. Examples of deep learning applications, why is deep learning important? • LSTMs, Transfer learning. • Explain Feed-forward neural networks, Recurrent neural networks (RNNs), Convolutional neural networks (CNN), Reinforcement learning. • Limitations of deep learning.
Professional Skill 90 Hrs.; Professional Knowledge 30 Hrs.	Gain proficiency in integrating natural language processing capabilities into applications, improving data analysis and decision-	86. Practice NLPK & Open NLP 87. Interpret and practice Natural Language features – basic NLP requests, specifying text content. Part of basic analysis and Chunking. Practice syntactic analysis – analysing syntax in a string, from cloud, syntactic	• Introduction to AI/ML algorithms (specific to NLP) • Introduction to Data sets • Explain methods/ features of Natural Language API for performing analysis and annotation on text such as Sentiment analysis, entity analysis, entity sentiment analysis, syntactic analysis,

		analysis requests and responses.	content classification, chunking etc.
	making, and enhancing the overall user experience.	88. Perform sentiment analysis – analyzing sentiment in a string, from a cloud storage, sentiment analysis response fields, interpreting sentiment analysis values. 89. Plan and perform entity analysis – analysing entities in a string, from cloud, entity analysis response fields. 90. Execute entity sentiment analysis – entity sentiment analysis requests and response. 91. Practice Content Document classification and spam filtering classification –Practice sequence to sequence oprations such as machine translation.	
Professional Skill 120 Hrs.; Professional Knowledge 30 Hrs.	Interpret and understand visual information using Computer vision.	<u>Introduction to Computer Vision</u> 92. OpenCV-Python 93. Perform environmental setup. 94. Read and write an image. 95. Resize and rotate an image. 96. Working with image threshold, image filtering, edge detection, image features and alignment, image stitching and creating panoramas, high dynamic range imaging	• Introduction to computer vision • Explain Image segmentation, image threshold, filtering, image features and alignment. • Explain edge and motion detection, image stitching, panoramas, histogram, image contours, template matching, image pyramids, image addition, blending and fourier transform. • Explain Object classification,

		(HDR), histogram and histogram using Matplotlib. 97. Practice with color spaces, Morphological transformations, erosion, dilation, image contours – find contours and draw contours. 98. Work with template matching, image pyramids, image addition, image blending with pyramids, fourier transform. 99. Capture video from camera, play video from file, extract images from video, video from images, face detection, meanshift and camshaft. 100. Working with object tracking and detection, pose estimation, feature detection, feature matching, digit recognition with KNN, Working with pretrained Vision models.	tracking and detection, feature detection and matching. • Introduction to Computer Vision with Pytorch, explain various pre-trained vision models.
Professional Skill 40 Hrs.; Professional Knowledge 20 Hrs.	Interpret and understand Generative AI Tools and models. Understanding the ethical challenges of generative AI and Responsible	101. Working with Generative AI Tools and models to perform NLP and Computer Vision activities. 102. Creating a simple chatbot using any Bot Service. Testing and refining the chatbot. 103. Working with pre trained	• Introduction to Generative AI, its evolution and future, benefits of genAI, limitations of it, stages of generative AI, its applications. • Use cases of generative AI. • Introduction to Bot Service • Privacy and security concerns • Understanding the ethical challenges of generative AI

AI.	large language models. 104. Generating Images using large image models.	and deepfakes. • Promoting responsible AI usage and mitigating biases in generated content. • AI governance and regulation
Project Work/Industrial Visit (Optional)		

Note: *The duration of Professional skills (Trade practical) and Professional knowledge (Trade theory) are indicative only. The Training Institute has the flexibility to adopt suitable training duration for effective training.*

SYLLABUS FOR CORE SKILLS
1. Employability Skills (Common for all CTS trades) (120 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/www.dgt.gov.in

S No.	Name of the Tools and Equipment	Specification	Quantity
LIST OF TOOLS & EQUIPMENT			
Artificial Intelligence Programming Assistant (for Batch of 24 Candidates)			
A. Trainees Tools/ Equipment			
1.	Desktop Computer	CPU: 32/64 Bit, Latest processor/gen, Speed: 3 GHz or Higher. RAM: 12 GB or higher, 1 TB SSD, Wi-Fi Enabled. Speaker, Network Card: Integrated Gigabit Ethernet, with USB Mouse, USB Keyboard and Monitor (as available in the market). Or All in one PC Licensed Operating System and Antivirus compatible with trade related software.	12 Nos.
2.	Server / Workstation with GPU	Linux OS	01 No.
3.	Laptop	4th Gen Ci5 or higher Processor, 16 GB RAM, 1TB Hard Disk/SSD, Win/latest Preloaded Licensed OS, 2GB Graphics Card, DVD Writer, Standard Ports and Connectors.	01 No.
4.	Wi–Fi Router	With Wireless Connectivity	01 No.
5.	Switch	24 Port	02 Nos.
6.	Crimping Tool	RJ-45	05 Nos.
7.	Screwdriver Set	Standard	04 Sets
8.	LAN Tester	UTP cat5 cable tester (RJ 45)	05 Nos.
9.	Structured cabling in Lab	To enable working with Wired Networks for Practical.	As required
10.	Internet Connectivity	Broadband connection with min. 2 Mbps speed/Optical Fiber	As required
11.	Registered Domain	At least 100 MB Web Space	As required
12.	All in One printer	A4 size	01 No.
13.	Digital Web Cam	High Resolution (3.1 Megapixel or higher)	As required
14.	DLP Projector with Screen/Multimedia Projector with screen/Smart Interactive Board/Smart TV		01 No.
15.	Online UPS	5 KVA	01 Nos.
16.	Programming Language	Python/R	As Required

17.	Database	MySQL	As Required
18.	For Data Science, Machine Learning, Deep Learning.	Any open-source tool like Python / Pandas / Matplotlib /Tensorflow / Keras / Numpy / PyTorch / Cloud based tools etc.	As Required
19.	Tool for NLP	Label Studio, Label Editor /Python /Cloud based tools etc. Any open source tools like Open NLP, NLTK	As Required
20.	Computer vision Tool	Any open-source tool like OpenCV/ Python /Cloud based tools etc.	As Required
21.	Cloud Services	AWS / Azure / Google / IBM etc.	As Required.
22.	Bot Services	AWS / Azure / Google / IBM etc.	
23.	Generative AI	Any open-source tool like chatGPT / DALL-E / Cloud based tools etc.	As Required
24.	Headphone &mic. set	Wired	05 Nos.
25.	Sound System	2:1	01 No.
26.	External Hard Disk	1 TB	02 Nos.
27.	Tools	Crimping etc. (As per requirement), Wi-Fi dongles, Bluetooth Dongles	
B. Software			
28.	MS Office/Open Office	(Academic) latest version available at the time of procurement	25 Licenses
29.	Antivirus for – clients / workstations in profile	As required	25 Licenses
C. List Of Other Items/Furniture			
30.	Chair and table for the instructor	As required	01 each (for classroom & laboratory)
31.	Dual Desk or Chair and Tables for Trainees	As required	12 / 24 Nos.
32.	Computer table/Work benches	As required	For 24 Computers
33.	Operator's chair	As required	24 Nos.
34.	Air conditioner	As required (2 Ton)	2 Nos.
35.	White Board	As required	01 No.
36.	Almirah	As required	01 No.
37.	Fire Extinguisher	Arrange all proper NOCs and equipment from Municipal/Competent authorities.	
NOTE:			
1. Internet facility is desired to be provided in the class room.			

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

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

S No.	Name & Designation	Organization	Remarks
**List of Expert Members participated/ contributed for finalizing the course curriculum of Artificial Intelligence Programming Assistant trade held on 04.09.2023 at CSTARI, Kolkata**			
1.	Mr. Sunil Kumar Gupta, DDG (ER)	CSTARI, Kolkata	Chairman
2.	Mr. N.R. Aravindan, Director	CSTARI, Kolkata	Member
3.	Mr. G.C. Saha, Joint Director	CSTARI, Kolkata	Member
4.	Mr. N.P. Bannibagi, Deputy Director	NIMI, Chennai	Member
5.	Mr. Abhishek Kumar, Deputy Director	STPI, Kolkata	Member
6.	Mr. MD Hussain Rabbani, Scientist "C"	ERTL (E), STQC, Kolkata	Member
7.	Mr. Sourav Sen, Advisory Technical Spec.	IBM, India	Member
8.	Mr. Asok Bandyopadhyay, Associate Director	C-DAC, Kolkata	Member
9.	Mr. Indrajit Bhattacharya, Principal Scientist	TCS, Kolkata	Member
10.	Mr. Niladri Roy, Consultant	TCS, Kolkata	Member
11.	Mr. Amit Kumar Mandal, Professor	Techno India University, Kolkata	Member
12.	Mr. Goutam Roy, Service Delivery Head	Prime Infoserve LLP, Kolkata	Member
13.	Mr. Amlan Raychaudhuri, Asst. Professor	BP Poddar Institute of Management & Technology, Kolkata	Member
14.	Mr. Prodip Mukhopadhyay, Sr. Advisor	MAKAUT, Kolkata	Member
15.	Mr. Avishek Paul, Asst. Professor	Techno India University, Kolkata	Member
16.	Mr. Arijit Sengupta, Asst.	TCS, Kolkata	Member

	Consultant		
17.	Mr. B. Sharanappa, Asst. Director	CSTARI, Kolkata	Member
18.	Mr. Bhagat Singh, Asst. Director	CSTARI, Kolkata	Member
19.	Mr. M.J. Vijay Raju, Asst. Director	CSTARI, Kolkata	Member
20.	Mr. Akhilesh Pandey, Asst. Director	CSTARI, Kolkata	Member
21.	Mr. B.K. Nigam, TO	CSTARI, Kolkata	Member
22.	Mr. K. V. S. Narayana, TO	CSTARI, Kolkata	Member
23.	Mr. P. K. Bairagi, TO	CSTARI, Kolkata	Member
24.	Mr. B. Biswas, TO	CSTARI, Kolkata	Member
25.	Mr. Anindya Sundar Das Gupta, Instructor	Women ITI, Banipur	Member
26.	Sarbojit Neogi, VI	NSTI, Kolkata	Member
27.	Mr. Jinendran PK, Junior Consultant	CSTARI, Kolkata	Member
28.	Mr. Sarvesh Singh, Junior Consultant	CSTARI, Kolkata	Member
29.	Mr. Sandeep, Junior Consultant	CSTARI, Kolkata	Member
30.	Mr. Pradip Biswas, Jr. D/man	CSTARI, Kolkata	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