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ARTIFICIAL INTELLIGENCE DATA TECHNICIAN

ASSESSMENT PACKAGE

National Vocational Certificate Level 4

Version 1 - November, 2019

NAVTTC

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ARTIFICIAL INTELLIGENCE DATA TECHNICIAN

ASSESSMENT PACKAGE

National Vocational Certificate Level 4

Version 1 - November, 2019

Self-Assessment Checklist

Candidate Name	
Registration No.	
Qualification	National Vocational Certificate Level-4 in Artificial Intelligence Data Technician
Competency Standards	061900931 Scrape data from the web
Assessment Task	**Assessment Task 1:** Create a basic webpage that contains all basic HTML tags and includes basic JavaScripts. Also, create a python program that can request a webpage from a webserver. When requesting the page, the program should send request headers along with cookies and use webdriver. The program should also display the downloaded page along with headers received. **Assessment Task 2:** Create a python program that can import beautiful soup package and use it to download a webpage. The program should append some data to the webpage in tabular form. The program should also export the content of the page to a data frame. The data frame should then be exported to a file. The program should then display all tags in the webpage along with the values. The program should also display all attributes of the tags along with their values. **Assessment Task 3:** Create a python program that can read an XML/JSON file and create an XML/JSON object from it. The program should display all elements from XML/JSON object by navigating it both in forward and backward direction as well as by using XPath.

I can……

Performance Criteria	Yes	No
1. Implement basic HTML tags	☐	☐
2. Implement basic HTML attributes usage.	☐	☐
3. Implement basic JavaScript behaviors.	☐	☐
4. Perform inspection of a webpage.	☐	☐
5. Create a basic webpage	☐	☐
6. Set request headers.	☐	☐
7. Set request cookie values where required	☐	☐
8. Configure a driver to some browser as required	☐	☐
9. Generate a request to webserver	☐	☐
10. Load response stream	☐	☐
11. Convert stream to page source/content	☐	☐
12. Read response headers	☐	☐
13. Perform installation of beautiful soup	☐	☐
14. Import package into program	☐	☐
15. Request a content to download	☐	☐
16. Find required content from page source	☐	☐
17. Append content	☐	☐
18. Convert content to a data frame	☐	☐
19. Export data	☐	☐
20. Find tag by name	☐	☐
21. Find tag by attribute values	☐	☐
22. Navigate through values.	☐	☐
23. Retrieve tag values	☐	☐
24. Retrieve attribute values.	☐	☐
25. Read xml/json file.	☐	☐
26. Create xml/json object.	☐	☐
27. Forward navigating through elements.	☐	☐

28. Backward navigation through elements.		
29. Navigate through XPath.		

Candidate's Signature: …… Assessor's Signature: ……...

Date: ……...

Instruction Sheet for the Candidate

Title of Qualification: National Vocational Certificate Level 4 – Artificial Intelligence Data Technician	CS Code:	Level: 04	Version: 02
Competency Standard Title: • Scrape data from the web	**Assessment Date (DD/MM/YY):**		

Candidate Details	Name: ..... Registration/Roll Number: …….
Guidance for Candidate	**To meet this standard, you are required to complete the following within the given time frame (for practical demonstration & assessment):** **Assessment Task 1:** Create a basic webpage that contains all basic HTML tags and includes basic JavaScripts. Also, create a python program that can request a webpage from a webserver. When requesting the page, the program should send request headers along with cookies and use webdriver. The program should also display the downloaded page along with headers received. **Assessment Task 2:** Create a python program that can import beautiful soup package and use it to download a webpage. The program should append some data to the webpage in tabular form. The program should also export the content of the page to a data frame. The data frame should then be exported to a file. The program should then display all tags in the webpage along with the values. The program should also display all attributes of the tags along with their values. **Assessment Task 3:** Create a python program that can read an XML/JSON file and create an XML/JSON object from it. The program should display all elements from XML/JSON object by navigating it both in forward and backward direction as well as by using XPath.
Time: 180 min	During a practical assessment, under observation by an assessor, you are required to create a webpage and python programs (details give in above task) demonstrating the following criteria: 1. Implement basic HTML tags 2. Implement basic HTML attributes usage. 3. Implement basic JavaScript behaviors.
Minimum Evidence Required	

	4. Perform inspection of a webpage. 5. Create a basic webpage 6. Set request headers. 7. Set request cookie values where required 8. Configure a driver to some browser as required 9. Generate a request to webserver 10. Load response stream 11. Convert stream to page source/content 12. Read response headers 13. Perform installation of beautiful soup 14. Import package into program 15. Request a content to download 16. Find required content from page source 17. Append content 18. Convert content to a data frame 19. Export data 20. Find tag by name 21. Find tag by attribute values 22. Navigate through values. 23. Retrieve tag values 24. Retrieve attribute values. 25. Read xml/json file. 26. Create xml/json object. 27. Forward navigating through elements. 28. Backward navigation through elements. 29. Navigate through XPath.

Assessors Judgment Guide (to be completed by the Assessor and signed both by the assessor and the candidate after the assessment)

Qualification	National Vocational Certificate Level 04 - Artificial Intelligence Data Technician
Competency Standard(s)	Scrape data from the web
Candidate Details	Name: ..... Registration/Roll Number: ..... Candidate Signature: ....
Assessment Outcome	COMPETENT ☐ NOT YET COMPETENT ☐ Name of the Assessor:..... Assessor's code: ..... Signature of the Assessor:..... .....

Assessment Summary (to be filled by the assessor)							
Activity	**Method**					**Result**	
Nature of Activity	Written	Oral	Observation	Portfolio	Role Play	Competent	Not Yet Competent
Practical Skill Demonstration			✓				
Knowledge Assessment		✓					
Other Requirement							

Observation Checklist

Assessment Task	Description of assessment
Assessment Task 1:	Create a basic webpage that contains all basic HTML tags and includes basic JavaScripts. Also, create a python program that can request a webpage from a webserver. When requesting the page, the program should send request headers along with cookies and use webdriver. The program should also display the downloaded page along with headers received.
Assessment Task 2:	Create a python program that can import beautiful soup package and use it to download a webpage. The program should append some data to the webpage in tabular form. The program should also export the content of the page to a data frame. The data frame should then be exported to a file. The program should then display all tags in the webpage along with the values. The program should also display all attributes of the tags along with their values.
Assessment Task 3:	Create a python program that can read an XML/JSON file and create an XML/JSON object from it. The program should display all elements from XML/JSON object by navigating it both in forward and backward direction as well as by using XPath.

During the practical assessment, candidate demonstrated the following:		**Yes**	**No**	**Remarks**
1.	Implement basic HTML tags			
2.	Implement basic HTML attributes usage.			
3.	Implement basic JavaScript behaviors.			
4.	Perform inspection of a webpage.			
5.	Create a basic webpage			
6.	Set request headers.			
7.	Set request cookie values where required			
8.	Configure a driver to some browser as required			
9.	Generate a request to webserver			
10.	Load response stream			
11.	Convert stream to page source/content			

12.	Read response headers			
13.	Perform installation of beautiful soup			
14.	Import package into program			
15.	Request a content to download			
16.	Find required content from page source			
17.	Append content			
18.	Convert content to a data frame			
19.	Export data			
20.	Find tag by name			
21.	Find tag by attribute values			
22.	Navigate through values.			
23.	Retrieve tag values			
24.	Retrieve attribute values.			
25.	Read xml/json file.			
26.	Create xml/json object.			
27.	Forward navigating through elements.			
28.	Backward navigation through elements.			
29.	Navigate through XPath.			
Competent ☐		**Not Yet Competent** ☐		

Feedback to the Candidate		
In terms of complete competency, the candidate was found:	Competent	
	Not Yet Competent	
Candidate's Signature: ……**Assessor's Signature:** ……		

Test Yourself (Multiple Choice Questions)

MCQ 1

MCQ Question 1 What is the correct HTML for creating a hyperlink?

A W3Schools

B <a>http://www.w3schools.com

C W3Schools

D W3Schools

MCQ Question 2 Which of these elements are all <table> elements?

A <table><tr><td>

B <table><tr><tt>

C <table><head><tfoot>

D <thead><body

Question 3	When trying to get or retrieve data from a specified resource, what HTTP method is used?	A POST B GET C HEAD D CONNECT
Question 4	Which property of the requests.Response object returns the content of the response, in bytes?	A encoding B request C content D cookies

Question 5	Which of the following objects from BeautifulSoup package represent the whole HTML document?	A Tag B NavigableString C BeautifulSoup D Comment
Question 6	Which attribute provided by BeautifulSoup can be used to navigate the HTML document sideways?	A .children B .parent C .next_sibling D .next_element

Question 7	Which of the following filter will be passed to the find methods of BeautifulSoup to filter against a sequence of characters that define a search pattern?	A string B regular expression C list D function
Question 8	Which argument will you use if you want the find_all() method to only consider tags with certain names?	A name B attrs C recursive D string

Question 9	When you convert from Python to JSON, Python tuple are converted into the JSON (JavaScript) equivalent:	A	Object
		B	Array
		C	String
		D	Number
Question 10	Which method will you use to serialize obj to a JSON formatted str?	A	dump
		B	dumps
		C	load
		D	loads

Answers

Question 01	**A**	**W3Schools**
Question 02	**A**	**<table><tr><td>**
Question 03	**B**	**GET**
Question 04	**C**	**content**
Question 05	**C**	**BeautifulSoup**
Question 06	**C**	**.next_sibling**
Question 07	**B**	**regular expression**
Question 08	**A**	**name**
Question 09	**B**	**Array**
Question 10	**B**	**dumps**

Self-Assessment Checklist

Candidate Name	
Registration No.	
Qualification	National Vocational Certificate Level 4 - Artificial Intelligence Data Technician
Competency Standards	061900932 Process Images through Image Processing software
Assessment Task	**Assessment Task 1:** Perform detection of different objects, features and extracting features from an image or video (provided or download from internet) by adaptive thresh-holding, global threshold, image sharpening, Gaussian blurring and median blurring method. **Assessment Task 2:** Perform following image/video manipulation techniques: • Canny edge • RGB to HSV conversion • Remove noise by 2D convolution filter • Set the geometry by X, Y Sobel filter method **Assessment Task 3:** Perform following calibration techniques for image/video (provided or download from internet): • Erosion • Morphological erosion • Dilation and grab cut techniques

I can…….

Performance Criteria	**Yes**	**No**
1. Read image from file	☐	☐
2. Display an image from data	☐	☐
3. Perform global threshold	☐	☐
4. Perform adaptive thresholding	☐	☐
5. Perform image sharpening	☐	☐

6.	Perform image blurring using averaging		
7.	Perform image blurring using median		
8.	Perform image blurring using Gaussian		
9.	Perform image cropping		
10.	Find image contours		
11.	Creating 2D convolution filter		
12.	Apply Laplacian filter for edge detection		
13.	Apply X, Y Sobel filter on noisy images		
14.	Apply canny edge detection filter		
15.	Plot filtered images		
16.	Perform RGB to greyscale conversion		
17.	Perform RGB to HSV conversion		
18.	Perform RGB to LAB colour conversion		
19.	Perform RGB to YCrCb colour conversion		
20.	Perform scaling operation on image		
21.	Perform image translation		
22.	Perform image rotation to any angle		
23.	Perform affine transformation		
24.	Perform image opening		
25.	Perform image erosion		
26.	Perform image dilation		
27.	Perform image closing		
28.	Perform morphological erosion		
29.	Perform top hating on image		
30.	Apply min max lock function		
31.	Perform template based object matching		
32.	Perform feature based object matching		

33.	Perform area based object matching		
34.	Apply grabcut technique for foreground extraction		
35.	Prepare image mask of suitable size		
36.	Apply image mask for foreground extraction		
37.	Perform series of basic image operations to extract foreground		

Candidate's Signature: …… Assessor's Signature: ……...

Date: ……...

Instruction Sheet for the Candidate

Title of Qualification: National Vocational Certificate Level 4 – Artificial Intelligence Data Technician	CS Code:	Level: 04	Version: 02
Competency Standard Title: • Process Images through Image Processing software	**Assessment Date (DD/MM/YY):**		

Candidate Details	Name: ..... Registration/Roll Number: .....
Guidance for Candidate	**To meet this standard, you are required to complete the following within the given time frame (for practical demonstration & assessment):** **Assessment Task 1:** Perform detection of different objects, features and extracting features from an image or video (provided or download from internet) by adaptive thresh-holding, global threshold, image sharpening, Gaussian blurring and median blurring method. **Assessment Task 2:** Perform following image/video manipulation techniques: • Canny edge • RGB to HSV conversion • Remove noise by 2D convolution filter • Set the geometry by X, Y Sobel filter method **Assessment Task 3:** Perform following calibration techniques for image/video (provided or download from internet): • Erosion • Morphological erosion • Dilation and grab cut techniques
Time: 180 min	During a practical assessment, under observation by an assessor, you are required to **create several python programs** demonstrating the following criteria:

Minimum Evidence Required	1. Read image from file 2. Display an image from data 3. Perform global threshold 4. Perform adaptive thresholding 5. Perform image sharpening 6. Perform image blurring using averaging 7. Perform image blurring using median 8. Perform image blurring using Gaussian 9. Perform image cropping 10. Find image contours 11. Creating 2D convolution filter 12. Apply Laplacian filter for edge detection 13. Apply X, Y Sobel filter on noisy images 14. Apply canny edge detection filter 15. Plot filtered images 16. Perform RGB to greyscale conversion 17. Perform RGB to HSV conversion 18. Perform RGB to LAB colour conversion 19. Perform RGB to YCrCb colour conversion 20. Perform scaling operation on image 21. Perform image translation 22. Perform image rotation to any angle 23. Perform affine transformation 24. Perform image opening 25. Perform image erosion 26. Perform image dilation 27. Perform image closing 28. Perform morphological erosion 29. Perform top hating on image 30. Apply min max lock function 31. Perform template based object matching 32. Perform feature based object matching 33. Perform area based object matching 34. Apply grabcut technique for foreground extraction 35. Prepare image mask of suitable size 36. Apply image mask for foreground extraction 37. Perform series of basic image operations to extract foreground

Assessors Judgment Guide (to be completed by the Assessor and signed both by the assessor and the candidate after the assessment)

Qualification	National Vocational Certificate Level 04 - Artificial Intelligence Data Technician
Competency Standard(s)	Process Images through Image Processing software
Candidate Details	Name: ..... Registration/Roll Number: ..... Candidate Signature: ....
Assessment Outcome	COMPETENT ☐ NOT YET COMPETENT ☐ Name of the Assessor:..... Assessor's code: ..... Signature of the Assessor:..... .....

Assessment Summary (to be filled by the assessor)							
Activity	**Method**					**Result**	
Nature of Activity	Written	Oral	Observation	Portfolio	Role Play	Competent	Not Yet Competent
Practical Skill Demonstration			✓				
Knowledge Assessment		✓					
Other Requirement							

Observation Checklist

Assessment Task	Description of assessment
Assessment Task 1	Perform detection of different objects, features and extracting features from an image or video (provided or download from internet) by adaptive thresh-holding, global threshold, image sharpening, Gaussian blurring and median blurring method.
Assessment Task 2:	Perform following image/video manipulation techniques: • Canny edge • RGB to HSV conversion • Remove noise by 2D convolution filter • Set the geometry by X, Y Sobel filter method
Assessment Task 3:	Perform following calibration techniques for image/video (provided or download from internet): • Erosion • Morphological erosion • Dilation and grab cut techniques

	During the practical assessment, candidate demonstrated the following:	**Yes**	**No**	**Remarks**
1.	Read image from file			
2.	Display an image from data			
3.	Perform global threshold			
4.	Perform adaptive thresholding			
5.	Perform image sharpening			
6.	Perform image blurring using averaging			
	Perform image blurring using median			
7.	Perform image blurring using Gaussian			
8.	Perform image cropping			
9.	Find image contours			
10.	Creating 2D convolution filter			
11.	Apply Laplacian filter for edge detection			
12.	Apply X, Y Sobel filter on noisy images			
13.	Apply canny edge detection filter			

14.	Plot filtered images			
15.	Perform RGB to greyscale conversion			
16.	Perform RGB to HSV conversion			
17.	Perform RGB to LAB colour conversion			
18.	Perform RGB to YCrCb colour conversion			
19.	Perform scaling operation on image			
20.	Perform image translation			
21.	Perform image rotation to any angle			
22.	Perform affine transformation			
23.	Perform image opening			
24.	Perform image erosion			
25.	Perform image dilation			
26.	Perform image closing			
27.	Perform morphological erosion			
28.	Perform top hating on image			
29.	Apply min max lock function			
30.	Perform template based object matching			
31.	Perform feature based object matching			
32.	Perform area based object matching			
33.	Apply grabcut technique for foreground extraction			
34.	Prepare image mask of suitable size			
35.	Apply image mask for foreground extraction			
36.	Perform series of basic image operations to extract foreground			

Competent ☐	**Not Yet Competent** ☐

Feedback to the Candidate		
In terms of complete competency, the candidate was found:	Competent	
	Not Yet Competent	
Candidate's Signature: ……**Assessor's Signature:** ……		

Self-Assessment Checklist

Candidate Name	
Registration No.	
Qualification	National Vocational Certificate Level 4 - Artificial Intelligence Data Technician
Competency Standards	061900933 Work with Data Manipulation Toolkit
Assessment Task	Load data from provided external data sources into a dataframes. Perform all step provided in ANNEX-A to manipulate data-frames. Final output must be stored to some external file.

I can…….

Performance Criteria	**Yes**	**No**
1. Open a python script	☐	☐
2. Import pandas	☐	☐
3. Import a csv file using “read_csv” function	☐	☐
4. Import an excel file using “read_excel” function	☐	☐
5. Import from any other file type using appropriate “read” function	☐	☐
6. Import data in a python script	☐	☐
7. Index columns using a list of columns	☐	☐
8. Index rows based on a list of index values	☐	☐
9. Index rows based on a conditional statement (mask)	☐	☐
10. Index columns based on a conditional statement (mask)	☐	☐
11. Index columns based on a range of columns	☐	☐
12. Index rows based on a range of index value	☐	☐
13. Rename column	☐	☐
14. Apply a function element-wise to a column using “apply”	☐	☐
15. Get value counts of a column	☐	☐

16. Get sum of values in a column		
17. Get basic stats of a column (mean/median/standard deviation etc.)		
18. Change type of a column		
19. Perform a vectorized arithmetic operation on a column		
20. Delete a column		
21. Duplicate a column		
22. Group values of a column and apply an operation on each group		
23. Count number of missing values in each column		
24. Fill missing values with a specific string		
25. Fill missing values with mean of the column		
26. Delete rows with missing values		
27. Convert a column to string		
28. Divide a column into two based on a separator		
29. Check if each row contains a specific substring		
30. Extract substring out of each row in a column		
31. Check if each row starts with a specific substring		
32. Replace a specific substring in each row in a column		
33. Change case of a string column		
34. Strip spaces from the sides of each row in a column		
35. Concatenate a value to each row in a column		
36. Concatenate another column with a string column elementwise		
37. Perform custom operations using “apply”		
38. Merge two data frames using merge functions		
39. Perform different types of joins on two dataframes		
40. Concatenate two or more dataframes row wise		

41. Concatenate two or more dataframes column wise		
42. Stack a dataframe		
43. Unstack a dataframe		
44. Create a pivot table		
45. Melt a dataframe		
46. Pivot a dataframe		
47. Count null values in a row		
48. Drop/select specific rows based on a condition		
49. Drop/select rows by index		
50. Reset index of rows		
51. Set a custom index of rows		

Candidate's Signature: …… Assessor's Signature: ……...

Date: ……...

Instruction Sheet for the Candidate

Title of Qualification: National Vocational Certificate Level 4 – Artificial Intelligence Data Technician	CS Code:	Level: 04	Version: 02
Competency Standard Title: • Work with Data Manipulation Toolkit	**Assessment Date (DD/MM/YY):**		

Candidate Details	Name: ..... Registration/Roll Number:
Guidance for Candidate	**To meet this standard, you are required to complete the following within the given time frame (for practical demonstration & assessment):** **Assessment Task:** 1. Load data from provided sources and perform all step mentioned in ANNEX-A to manipulate data-frames.
Time: 180 min	During a practical assessment, under observation by an assessor, you are required to load **data from provided sources and perform all step mentioned in ANNEX-A to manipulate data-frames.** demonstrating the following criteria:
Minimum Evidence Required	1. Open a python script 2. Import pandas 3. Import a csv file using “read_csv” function 4. Import an excel file using “read_excel” function 5. Import from any other file type using appropriate “read” function 6. Import data in a python script 7. Index columns using a list of columns 8. Index rows based on a list of index values 9. Index rows based on a conditional statement (mask) 10. Index columns based on a conditional statement (mask) 11. Index columns based on a range of columns 12. Index rows based on a range of index value 13. Rename column 14. Apply a function element-wise to a column using “apply” 15. Get value counts of a column 16. Get sum of values in a column 17. Get basic stats of a column (mean/median/standard deviation etc.) 18. Change type of a column 19. Perform a vectorized arithmetic operation on a column 20. Delete a column 21. Duplicate a column 22. Group values of a column and apply an operation on each group 23. Count number of missing values in each column 24. Fill missing values with a specific string 25. Fill missing values with mean of the column

	26. Delete rows with missing values 27. Convert a column to string 28. Divide a column into two based on a separator 29. Check if each row contains a specific substring 30. Extract substring out of each row in a column 31. Check if each row starts with a specific substring 32. Replace a specific substring in each row in a column 33. Change case of a string column 34. Strip spaces from the sides of each row in a column 35. Concatenate a value to each row in a column 36. Concatenate another column with a string column elementwise 37. Perform custom operations using “apply” 38. Merge two data frames using merge functions 39. Perform different types of joins on two dataframes 40. Concatenate two or more dataframes row wise 41. Concatenate two or more dataframes column wise 42. Stack a dataframe 43. Unstack a dataframe 44. Create a pivot table 45. Melt a dataframe 46. Pivot a dataframe 47. Count null values in a row 48. Drop/select specific rows based on a condition 49. Drop/select rows by index 50. Reset index of rows 51. Set a custom index of rows

Assessors Judgment Guide (to be completed by the Assessor and signed both by the assessor and the candidate after the assessment)

Qualification	National Vocational Certificate Level 04 - Artificial Intelligence Data Technician
Competency Standard(s)	Work with Data Manipulation Toolkit
Candidate Details	Name: ..... Registration/Roll Number: ..... Candidate Signature: ....
Assessment Outcome	COMPETENT ☐ NOT YET COMPETENT ☐ Name of the Assessor:..... Assessor's code: ..... Signature of the Assessor:..... .....

Assessment Summary (to be filled by the assessor)							
Activity	**Method**					**Result**	
Nature of Activity	Written	Oral	Observation	Portfolio	Role Play	Competent	Not Yet Competent
Practical Skill Demonstration			✓				
Knowledge Assessment		✓					
Other Requirement							

Observation Checklist

Assessment Task	Description of assessment
Assessment Task 1	Load data from provided sources and perform all step mentioned in ANNEX-A to manipulate data-frames.

	During the practical assessment, candidate demonstrated the following:	**Yes**	**No**	**Remarks**
1.	Open a python script			
2.	Import pandas			
3.	Import a csv file using “read_csv” function			
4.	Import an excel file using “read_excel” function			
5.	Import from any other file type using appropriate “read” function			
6.	Import data in a python script			
7.	Index columns using a list of columns			
8.	Index rows based on a list of index values			
9.	Index rows based on a conditional statement (mask)			
10.	Index columns based on a conditional statement (mask)			
11.	Index columns based on a range of columns			
12.	Index rows based on a range of index value			
13.	Rename column			
14.	Apply a function element-wise to a column using “apply”			
15.	Get value counts of a column			
16.	Get sum of values in a column			
17.	Get basic stats of a column (mean/median/standard deviation etc.)			
18.	Change type of a column			
19.	Perform a vectorized arithmetic operation on a column			
20.	Delete a column			

21.	Duplicate a column			
22.	Group values of a column and apply an operation on each group			
23.	Count number of missing values in each column			
24.	Fill missing values with a specific string			
25.	Fill missing values with mean of the column			
26.	Delete rows with missing values			
27.	Convert a column to string			
28.	Divide a column into two based on a separator			
29.	Check if each row contains a specific substring			
30.	Extract substring out of each row in a column			
31.	Check if each row starts with a specific substring			
32.	Replace a specific substring in each row in a column			
33.	Change case of a string column			
34.	Strip spaces from the sides of each row in a column			
35.	Concatenate a value to each row in a column			
36.	Concatenate another column with a string column elementwise			
37.	Perform custom operations using “apply”			
38.	Merge two data frames using merge functions			
39.	Perform different types of joins on two dataframes			
40.	Concatenate two or more dataframes row wise			
41.	Concatenate two or more dataframes column wise			
42.	Stack a dataframe			
43.	Unstack a dataframe			
44.	Create a pivot table			
45.	Melt a dataframe			
46.	Pivot a dataframe			

Competent ☐	**Not Yet Competent** ☐

Feedback to the Candidate		
In terms of complete competency, the candidate was found:	Competent	
	Not Yet Competent	
Candidate's Signature: ……**Assessor's Signature:** ……		

Test Yourself (Multiple Choice Questions)

MODULE

Question 01 Which is default missing value in pandas dataframe.

A Not Found

B NULL

C NAN

D NaN

Question 02 Which of the following is not the accepted in dataframes directly?

A Fixed Sized arrays

B Series

C 3-dimensional array

D Structured data

Question 03 Mark the wrong statement

A Primary difference between Series and ndarray is operations between Series automatically align the data based on label

B NumPy methods accepting an ndarray can also accept Series instead.

C DataFrame behaves as fixed-size dict where you can get and set values through index labels

D DataFrames can be exported as excel files.

Question 04 Which of the following works analogously to the form of the dict constructor?

A DataFrame.from_items

B DataFrame.from_records

C DataFrame.from_dict

D DataFrame.Init

Question 05

Pandas allows to load range of columns at initialize level.

A True

B False

C

D

Question 06

Consider following lists

a = [1,2,3,4,5]

b = [6,7,8,9]

Output:

a = [1,2,3,4,5,6,7,8,9]

to show a and b in one dimension we will use?

A a.extend(b)

B a.append(b)

C a.merge(b)

D a.concatinate(b)

Question 07

A = [1, 0, 0
0, 1, 0
0, 0, 1]
to create above matrix we will use

A np.array([1, 0, 0], [0, 1, 0], [0, 0, 1])

B Ndarray(3)

C np.eye(3)

D identity(3)

Question 08

What is output of following.

```
D = {1 : 1, 2 : '2', '1' : 1, '2' : 3}
D['1'] = 2
print(D[D[D[str(D[1])]]])
```

A ‘1’

B ‘2’

C 3

D KeyError

Question 09	We can perform Melt over dataFrame using	A Single variable only B Using single index only C Using multiple variables D Using Fixed variable.
Question 10	Return of read_csv is	A dataframe B list C Ndarray D Type(None)

Answers

Question 1	D	Question 2	C
Question 3	C	Question 4	A
Question 5	A	Question 6	A
Question 7	D	Question 8	C
Question 9	C	Question 10	A

ANNUXURE-A

1. Open pip and navigate to project directory
2. Import pandas
3. Import a csv file using “read_csv” function in one framework
4. Import an excel file using “read_excel” function in second frame.
5. Rename string columns and add “Str” at the end of column names in both dataframes.
6. Merge both dataframes against rows and concatenate column 1 and column 2 from new merged dataframe.
7. Drop column 2 from merged dataframe.
8. Mask merged column as “merged col”
9. Add new columns and name it as “Group Col” and add any 3 to 4 string values (repeat them to fill the frame)
10. Count missing values in dataframe and add 0 in numeric columns and “NA” in string columns.
11. Show mean of numeric columns in dataframe and count columns having “NA”
12. Pick one string columns count capital character in appearing in all entries.
13. Melt the dataframe from multiple variables.
14. Drop all rows having 0 in numeric columns.
15. Pivot the dataframe from list.
16. Export final shape of merged dataframe to external file.

Self-Assessment Checklist

Candidate Name	
Registration No.	
Qualification	National Vocational Certificate Level 4 - Artificial Intelligence Data Technician
Competency Standards	061900934 Work with Multidimensional Arrays' Manipulation and Computation Package
Assessment Task	Perform various operations on multidimensional arrays (using ndarray): **Assessment Task 1:** Create a python program: • to read and write ndarray from or to pickle file. • to perform iteration operations over n-dimensional array. • to append or extend operations on an array. • to perform four drop operations from an array. **Assessment Task 2:** Create a python program: • to perform slicing and indexing of n-dimensional array. • to perform Boolean indexing using basic operators • to perform Boolean indexing using advance operations • to select arbitrary items based on array dimension. **Assessment Task 3:** Create a python program: • to perform bitwise binary operation on arrays • to perform various string operation on arrays • to perform comparison of arrays. • to change the type of an array. • to perform split operations on arrays • to construct tile array • to rearrange array **Assessment Task** 4: Create a python program: • to reshape and ravel operations on ndarray

	• to move, roll and swap axis operations on ndarray • to transpose operation on arrays • to perform broadcasting on ndarray. **Assessment Task 5:** Create a python program: • to concatenate multiple ndarray • to perform stacking of ndarray • to perform column stacking of ndarray • to perform stacking on various axes of ndarray **Assessment Task 6:** Create a python program: • to read a text document and perform tokenization • to count the number of unique words in a text document • to convert text document to label encoded array • to perform one hot encoding on text data **Assessment Task 7:** Create a python program: • to load audio data and convert it to ndarray • to load image data and convert it to ndarray • to load LIDAR data and convert it to ndArray • to load time series data and convert it to ndArray

I can…….

Performance Criteria	**Yes**	**No**
1. Read ndArray from pickle file	☐	☐
2. Write ndArray to a pickle file	☐	☐
3. Iterate over arrays	☐	☐
4. Append elements to an ndArray	☐	☐
5. Drop elements from ndArray	☐	☐
6. Perform basic slicing and indexing on ndArray	☐	☐
7. Index ndArray using a mask (Boolean array indexing)	☐	☐
8. Index ndArray using integer array indexing	☐	☐

9. Perform binary operations on arrays		
10. Perform string operations on arrays		
11. Perform comparison operations on arrays		
12. Change type of an array		
13. Slit arrays (split, dsplit, vsplit, hsplit)		
14. Tile arrays		
15. Rearrange array (reshape, roll, flip)		
16. Change dimensions with “reshape”		
17. Flatten array with “ravel”		
18. Move axis of an array		
19. Roll axis of an array		
20. Swap axes of an array		
21. Take transpose of an array		
22. Broadcast an array		
23. Concatenate arrays		
24. Stack arrays		
25. Stack 1D arrays as columns in a 2D array (column stack)		
26. Perform stacking on particular axes (dstack, hstack, vstack)		
27. Read text documents into variables		
28. Tokenize text documents		
29. Count number of unique words in a document		
30. Convert a text document into a label encoded array		
31. Encode a document phrase using one hot encoding		
32. Read Audio data as numpy array		
33. Read Image data as numpy array		
34. Read LIDAR data as numpy array		
35. Read Time Series data as numpy array		

Candidate’s Signature: …… Assessor’s Signature: ……...

Date: ……...

Instruction Sheet for the Candidate

Title of Qualification: National Vocational Certificate Level 4 – Artificial Intelligence Data Technician	CS Code:	Level: 04	Version: 02
Competency Standard Title: • Work with Multidimensional Arrays' Manipulation and Computation Package	**Assessment Date (DD/MM/YY):**		

Candidate Details	Name: ..... Registration/Roll Number: .....
Guidance for Candidate	**To meet this standard, you are required to complete the following within the given time frame (for practical demonstration & assessment):** **Assessment Task 1:** Create a python program: • to read and write ndarray from or to pickle file. • to perform iteration operations over n-dimensional array. • to append or extend operations on an array. • to perform four drop operations from an array. **Assessment Task 2:** Create a python program: • to perform slicing and indexing of n-dimensional array. • to perform Boolean indexing using basic operators • to perform Boolean indexing using advance operations • to select arbitrary items based on array dimension. **Assessment Task 3:** Create a python program: • to perform bitwise binary operation on arrays • to perform various string operation on arrays • to perform comparison of arrays. • to change the type of an array. • to perform split operations on arrays • to construct tile array

	• to rearrange array **Assessment Task** 4: Create a python program: • to reshape and ravel operations on ndarray • to move, roll and swap axis operations on ndarray • to transpose operation on arrays • to perform broadcasting on ndarray. **Assessment Task 5:** Create a python program: • to concatenate multiple ndarray • to perform stacking of ndarray • to perform column stacking of ndarray • to perform stacking on various axes of ndarray **Assessment Task 6:** Create a python program: • to read a text document and perform tokenization • to count the number of unique words in a text document • to convert text document to label encoded array • to perform one hot encoding on text data **Assessment Task 7:** Create a python program: • to load audio data and convert it to ndarray • to load image data and convert it to ndarray • to load LIDAR data and convert it to ndArray • to load time series data and convert it to ndArray
Time: 180 min	During a practical assessment, under observation by an assessor, you are required to **create several python programs** demonstrating the following criteria:
Minimum Evidence Required	1. Import a pickle file. 2. Read and Write operations on a pickle file. 3. Iteration operation over ndarray. 4. Append and Drop operations to and from an array. 5. Slicing and basic indexing of ndarray. 6. Boolean indexing of ndarray using basic operators. 7. Selection of arbitrary items based on array dimension. 8. Bitwise binary operation on ndarray 9. String operation on ndarray 10. Comparison of ndarray. 11. Change the type of ndarray.

	12. Split operations on ndarray. 13. Construct tile array 14. Implement various functions to rearrange ndarray 15. Reshape and ravel operation on ndarrays 16. Move, roll, swap axis operations on ndarray 17. Transpose ndarray. 18. Broadcast ndarray. 19. Concatenate of array 20. Staking of arrays 21. Install text processing package 22. Read text document and perform tokenization 23. Count number of unique words in documents 24. Label encoding of text data 25. Hot encoding of text data 26. Recording audio with PyAudio 27. Convert audio data buffer to ndArray 28. load image data and convert to ndarray 29. load LIDAR data and convert to ndarray 30. Load time series data and convert to ndarray

Assessors Judgment Guide (to be completed by the Assessor and signed both by the assessor and the candidate after the assessment)

Qualification	National Vocational Certificate Level 04 - Artificial Intelligence Data Technician
Competency Standard(s)	Work with Multidimensional Arrays' Manipulation and Computation Package
Candidate Details	Name: ..... Registration/Roll Number: ..... Candidate Signature: ....
Assessment Outcome	COMPETENT ☐ NOT YET COMPETENT ☐ Name of the Assessor:..... Assessor's code: ..... Signature of the Assessor:..... .....

Assessment Summary (to be filled by the assessor)							
Activity	**Method**					**Result**	
Nature of Activity	Written	Oral	Observation	Portfolio	Role Play	Competent	Not Yet Competent
Practical Skill Demonstration			✓				
Knowledge Assessment		✓					
Other Requirement							

Observation Checklist

Assessment Task	Description of assessment
Assessment Task 1	Create a python program: • to read and write ndarray from or to pickle file. • to perform iteration operations over n-dimensional array. • to append or extend operations on an array. • to perform four drop operations from an array.
Assessment Task 2	Create a python program: • to perform slicing and indexing of n-dimensional array. • to perform Boolean indexing using basic operators • to perform Boolean indexing using advance operations • to select arbitrary items based on array dimension.
Assessment Task 3	Create a python program: • to perform bitwise binary operation on arrays • to perform various string operation on arrays • to perform comparison of arrays. • to change the type of an array. • to perform split operations on arrays • to construct tile array • to rearrange array
Assessment Task 4	Create a python program: • to reshape and ravel operations on ndarray • to move, roll and swap axis operations on ndarray • to transpose operation on arrays • to perform broadcasting on ndarray.
Assessment Task 5	Create a python program: • to concatenate multiple ndarray • to perform stacking of ndarray • to perform column stacking of ndarray • to perform stacking on various axes of ndarray
Assessment Task 6	Create a python program: • to read a text document and perform tokenization • to count the number of unique words in a text document • to convert text document to label encoded array • to perform one hot encoding on text data
Assessment Task 7	Create a python program: • to load audio data and convert it to ndarray • to load image data and convert it to ndarray • to load LIDAR data and convert it to ndArray • to load time series data and convert it to ndArray

During the practical assessment, candidate demonstrated the following:		Yes	No	Remarks
1.	Import a pickle file.			
2.	Read and Write operations on a pickle file.			
3.	Iteration operation over ndarray.			
4.	Append and Drop operations to and from an array			
5.	Slicing and basic indexing of ndarray			
6.	Boolean indexing of ndarray using basic operators.			
7.	Selection of arbitrary items based on array dimension			
8.	Bitwise binary operation on ndarray			
9.	String operation on ndarray			
10.	Comparison of ndarray.			
11.	Change the type of ndarray.			
12.	Split operations on ndarray.			
13.	Construct tile array			
14.	Implement various functions to rearrange ndarray			
15.	Reshape and ravel operation on ndarrays			
16.	Move, roll, swap axis operations on ndarray			
17.	Transpose ndarray			
18.	Broadcast ndarray.			
19.	Concatenate of array			
20.	Staking of arrays			
21.	Install text processing package			
22.	Read text document and perform tokenization			
23.	Count number of unique words in documents			
24.	Label encoding of text data			
25.	Hot encoding of text data			

26.	Recording audio with PyAudio			
27.	Convert audio data buffer to ndArray			
28.	load image data and convert to ndarray			
29.	load LIDAR data and convert to ndarray			
30.	Load time series data and convert to ndarray			
Competent ☐		**Not Yet Competent** ☐		

Feedback to the Candidate		
In terms of complete competency, the candidate was found:	Competent	
	Not Yet Competent	
Candidate's Signature: ……**Assessor's Signature:** ……		

Test Yourself (Multiple Choice Questions)

MODULE 1

Question 01 Which of the following is contained in NumPy library?

A n-dimensional array object

B tools for integrating C/C++ and Fortran code

C fourier transform

D all of the Mentioned

Question 02 The _____ function returns its argument with a modified shape, whereas the _____ method modifies the array itself.

A reshape,resize

B resize,reshape

C reshape2,resize

D all of the Mentioned

Question 03 Which of the following function stacks 1D arrays as columns into a 2D array?

A row_stack

B column_stack

C com_stack

D all of the Mentioned

Question 04 ndarray is also known as the alias array.

A True

B False

C

D

Question 05 Which of the following method creates a new array object that looks at the same data

A view

B copy

C paste

D all of the Mentioned

Question 06 ndarray.dataitemSize is the buffer containing the actual elements of the array

A True

B False

C

D

Question 07 How would you join the two arrays of train and test sets?

A resulting_set = train_set.append(test_set)

B resulting_set = np.concatenate([train_set, test_set])

C resulting_set = np.vstack([train_set, test_set])

D None of these

Question 08 Correct syntax of the reshape() function in Numpy array python is

A array.reshape(shape)

B reshape(shape,array)

C reshape(array,shape)

D reshape(shape)

Question 09 How we can convert the Numpy array to the list in python?

A list(array)

B list.array

C array.list

D None of the above

Question 10 How we install Numpy in the system ?

A install numpy

B pip install python numpy

C pip install numpy

D pip install numpy python

Question 11 Numpy in the Python provides the

A Function

B Lambda function

C Type casting

D Array

Question 12 Which of the following is not valid to import the numpy module ?

A .import numpy as np

B import numpy as p

C import numpy as n

D None of the above

Answers:

Question 01 D

Question 02 A

Question 03 B

Question 04 A

Question 05 A

Question 06 A

Question 07 C

Question 08 C

Question 09 A

Question 10 C

Question 11 D

Question 12 D

Knowledge Assessment

Qualification	National Vocational Certificate Level 04 - Artificial Intelligence Data Technician
Competency Standard(s)	Scrape data from the web
Candidate Details	Name: ..... Registration/Roll Number: ..... Candidate Signature:..... .....
Assessment Outcome	COMPETENT ☐ NOT YET COMPETENT ☐ Name of the Assessor: ..... Assessor's code: ..... Signature of the Assessor: ....

Candidate's response is not required to be identical, but similar concepts and/or keywords must be used. Oral questioning may be used to clarify candidate understanding of topic and its application.			
Questions (Candidate confidently answered questions correctly and demonstrated understanding of the topics and their application)		**Satisfactory**	**Not Satisfactory**
1.	List eight HTML tags		
	<html>, <head>, <body>, <h1>, <h2>, <h3>, <h4>, <h5>, <h6>, <p>, <hr>, <a>, , , , <img>, ,		
2.	List four of the basic HTML tag attributes		
	id, class, style, data-x		
3.	Outline five methods of the requests module		
	delete, get, head, patch, post, put, request		
4.	Describe the properties and methods of requests.Response Object		

	apparent_encoding, close(), content, cookies, elapsed, encoding, headers, history, is_permanent_redirect, is_redirect, iter_content(), iter_lines(), json(), links, next, ok, raise_for_status(), reason, request, status_code, text, url		
5.	State what BeautifulSoap is used for as well as what Tag objects are.		
	The BeautifulSoup object itself represents the document as a whole. It has no name and no attributes. A Tag object corresponds to an XML or HTML tag in the original document. Tags have a lot of attributes and methods.		
6.	Describe how to use BeautifulSoap to navigate an XML/HTML document		
	The XML or HTML document tree can be navigate in for diffrent ways: Going down by navigating using tag names, .contents and .children, .descendants, .string, .strings and stripped_strings Going up by using .parent, .parents Going sideways by using .next_sibling and .previous_sibling, .next_siblings and .previous_siblings Going back and forth by using .next_element and .previous_element, .next_elements and .previous_elements		
7.	List two common methods in BeautifulSoap to search through the document tree		
	The two most popular methods for searching the document tree are: find() and find_all(). The find_all() method looks through a tag's descendants and retrieves all descendants that match your filters. The find() method finds only one result that match your filters.		
8.	Point out the different kinds of filters that we can use with find_all() method		
	A string		

	A regular expression A list True A function		
9.	State how we can read and write JSON data in python		
	Python has a built-in package called json, which can be used to work with JSON data. If you have a JSON string, you can parse it by using the json.loads() method. If you have a Python object, you can convert it into a JSON string by using the json.dumps() method.		
10.	Define XPath		
	XPath is a way of identifying nodes and content in an XML document structure (including HTML). You can create an XPath query to find specific tables, reference specific rows, or even find cells of a table with certain attributes.		

Knowledge Assessment

Qualification	National Vocational Certificate Level 04 - Artificial Intelligence Data Technician
Competency Standard(s)	Process Images through Image Processing software
Candidate Details	Name: ..... Registration/Roll Number: ..... Candidate Signature:..... .....
Assessment Outcome	COMPETENT ☐ NOT YET COMPETENT ☐ Name of the Assessor: ..... Assessor's code: ..... Signature of the Assessor: ....

Candidate's response is not required to be identical, but similar concepts and/or keywords must be used. Oral questioning may be used to clarify candidate understanding of topic and its application.			
Questions (Candidate confidently answered questions correctly and demonstrated understanding of the topics and their application)		**Satisfactory**	**Not Satisfactory**
1.	Which functions of the OpenCV module can be used to perform the thresholding operation?		
	cv2.threshold, cv2.adaptiveThreshold		
2.	What is the technique for blurring images?		
	Image blurring is achieved by convolving the image with a low-pass filter kernel.		
3.	Name three different filters that can be used for image blurring?		
	Averaging, Median and Gaussian		
4.	Name various morphological operations that can be performed on images?		

	Erosion, Dilation, Opening, Closing		
5.	What is Canny Edge Detection?		
	Canny Edge Detection is a popular edge detection algorithm. It was developed by John F. Canny		
6.	Which function can be used to perform Canny Edge Detection?		
	cv2.Canny		
7.	What is template matching?		
	Template Matching is a method for searching and finding the location of a template image in a larger image.		
8.	What function can be used to perform template matching?		
	cv2.matchTemplate		
9.	What is the purpose of GrabCut Algorithm?		
	GrabCut is an algorithm for foreground extraction with minimal user interaction		
10.	What is the purpose of cv2.cvtColor function?		
	The cv2.cvtColor function is used to perform color conversion.		

Knowledge Assessment

Qualification	National Vocational Certificate Level 04 - Artificial Intelligence Data Technician
Competency Standard(s)	Work with Data Manipulation Toolkit
Candidate Details	Name: ..... Registration/Roll Number: ..... Candidate Signature:..... .....
Assessment Outcome	COMPETENT ☐ NOT YET COMPETENT ☐ Name of the Assessor: ..... Assessor's code: ..... Signature of the Assessor: ....

Candidate's response is not required to be identical, but similar concepts and/or keywords must be used. Oral questioning may be used to clarify candidate understanding of topic and its application.

	Questions (Candidate confidently answered questions correctly and demonstrated understanding of the topics and their application)	**Satisfactory**	**Not Satisfactory**
1.	Describe how we can import a file in python script		
2.	Explain conditional statements (mask)		
3.	Summarize how we can sum two columns in a python script		
4.	List the different string level operations		
5.	Explain how to merge data in python		

6.	Describe what the library pandas is used for		
7.	List the different ways by which we handle missing data in python		
8.	Define vectors		
9.	Describe indexing within the context of arrays		
10.	List any three string operations		

Knowledge Assessment

Qualification	National Vocational Certificate Level 04 - Artificial Intelligence Data Technician
Competency Standard(s)	Work with Multidimensional Arrays' Manipulation and Computation Package
Candidate Details	Name: ..... Registration/Roll Number: ..... Candidate Signature:..... .....
Assessment Outcome	COMPETENT ☐ NOT YET COMPETENT ☐ Name of the Assessor: ..... Assessor's code: ..... Signature of the Assessor: ....

Candidate's response is not required to be identical, but similar concepts and/or keywords must be used. Oral questioning may be used to clarify candidate understanding of topic and its application.			
Questions (Candidate confidently answered questions correctly and demonstrated understanding of the topics and their application)		**Satisfactory**	**Not Satisfactory**
1.	Describe what a pickle file is used for		
	It is used for serializing and de-serializing a Python object structure. Any object in python can be pickled so that it can be saved on disk. What pickle does is that it "serialises" the object first before writing it to file. Pickling is a way to convert a python object (list, dict, etc.) into a character stream.		
2.	State the function which adds values to the end of an ndarray?		
	numpy.append function adds values at the end of an input array.		
3.	Describe the operation which is used to work with a subset of an array in python?		

	Indexing and Slicing are two of the most common operations that you need to be familiar with when working with Numpy arrays. You will use them when you would like to work with a subset of the array.		
4.	Write a basic program to slice an ndarray ?		
	import numpy as np a = np.arange(10) s = slice(2,7,2) print a[s]		
5.	Describe the bitwise binary operation on an ndarray		
	Binary operators acts on bits and performs bit by bit operation. Binary operation is simply a rule for combining two values to create a new value. numpy.bitwise_and() : This function is used to Compute the bit-wise AND of two array element-wise.		
6.	List ant three string operations on ndarrays?		
	numpy.lower() : This function returns the lowercase string from the given string. numpy.split() : This function returns a list of strings after breaking the given string by the specified separator. numpy.join() : This function is a string method and returns a string in which the elements of sequence have been joined by str separat		
7.	State the purpose of tile and repeat operations and write their syntax?		
	numpy.tile(A, reps):Construct an array by repeating A the number of times given by reps. numpy.repeat(a, repeats, axis=None): Repeat elements of an array.		
8.	Write the command to load text with complete syntax?		
	In Python numpy.load() is used load data from a text file, with aim to be a fast reader for simple text files. Syntax: numpy.loadtxt(fname, dtype='float', comments='#', delimiter=None, converters=None, skiprows=0, usecols=None, unpack=False, ndmin=0)		
9.	Explain the stacking function on an ndarray?		
	numpy.stack() function is used to join a sequence of same dimension arrays along a new axis.The axis parameter specifies the index of the new axis in the dimensions of the result. For example, if axis=0 it will be the first dimension and if axis=-1 it will be the last dimension.		
10.	Explain is the purpose of move, rol and swap operations on nd array with syntax?		

	moveaxis(a, source, destination) : Move axes of an array to new positions. rollaxis(a, axis[, start]): Roll the specified axis backwards, until it lies in a given position. swapaxes(a, axis1, axis2): Interchange two axes of an array.		

Self-Assessment Checklist

Candidate Name	
Registration No.	
Qualification	National Vocational Certificate Level 4 - Artificial Intelligence Data Technician
Competency Standards	• 061900931 Scrape data from the web • 061900932 Process Images through Image Processing software • 061900933 Work with Data Manipulation Toolkit • 061900934 Work with Multidimensional Arrays' Manipulation and Computation Package
Assessment Task	Create a python program that can scrape data of mobile phones from OLX website and export the data in a formatted and presentable way. The program must be able to do the Following: • Program should get the HTML of the page. • It should also extract useful information such the title of the website, product title, product image, product price and product URL. • It program should keep useful data in list form and convert it into a dataframe. • The product images should be converted into BMP and saved on disk. • The program should then clean up the dataframe. • Finally, the program should convert the dataframe into a csv file.

I can…….

Performance Criteria	**Yes**	**No**

1. Implement basic HTML tags		
2. Implement basic HTML attributes usage.		
3. Implement basic JavaScript behaviors.		
4. Perform inspection of a webpage.		
5. Create a basic webpage		
6. Set request headers.		
7. Set request cookie values where required		
8. Configure a driver to some browser as required		
9. Generate a request to webserver		
10. Load response stream		
11. Convert stream to page source/content		
12. Read response headers		
13. Perform installation of beautiful soup		
14. Import package into program		
15. Request a content to download		
16. Find required content from page source		
17. Append content		
18. Convert content to a data frame		
19. Export data		
20. Find tag by name		
21. Find tag by attribute values		
22. Navigate through values.		
23. Retrieve tag values		
24. Retrieve attribute values.		
25. Read xml/json file.		
26. Create xml/json object.		
27. Forward navigating through elements.		
28. Backward navigation through elements.		
29. Navigate through XPath.		
30. Read image from file		
31. Display an image from data		

32. Perform global threshold		
33. Perform adaptive thresholding		
34. Perform image sharpening		
35. Perform image blurring using averaging		
36. Perform image blurring using median		
37. Perform image blurring using Gaussian		
38. Perform image cropping		
39. Find image contours		
40. Creating 2D convolution filter		
41. Apply Laplacian filter for edge detection		
42. Apply X, Y Sobel filter on noisy images		
43. Apply canny edge detection filter		
44. Plot filtered images		
45. Perform RGB to greyscale conversion		
46. Perform RGB to HSV conversion		
47. Perform RGB to LAB colour conversion		
48. Perform RGB to YCrCb colour conversion		
49. Perform scaling operation on image		
50. Perform image translation		
51. Perform image rotation to any angle		
52. Perform affine transformation		
53. Perform image opening		
54. Perform image erosion		
55. Perform image dilation		
56. Perform image closing		
57. Perform morphological erosion		
58. Perform top hating on image		
59. Apply min max lock function		
60. Perform template based object matching		
61. Perform feature based object matching		
62. Perform area based object matching		

63. Apply grabcut technique for foreground extraction		
64. Prepare image mask of suitable size		
65. Apply image mask for foreground extraction		
66. Perform series of basic image operations to extract foreground		
67. Open a python script		
68. Import pandas		
69. Import a csv file using “read_csv” function		
70. Import an excel file using “read_excel” function		
71. Import from any other file type using appropriate “read” function		
72. Import data in a python script		
73. Index columns using a list of columns		
74. Index rows based on a list of index values		
75. Index rows based on a conditional statement (mask)		
76. Index columns based on a conditional statement (mask)		
77. Index columns based on a range of columns		
78. Index rows based on a range of index value		
79. Rename column		
80. Apply a function element-wise to a column using “apply”		
81. Get value counts of a column		
82. Get sum of values in a column		
83. Get basic stats of a column (mean/median/standard deviation etc.)		
84. Change type of a column		
85. Perform a vectorized arithmetic operation on a column		
86. Delete a column		
87. Duplicate a column		
88. Group values of a column and apply an operation on each group		
89. Count number of missing values in each column		
90. Fill missing values with a specific string		
91. Fill missing values with mean of the column		

92. Delete rows with missing values		
93. Convert a column to string		
94. Divide a column into two based on a separator		
95. Check if each row contains a specific substring		
96. Extract substring out of each row in a column		
97. Check if each row starts with a specific substring		
98. Replace a specific substring in each row in a column		
99. Change case of a string column		
100. Strip spaces from the sides of each row in a column		
101. Concatenate a value to each row in a column		
102. Concatenate another column with a string column elementwise		
103. Perform custom operations using “apply”		
104. Merge two data frames using merge functions		
105. Perform different types of joins on two dataframes		
106. Concatenate two or more dataframes row wise		
107. Concatenate two or more dataframes column wise		
108. Stack a dataframe		
109. Unstack a dataframe		
110. Create a pivot table		
111. Melt a dataframe		
112. Pivot a dataframe		
113. Count null values in a row		
114. Drop/select specific rows based on a condition		
115. Drop/select rows by index		
116. Reset index of rows		
117. Set a custom index of rows		
118. Read ndArray from pickle file		
119. Write ndArray to a pickle file		
120. Iterate over arrays		
121. Append elements to an ndArray		

122. Drop elements from ndArray		
123. Perform basic slicing and indexing on ndArray		
124. Index ndArray using a mask (Boolean array indexing)		
125. Index ndArray using integer array indexing		
126. Perform binary operations on arrays		
127. Perform string operations on arrays		
128. Perform comparison operations on arrays		
129. Change type of an array		
130. Slit arrays (split, dsplit, vsplit, hsplit)		
131. Tile arrays		
132. Rearrange array (reshape, roll, flip)		
133. Change dimensions with “reshape”		
134. Flatten array with “ravel”		
135. Move axis of an array		
136. Roll axis of an array		
137. Swap axes of an array		
138. Take transpose of an array		
139. Broadcast an array		
140. Concatenate arrays		
141. Stack arrays		
142. Stack 1D arrays as columns in a 2D array (column stack)		
143. Perform stacking on particular axes (dstack, hstack, vstack)		
144. Read text documents into variables		
145. Tokenize text documents		
146. Count number of unique words in a document		
147. Convert a text document into a label encoded array		
148. Encode a document phrase using one hot encoding		
149. Read Audio data as numpy array		
150. Read Image data as numpy array		
151. Read LIDAR data as numpy array		
152. Read Time Series data as numpy array		

Candidate’s Signature: …… Assessor’s Signature: ……...

Date: ……...

Instruction Sheet for the Candidate

Title of Qualification: National Vocational Certificate Level 4 – Artificial Intelligence Data Technician	CS Code:	Level: 04	Version: 02
Competency Standard Title: • Scrape data from the web • Process Images through Image Processing software • Work with Data Manipulation Toolkit • Work with Multidimensional Arrays' Manipulation and Computation Package	**Assessment Date (DD/MM/YY):**		

Candidate Details	Name: ..... Registration/Roll Number: .....
Guidance for Candidate	**To meet this standard, you are required to complete the following within the given time frame (for practical demonstration & assessment):** Create a python program that can scrape data of mobile phones from OLX website and export the data in a formatted and presentable way. The program must be able to do the Following: 1. Program should get the HTML of the page. 2. It should also extract useful information such the title of the website, product title, product image, product price and product URL. 3. It program should keep useful data in list form and convert it into a dataframe. 4. The product images should be converted into BMP and saved on disk. 5. The program should then clean up the dataframe. 6. Finally, the program should convert the dataframe into a csv file.
Time: 180 min	During a practical assessment, under observation by an assessor, you are required to create a webpage and python programs (details give in above task) demonstrating the following criteria:
Minimum Evidence Required	1. Implement basic HTML tags 2. Implement basic HTML attributes usage. 3. Implement basic JavaScript behaviors. 4. Perform inspection of a webpage. 5. Create a basic webpage 6. Set request headers. 7. Set request cookie values where required 8. Configure a driver to some browser as required 9. Generate a request to webserver 10. Load response stream 11. Convert stream to page source/content 12. Read response headers 13. Perform installation of beautiful soup 14. Import package into program 15. Request a content to download

	16. Find required content from page source 17. Append content 18. Convert content to a data frame 19. Export data 20. Find tag by name 21. Find tag by attribute values 22. Navigate through values. 23. Retrieve tag values 24. Retrieve attribute values. 25. Read xml/json file. 26. Create xml/json object. 27. Forward navigating through elements. 28. Backward navigation through elements. 29. Navigate through XPath. 30. Read image from file 31. Display an image from data 32. Perform global threshold 33. Perform adaptive thresholding 34. Perform image sharpening 35. Perform image blurring using averaging 36. Perform image blurring using median 37. Perform image blurring using Gaussian 38. Perform image cropping 39. Find image contours 40. Creating 2D convolution filter 41. Apply Laplacian filter for edge detection 42. Apply X, Y Sobel filter on noisy images 43. Apply canny edge detection filter 44. Plot filtered images 45. Perform RGB to greyscale conversion 46. Perform RGB to HSV conversion 47. Perform RGB to LAB colour conversion 48. Perform RGB to YCrCb colour conversion 49. Perform scaling operation on image 50. Perform image translation 51. Perform image rotation to any angle 52. Perform affine transformation 53. Perform image opening 54. Perform image erosion 55. Perform image dilation 56. Perform image closing 57. Perform morphological erosion 58. Perform top hating on image 59. Apply min max lock function 60. Perform template based object matching 61. Perform feature based object matching 62. Perform area based object matching 63. Apply grabcut technique for foreground extraction 64. Prepare image mask of suitable size 65. Apply image mask for foreground extraction 66. Perform series of basic image operations to extract foreground 67. Open a python script 68. Import pandas 69. Import a csv file using “read_csv” function 70. Import an excel file using “read_excel” function 71. Import from any other file type using appropriate “read” function 72. Import data in a python script 73. Index columns using a list of columns 74. Index rows based on a list of index values 75. Index rows based on a conditional statement (mask)

	76. Index columns based on a conditional statement (mask) 77. Index columns based on a range of columns 78. Index rows based on a range of index value 79. Rename column 80. Apply a function element-wise to a column using “apply” 81. Get value counts of a column 82. Get sum of values in a column 83. Get basic stats of a column (mean/median/standard deviation etc.) 84. Change type of a column 85. Perform a vectorized arithmetic operation on a column 86. Delete a column 87. Duplicate a column 88. Group values of a column and apply an operation on each group 89. Count number of missing values in each column 90. Fill missing values with a specific string 91. Fill missing values with mean of the column 92. Delete rows with missing values 93. Convert a column to string 94. Divide a column into two based on a separator 95. Check if each row contains a specific substring 96. Extract substring out of each row in a column 97. Check if each row starts with a specific substring 98. Replace a specific substring in each row in a column 99. Change case of a string column 100. Strip spaces from the sides of each row in a column 101. Concatenate a value to each row in a column 102. Concatenate another column with a string column elementwise 103. Perform custom operations using “apply” 104. Merge two data frames using merge functions 105. Perform different types of joins on two dataframes 106. Concatenate two or more dataframes row wise 107. Concatenate two or more dataframes column wise 108. Stack a dataframe 109. Unstack a dataframe 110. Create a pivot table 111. Melt a dataframe 112. Pivot a dataframe 113. Count null values in a row 114. Drop/select specific rows based on a condition 115. Drop/select rows by index 116. Reset index of rows 117. Set a custom index of rows 118. Read ndArray from pickle file 119. Write ndArray to a pickle file 120. Iterate over arrays 121. Append elements to an ndArray 122. Drop elements from ndArray 123. Perform basic slicing and indexing on ndArray 124. Index ndArray using a mask (Boolean array indexing) 125. Index ndArray using integer array indexing 126. Perform binary operations on arrays 127. Perform string operations on arrays 128. Perform comparison operations on arrays 129. Change type of an array 130. Slit arrays (split, dsplit, vsplit, hsplit) 131. Tile arrays 132. Rearrange array (reshape, roll, flip) 133. Change dimensions with “reshape” 134. Flatten array with “ravel” 135. Move axis of an array

	136.	Roll axis of an array
	137.	Swap axes of an array
	138.	Take transpose of an array
	139.	Broadcast an array
	140.	Concatenate arrays
	141.	Stack arrays
	142.	Stack 1D arrays as columns in a 2D array (column stack)
	143.	Perform stacking on particular axes (dstack, hstack, vstack)
	144.	Read text documents into variables
	145.	Tokenize text documents
	146.	Count number of unique words in a document
	147.	Convert a text document into a label encoded array
	148.	Encode a document phrase using one hot encoding
	149.	Read Audio data as numpy array
	150.	Read Image data as numpy array
	151.	Read LIDAR data as numpy array
	152.	Read Time Series data as numpy array

Assessors Judgment Guide (to be completed by the Assessor and signed both by the assessor and the candidate after the assessment)

Qualification	National Vocational Certificate Level 04 - Artificial Intelligence Data Technician
Competency Standard(s)	Use Word Processor
Candidate Details	Name: ..... Registration/Roll Number: ..... Candidate Signature: ....
Assessment Outcome	COMPETENT ☐ NOT YET COMPETENT ☐ Name of the Assessor:..... Assessor's code: ..... Signature of the Assessor:..... .....

Assessment Summary (to be filled by the assessor)							
Activity	**Method**					**Result**	
Nature of Activity	Written	Oral	Observation	Portfolio	Role Play	Competent	Not Yet Competent
Practical Skill Demonstration			✓				
Knowledge Assessment		✓					
Other Requirement							

Observation Checklist

Assessment Task	Description of assessment
Assessment Task 1	Create a python program that can scrape data of mobile phones from OLX website and export the data in a formatted and presentable way. The program must be able to do the Following: • Program should get the HTML of the page. • It should also extract useful information such the title of the website, product title, product image, product price and product URL. • It program should keep useful data in list form and convert it into a dataframe. • The product images should be converted into BMP and saved on disk. • The program should then clean up the dataframe. • Finally, the program should convert the dataframe into a csv file.

	During the practical assessment, candidate demonstrated the following:	**Yes**	**No**	**Remarks**
1.	Implement basic HTML tags			
2.	Implement basic HTML attributes usage.			
3.	Implement basic JavaScript behaviors.			
4.	Perform inspection of a webpage.			
5.	Create a basic webpage			
6.	Set request headers.			
7.	Set request cookie values where required			
8.	Configure a driver to some browser as required			
9.	Generate a request to webserver			
10.	Load response stream			
11.	Convert stream to page source/content			
12.	Read response headers			
13.	Perform installation of beautiful soup			
14.	Import package into program			
15.	Request a content to download			
16.	Find required content from page source			
17.	Append content			
18.	Convert content to a data frame			

19.	Export data			
20.	Find tag by name			
21.	Find tag by attribute values			
22.	Navigate through values.			
23.	Retrieve tag values			
24.	Retrieve attribute values.			
25.	Read xml/json file.			
26.	Create xml/json object.			
27.	Forward navigating through elements.			
28.	Backward navigation through elements.			
29.	Navigate through XPath.			
30.	Implement basic HTML tags			
31.	Implement basic HTML attributes usage.			
32.	Implement basic JavaScript behaviors.			
33.	Perform inspection of a webpage.			
34.	Create a basic webpage			
35.	Set request headers.			
36.	Set request cookie values where required			
37.	Configure a driver to some browser as required			
38.	Generate a request to webserver			
39.	Load response stream			
40.	Convert stream to page source/content			
41.	Read response headers			
42.	Perform installation of beautiful soup			
43.	Import package into program			
44.	Request a content to download			
45.	Find required content from page source			
46.	Append content			
47.	Convert content to a data frame			
48.	Export data			

49.	Find tag by name			
50.	Find tag by attribute values			
51.	Navigate through values.			
52.	Retrieve tag values			
53.	Retrieve attribute values.			
54.	Read xml/json file.			
55.	Create xml/json object.			
56.	Forward navigating through elements.			
57.	Backward navigation through elements.			
58.	Navigate through XPath.			
59.	Read image from file			
60.	Display an image from data			
61.	Perform global threshold			
62.	Perform adaptive thresholding			
63.	Perform image sharpening			
64.	Perform image blurring using averaging			
65.	Perform image blurring using median			
66.	Perform image blurring using Gaussian			
67.	Perform image cropping			
68.	Find image contours			
69.	Creating 2D convolution filter			
70.	Apply Laplacian filter for edge detection			
71.	Apply X, Y Sobel filter on noisy images			
72.	Apply canny edge detection filter			
73.	Plot filtered images			
74.	Perform RGB to greyscale conversion			
75.	Perform RGB to HSV conversion			
76.	Perform RGB to LAB colour conversion			
77.	Perform RGB to YCrCb colour conversion			
78.	Perform scaling operation on image			

79.	Perform image translation			
80.	Perform image rotation to any angle			
81.	Perform affine transformation			
82.	Perform image opening			
83.	Perform image erosion			
84.	Perform image dilation			
85.	Perform image closing			
86.	Perform morphological erosion			
87.	Perform top hating on image			
88.	Apply min max lock function			
89.	Perform template based object matching			
90.	Perform feature based object matching			
91.	Perform area based object matching			
92.	Apply grabcut technique for foreground extraction			
93.	Prepare image mask of suitable size			
94.	Apply image mask for foreground extraction			
95.	Perform series of basic image operations to extract foreground			
96.	Open a python script			
97.	Import pandas			
98.	Import a csv file using “read_csv” function			
99.	Import an excel file using “read_excel” function			
100.	Import from any other file type using appropriate “read” function			
101.	Import data in a python script			
102.	Index columns using a list of columns			
103.	Index rows based on a list of index values			
104.	Index rows based on a conditional statement (mask)			
105.	Index columns based on a conditional statement (mask)			

106.	Index columns based on a range of columns			
107.	Index rows based on a range of index value			
108.	Rename column			
109.	Apply a function element-wise to a column using “apply”			
110.	Get value counts of a column			
111.	Get sum of values in a column			
112.	Get basic stats of a column (mean/median/standard deviation etc.)			
113.	Change type of a column			
114.	Perform a vectorized arithmetic operation on a column			
115.	Delete a column			
116.	Duplicate a column			
117.	Group values of a column and apply an operation on each group			
118.	Count number of missing values in each column			
119.	Fill missing values with a specific string			
120.	Fill missing values with mean of the column			
121.	Delete rows with missing values			
122.	Convert a column to string			
123.	Divide a column into two based on a separator			
124.	Check if each row contains a specific substring			
125.	Extract substring out of each row in a column			
126.	Check if each row starts with a specific substring			
127.	Replace a specific substring in each row in a column			
128.	Change case of a string column			
129.	Strip spaces from the sides of each row in a column			
130.	Concatenate a value to each row in a column			
131.	Concatenate another column with a string column elementwise			

132.	Perform custom operations using “apply”			
133.	Merge two data frames using merge functions			
134.	Perform different types of joins on two dataframes			
135.	Concatenate two or more dataframes row wise			
136.	Concatenate two or more dataframes column wise			
137.	Stack a dataframe			
138.	Unstack a dataframe			
139.	Create a pivot table			
140.	Melt a dataframe			
141.	Pivot a dataframe			
142.	Count null values in a row			
143.	Drop/select specific rows based on a condition			
144.	Drop/select rows by index			
145.	Reset index of rows			
146.	Set a custom index of rows			
147.	Read ndArray from pickle file			
148.	Write ndArray to a pickle file			
149.	Iterate over arrays			
150.	Append elements to an ndArray			
151.	Drop elements from ndArray			
152.	Perform basic slicing and indexing on ndArray			

Competent ☐	**Not Yet Competent** ☐

Feedback to the Candidate		
In terms of complete competency, the candidate was found:	Competent	
	Not Yet Competent	
Candidate's Signature: ……**Assessor's Signature:** ……		

Test Yourself (Multiple Choice Questions)

MODULE 1

Question 1 What is the correct HTML for creating a hyperlink?

A W3Schools

B <a>http://www.w3schools.com

C W3Schools

D W3Schools

Question 2 Which of these elements are all <table> elements?

A <table><tr><td>

B <table><tr><tt>

C <table><head><tfoot>

D <thead><body

Question 3 When trying to get or retrieve data from a specified resource, what HTTP method is used?

A POST

B GET

C HEAD

D CONNECT

Question 4 Which property of the requests.Response object returns the content of the response, in bytes?

A encoding

B request

C content

D cookies

Question 5 Which of the following objects from BeautifulSoup package represent the whole HTML document?

A Tag

B NavigableString

C BeautifulSoup

D Comment

Question 6 Which attribute provided by BeautifulSoup can be used to navigate the HTML document sideways?

A .children

B .parent

C .next_sibling

D .next_element

Question 7 Which of the following filter will be passed to the find methods of BeautifulSoup to filter against a sequence of characters that define a search pattern?

A string

B regular expression

C list

D function

Question 8 Which argument will you use if you want the find_all() method to only consider tags with certain names?

A name

B attrs

C recursive

D string

Question 9 When you convert from Python to JSON, Python tuple are converted into the JSON (JavaScript) equivalent:

A Object

B Array

C String

D Number

Question 10 Which method will you use to serialize obj to a JSON formatted str?

A dump

B dumps

C load

D Loads

Test Yourself (Multiple Choice Questions)

MODULE 2

Question 01	Which is default missing value in pandas dataframe.	A Not Found B NULL C NAN D NaN
Question 02	Which of the following is not the accepted in dataframes directly?	A Fixed Sized arrays B Series C 3-dimensional array D Structured data
Question 03	Mark the wrong statement	A Primary difference between Series and ndarray is operations between Series automatically align the data based on label B NumPy methods accepting an ndarray can also accept Series instead. C DataFrame behaves as fixed-size dict where you can get and set values through index labels D DataFrames can be exported as excel files.
Question 04	Which of the following works analogously to the form of the dict constructor?	A DataFrame.from_items B DataFrame.from_records C DataFrame.from_dict D DataFrame.Init

Question 05	Pandas allows to load range of columns at initialize level.	A True B False C D
Question 06	Consider following lists a = [1,2,3,4,5] b = [6,7,8,9] Output: a = [1,2,3,4,5,6,7,8,9] to show a and b in one dimension we will use?	A a.extend(b) B a.append(b) C a.merge(b) D a.concatinate(b)
Question 07	**A = [1, 0, 0** **0, 1, 0** **0, 0, 1]** to create above matrix we will use	A np.array([1, 0, 0], [0, 1, 0], [0, 0, 1]) B Ndarray(3) C np.eye(3) D identity(3)
Question 08	What is output of following. D = {1 : 1, 2 : '2', '1' : 1, '2' : 3} D['1'] = 2 print(D[D[D[str(D[1])]]])	A ‘1’ B ‘2’ C 3 D KeyError

Question 09	We can perform Melt over dataFrame using	A Single variable only B Using single index only C Using multiple variables D Using Fixed variable.
Question 10	Return of read_csv is	A dataframe B list C Ndarray D Type(None)

MODULE 3

Question 01	Which of the following is contained in NumPy library?	A n-dimensional array object B tools for integrating C/C++ and Fortran code C fourier transform D all of the Mentioned
Question 02	The _____ function returns its argument with a modified shape, whereas the _____ method modifies the array itself.	A reshape,resize B resize,reshape C reshape2,resize D all of the Mentioned

Question 03 Which of the following function stacks 1D arrays as columns into a 2D array?

A row_stack

B column_stack

C com_stack

D all of the Mentioned

Question 04 ndarray is also known as the alias array.

A True

B False

C

D

Question 05 Which of the following method creates a new array object that looks at the same data

A view

B copy

C paste

D all of the Mentioned

Question 06 ndarray.dataitemSize is the buffer containing the actual elements of the array

A True

B False

C

D

Question 07 **How would you join the two arrays of train and test sets?**

A resulting_set = train_set.append(test_set)

B resulting_set = np.concatenate([train_set, test_set])

C resulting_set = np.vstack([train_set, test_set])

D None of these

Question 08 Correct syntax of the reshape() function in Numpy array python is

A array.reshape(shape)

B reshape(shape,array)

C reshape(array,shape)

D reshape(shape)

Question 09 How we can convert the Numpy array to the list in python?

A list(array)

B list.array

C array.list

D None of the above

Question 10 How we install Numpy in the system ?

A install numpy

B pip install python numpy

C pip install numpy

D pip install numpy python

Question 11 Numpy in the Python provides the

A Function

B Lambda function

C Type casting

D Array

Question 12 Which of the following is not valid to import the numpy module ?

A .import numpy as np

B import numpy as p

C import numpy as n

D None of the above

Module 1 Answers:

Question 01	**A**	**W3Schools**
Question 02	**A**	**<table><tr><td>**
Question 03	**B**	**GET**
Question 04	**C**	**content**
Question 05	**C**	**BeautifulSoup**
Question 06	**C**	**.next_sibling**
Question 07	**B**	**regular expression**
Question 08	**A**	**name**
Question 09	**B**	**Array**
Question 10	**B**	**dumps**

Module 2 Answers:

Question 1	D	Question 2	C
Question 3	C	Question 4	A
Question 5	A	Question 6	A
Question 7	D	Question 8	C
Question 9	C	Question 10	A

Module 3 Answers:

Question 01 D

Question 02 A

Question 03 B

Question 04 A

Question 05 A

Question 06 A

Question 07 C

Question 08 C

Question 09 A

Question 10 C

Question 11 D

Question 12 D

Knowledge Assessment

Qualification	National Vocational Certificate Level 04 - Artificial Intelligence Data Technician
Competency Standard(s)	• Scrape data from the web • Process Images through Image Processing software • Work with Data Manipulation Toolkit • Work with Multidimensional Arrays' Manipulation and Computation Package
Candidate Details	Name: ..... Registration/Roll Number: ..... Candidate Signature:..... .....
Assessment Outcome	COMPETENT ☐ NOT YET COMPETENT ☐ Name of the Assessor: ..... Assessor's code: ..... Signature of the Assessor: ....

Candidate's response is not required to be identical, but similar concepts and/or keywords must be used. Oral questioning may be used to clarify candidate understanding of topic and its application.

	Questions (Candidate confidently answered questions correctly and demonstrated understanding of the topics and their application)	**Satisfactory**	**Not Satisfactory**
1.	List eight HTML tags		
	<html>, <head>, <body>, <h1>, <h2>, <h3>, <h4>, <h5>, <h6>, <p>, <hr>, <a>, , , , <img>, ,		
2.	List four of the basic HTML tag attributes		
	id, class, style, data-x		
3.	Outline five methods of the requests module		
	delete, get, head, patch, post, put, request		
4.	Describe the properties and methods of requests.Response Object		
	apparent_encoding, close(), content, cookies, elapsed, encoding, headers, history, is_permanent_redirect, is_redirect, iter_content(), iter_lines(), json(), links, next,		

	ok, raise_for_status(), reason, request, status_code, text, url		
5.	State what BeautifulSoap is used for as well as what Tag objects are.		
	The BeautifulSoup object itself represents the document as a whole. It has no name and no attributes. A Tag object corresponds to an XML or HTML tag in the original document. Tags have a lot of attributes and methods.		
6.	Describe how to use BeautifulSoap to navigate an XML/HTML document		
	The XML or HTML document tree can be navigate in for diffrent ways: Going down by navigating using tag names, .contents and .children, .descendants, .string, .strings and stripped_strings Going up by using .parent, .parents Going sideways by using .next_sibling and .previous_sibling, .next_siblings and .previous_siblings Going back and forth by using .next_element and .previous_element, .next_elements and .previous_elements		
7.	List two common methods in BeautifulSoap to search through the document tree		
	The two most popular methods for searching the document tree are: find() and find_all(). The find_all() method looks through a tag's descendants and retrieves all descendants that match your filters. The find() method finds only one result that match your filters.		
8.	Point out the different kinds of filters that we can use with find_all() method		
	A string A regular expression A list True A function		
9.	State how we can read and write JSON data in python		

	Python has a built-in package called json, which can be used to work with JSON data. If you have a JSON string, you can parse it by using the json.loads() method. If you have a Python object, you can convert it into a JSON string by using the json.dumps() method.		
10.	Define XPath		
	XPath is a way of identifying nodes and content in an XML document structure (including HTML). You can create an XPath query to find specific tables, reference specific rows, or even find cells of a table with certain attributes.		
11.	Which functions of the OpenCV module can be used to perform the thresholding operation?		
	cv2.threshold, cv2.adaptiveThreshold		
12.	What is the technique for blurring images?		
	Image blurring is achieved by convolving the image with a low-pass filter kernel.		
13.	Name three different filters that can be used for image blurring?		
	Averaging, Median and Gaussian		
14.	Name various morphological operations that can be performed on images?		
	Erosion, Dilation, Opening, Closing		
15.	What is Canny Edge Detection?		
	Canny Edge Detection is a popular edge detection algorithm. It was developed by John F. Canny		
16.	Which function can be used to perform Canny Edge Detection?		
	cv2.Canny		
17.	What is template matching?		
	Template Matching is a method for searching and finding the location of a template image in a larger image.		
18.	What function can be used to perform template matching?		
	cv2.matchTemplate		
19.	What is the purpose of GrabCut Algorithm?		
	GrabCut is an algorithm for foreground extraction with minimal user interaction		
20.	What is the purpose of cv2.cvtColor function?		
	The cv2.cvtColor function is used to perform color conversion.		

21.	Describe how we can import a file in python script		
22.	Explain conditional statements (mask)		
23.	Summarize how we can sum two columns in a python script		
24.	List the different string level operations		
25.	Explain how to merge data in python		
26.	Describe what the library pandas is used for		
27.	List the different ways by which we handle missing data in python		
28.	Define vectors		
29.	Describe indexing within the context of arrays		
30.	List any three string operations		
31.	Describe what a pickle file is used for		
	It is used for serializing and de-serializing a Python object structure. Any object in python can be pickled so that it can be saved on disk. What pickle does is that it “serialises” the object first before writing it to file. Pickling is a way to convert a python object (list, dict, etc.) into a character stream.		
32.	State the function which adds values to the end of an ndarray?		
	numpy.append function adds values at the end of an input array.		

33.	Describe the operation which is used to work with a subset of an array in python?		
	Indexing and Slicing are two of the most common operations that you need to be familiar with when working with Numpy arrays. You will use them when you would like to work with a subset of the array.		
34.	Write a basic program to slice an ndarray ?		
	import numpy as np a = np.arange(10) s = slice(2,7,2) print a[s]		
35.	Describe the bitwise binary operation on an ndarray		
	Binary operators acts on bits and performs bit by bit operation. Binary operation is simply a rule for combining two values to create a new value. numpy.bitwise_and() : This function is used to Compute the bit-wise AND of two array element-wise.		
36.	List ant three string operations on ndarrays?		
	numpy.lower() : This function returns the lowercase string from the given string. numpy.split() : This function returns a list of strings after breaking the given string by the specified separator. numpy.join() : This function is a string method and returns a string in which the elements of sequence have been joined by str separat		
37.	State the purpose of tile and repeat operations and write their syntax?		
	numpy.tile(A, reps):Construct an array by repeating A the number of times given by reps. numpy.repeat(a, repeats, axis=None): Repeat elements of an array.		
38.	Write the command to load text with complete syntax?		
	In Python numpy.load() is used load data from a text file, with aim to be a fast reader for simple text files. Syntax: numpy.loadtxt(fname, dtype='float', comments='#', delimiter=None, converters=None, skiprows=0, usecols=None, unpack=False, ndmin=0)		
39.	Explain the stacking function on an ndarray?		
	numpy.stack() function is used to join a sequence of same dimension arrays along a new axis.The axis parameter specifies the index of the new axis in the dimensions of the result. For example, if axis=0 it will be the first dimension and if axis=-1 it will be the last dimension.		
40.	Explain is the purpose of move, rol and swap operations on nd array with syntax?		

	moveaxis(a, source, destination) : Move axes of an array to new positions. rollaxis(a, axis[, start]): Roll the specified axis backwards, until it lies in a given position. swapaxes(a, axis1, axis2): Interchange two axes of an array.		

National Vocational and Technical Training Commission (NAVTTC)

Plot 38, Kirthar Road, Sector H-9/4, Islamabad, Pakistan
+92 51 9044 322
+92 51 9044 322
info@navttc.org
www.navttc.org