Ain Shams University

Faculty Of Engineering

CSE 365

Computer Vision

OCR Final Project

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Contents

List of Figures:

Solution :

```
import cv2
import numpy as np
import math


def rotateImage(image, angle): # image rotation function by calculating the center of
the image and then rotate it
    image_center = tuple(np.array(image.shape[1::-1]) / 2) # calculating the center
of image
    rot_mat = cv2.getRotationMatrix2D(image_center, angle, 1.0) # calculating the
suitable rotation matrix
    result = cv2.warpAffine(image, rot_mat, image.shape[1::-1],
flags=cv2.INTER_LINEAR) # Getting the final image as a result
    return result


file = open("Output.txt","w+") # Opening the output file to use it
img = cv2.imread('test_sample2.jpg', 0) # Reading the input image
img = cv2.resize(img,(481,680)) # Resizing the image
img = cv2.bitwise_not(img) # Inverting the image to be ready for applying some
operations

img_edges = cv2.Canny(img, 100, 100, apertureSize=3) # Edge detection
lines = cv2.HoughLinesP(img_edges, 1, math.pi / 180.0, 100, minLineLength=50,
maxLineGap=5) # Line detection
angles = []
for x1, y1, x2, y2 in lines[0]:

    angle = math.degrees(math.atan2(y2 - y1, x2 - x1)) # Calculating the angle of
rotation by calculating slope
    angles.append(angle)

median_angle = np.median(angles) # Getting the angle value to rotate the image

img = rotateImage(img,median_angle) # Image rotation function by passing the image
and the angle calculated before
img = cv2.resize(img,(481,680)) # Resizing again after rotation

ret, thresh = cv2.threshold(img,235,255,cv2.THRESH_BINARY) # Applying thresholding on
the image to get the needed information only
kernel = cv2.getStructuringElement(cv2.MORPH_ELLIPSE,(3,3))
eroded = cv2.erode(thresh,kernel)
eroded = cv2.dilate(eroded,kernel) # erosion to make sure there is no noise

answers = cv2.connectedComponentsWithStats(eroded, 4, cv2.CV_32S) # Function to
detect the components in the image after thresholding
answers = answers[2]
answers = answers[1:23]
j = 0
Question_no =
"1.1","1.2","1.3","1.4","1.5","2.1","2.2","2.3","2.4","2.5","2.6","3.1","3.2","3.3","
4.1","4.2","4.3",\
              "5.1","5.2"
```

```
for i in answers: # printing the answers detected from the image
    if i[1] == answers[0][1]:
        if (i[0] >= 353) & (i[0] <= 391):
            file.write("Gender: Male \r\n")
        elif (i[0] >= 392) & (i[0] <= 446):
            file.write("Gender: Female \r\n")
    if i[1] == answers[1][1]:
        # Continue semester values
        if (i[0] >= 145) & (i[0] <= 185):
            file.write("Semester: Fall \r\n")
        if (i[0] >= 190) & (i[0] <= 260):
            file.write("Semester: Spring \r\n")
        if (i[0] >= 290) & (i[0] <= 350):
            file.write("Semester: Summer \r\n")
    if i[1] == answers[2][1]:
        # Program value
        if (i[0] >= 120) & (i[0] <= 150) & ~(i[1] >= 140):
            file.write("Program: MCTA
\r\n========================================================================== \r\n"

"========================================================================== \r\n")  #
done
        if (i[0] >= 159) & (i[0] <= 189) & ~(i[1] >= 140):
            file.write("Program: ENVER
\r\n========================================================================== \r\n"

"========================================================================== \r\n")  #
done
        if (i[0] >= 198) & (i[0] <= 228) & ~(i[1] >= 140):
            file.write("Program: BLDG
\r\n========================================================================== \r\n"

"========================================================================== \r\n")  #
done
        if (i[0] >= 237) & (i[0] <= 277) & ~(i[1] >= 140):
            file.write("Program: CESS
\r\n========================================================================== \r\n"

"========================================================================== \r\n")  #
done
        if (i[0] >= 275) & (i[0] <= 305) & ~(i[1] >= 140):
            file.write("Program: ERGY
\r\n========================================================================== \r\n"

"========================================================================== \r\n")  #
done
        if (i[0] >= 307) & (i[0] <= 337) & ~(i[1] >= 140):
            file.write("Program: COMM
\r\n========================================================================== \r\n"

"========================================================================== \r\n")  #
done
        if (i[0] >= 354) & (i[0] <= 384) & ~(i[1] >= 140):
            file.write("Program: MANF
\r\n========================================================================== \r\n"
```

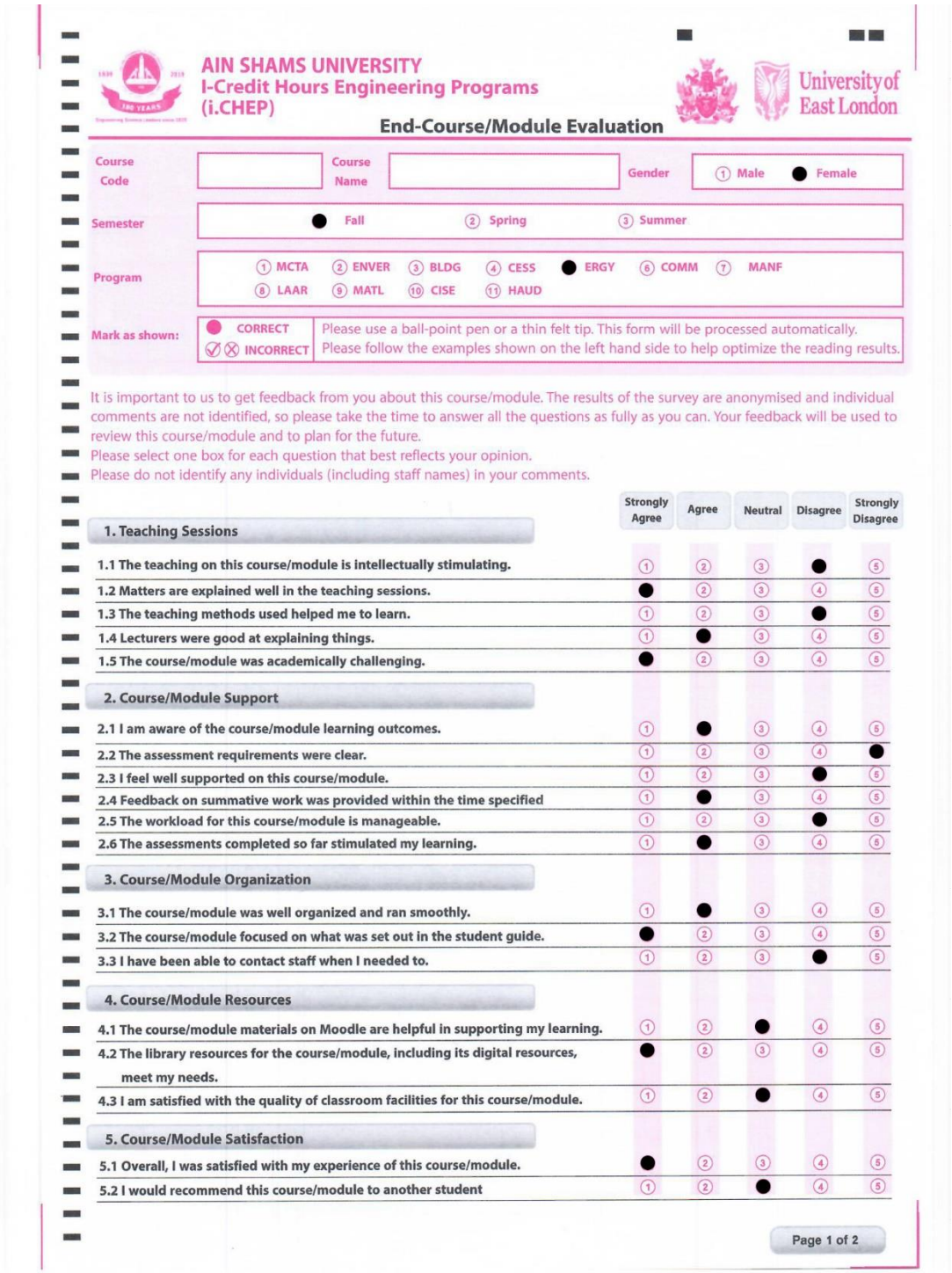
```
"========================================================================== \r\n")  #
done
        if (i[0] >= 120) & (i[0] <= 150) & (i[1] >= 140):
            file.write("Program: LAAR
\r\n========================================================================== \r\n"

"========================================================================== \r\n")  #
done
        if (i[0] >= 159) & (i[0] <= 189) & (i[1] >= 140):
            file.write("Program: MATL
\r\n========================================================================== \r\n"

"========================================================================== \r\n")  #
done
        if (i[0] >= 198) & (i[0] <= 228) & (i[1] >= 140):
            file.write("Program: CISE
\r\n========================================================================== \r\n"

"========================================================================== \r\n")  #
done
        if (i[0] >= 237) & (i[0] <= 277) & (i[1] >= 140):
            file.write("Program: HAUD
\r\n========================================================================== \r\n"

"========================================================================== \r\n")  #
done

    while (j != 19) & (i[1] >= answers[3][1]):
        if i[1] == answers[j+3][1]:
            # Questions
            if (i[0] >= 310) & (i[0] <= 340):
                file.write("Question"+Question_no[j] + " : Strongly Agree
\r\n========================================================================== \r\n")
                j += 1
                break
            if (i[0] >= 341) & (i[0] <= 371):
                file.write("Question"+Question_no[j] + " : Agree
\r\n========================================================================== \r\n")
                j += 1
                break
            if (i[0] >= 372) & (i[0] <= 402):
                file.write("Question"+Question_no[j] + " : Neutral
\r\n========================================================================== \r\n")
                j += 1
                break
            if (i[0] >= 403) & (i[0] <= 433):
                file.write("Question"+Question_no[j] + " : Disagree
\r\n========================================================================== \r\n")
                j += 1
                break
            if (i[0] >= 434) & (i[0] <= 474):
                file.write("Question"+Question_no[j] + " : Strongly Disagree
\r\n========================================================================== \r\n")
                j += 1
```

```
                break
file.close()
cv2.waitKey(0)
cv2.destroyAllWindows()
```

Steps to reach the output :

1. After reading the input image , first resizing the image to make sure that any image has the same size so as the algorithm will work on any image size
2. Then checking if the image is rotated and detect the angle of rotation and the direction of rotation by calculating the slope
3. After rotating the image , thresholding is applied to remove any un-wanted data and focus on the needed features only
4. Finally assigning ranges for each question on the X-AXIS and Y-AXIS to be able to know the answer

Test Cases 1 :



AIN SHAMS UNIVERSITY
I-Credit Hours Engineering Programs
(i.CHEP)

University of East London

End-Course/Module Evaluation

Course Code: | Course Name: | Gender: (1) Male ● Female

Semester: (1) ● Fall (2) Spring (3) Summer

Program: (1) MCTA (2) ENVER (3) BLDG (4) CESS ● ERGY (6) COMM (7) MANF (8) LAAR (9) MATL (10) CISE (11) HAUD

Mark as shown: ● CORRECT ⊘ ⊗ INCORRECT

Please use a ball-point pen or a thin felt tip. This form will be processed automatically.
Please follow the examples shown on the left hand side to help optimize the reading results.

It is important to us to get feedback from you about this course/module. The results of the survey are anonymised and individual comments are not identified, so please take the time to answer all the questions as fully as you can. Your feedback will be used to review this course/module and to plan for the future.
Please select one box for each question that best reflects your opinion.
Please do not identify any individuals (including staff names) in your comments.

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
1. Teaching Sessions					
1.1 The teaching on this course/module is intellectually stimulating.	1	2	3	●	5
1.2 Matters are explained well in the teaching sessions.	●	2	3	4	5
1.3 The teaching methods used helped me to learn.	1	2	3	●	5
1.4 Lecturers were good at explaining things.	1	●	3	4	5
1.5 The course/module was academically challenging.	●	2	3	4	5
2. Course/Module Support					
2.1 I am aware of the course/module learning outcomes.	1	●	3	4	5
2.2 The assessment requirements were clear.	1	2	3	4	●
2.3 I feel well supported on this course/module.	1	2	3	●	5
2.4 Feedback on summative work was provided within the time specified	1	●	3	4	5
2.5 The workload for this course/module is manageable.	1	2	3	●	5
2.6 The assessments completed so far stimulated my learning.	1	●	3	4	5
3. Course/Module Organization					
3.1 The course/module was well organized and ran smoothly.	1	●	3	4	5
3.2 The course/module focused on what was set out in the student guide.	●	2	3	4	5
3.3 I have been able to contact staff when I needed to.	1	2	3	●	5
4. Course/Module Resources					
4.1 The course/module materials on Moodle are helpful in supporting my learning.	1	2	●	4	5
4.2 The library resources for the course/module, including its digital resources, meet my needs.	●	2	3	4	5
4.3 I am satisfied with the quality of classroom facilities for this course/module.	1	2	●	4	5
5. Course/Module Satisfaction					
5.1 Overall, I was satisfied with my experience of this course/module.	●	2	3	4	5
5.2 I would recommend this course/module to another student	1	2	●	4	5

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Figure 1 Test Sample 1

Output for testcase 1:

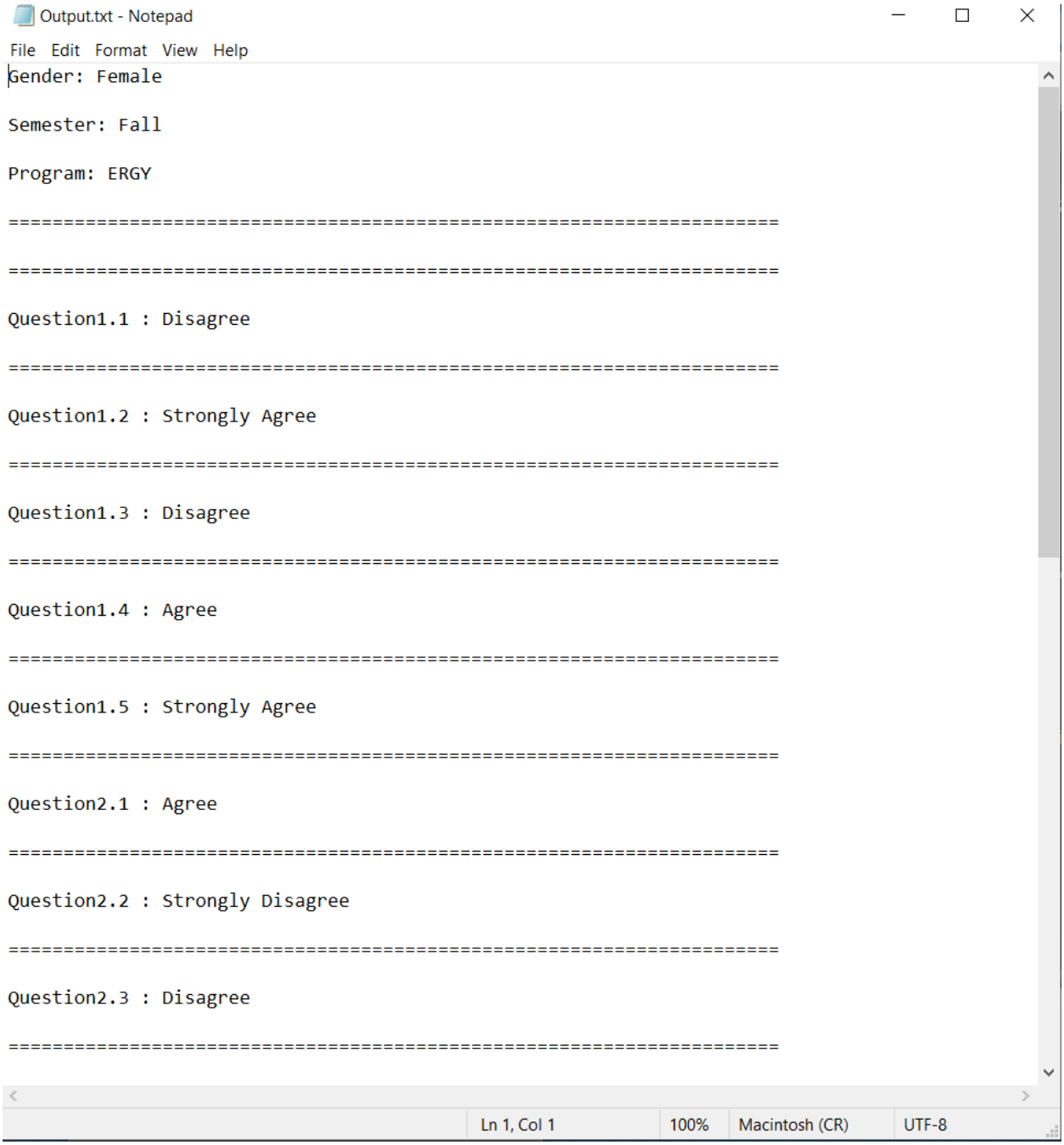


Figure 2 Test Case 1 Output File

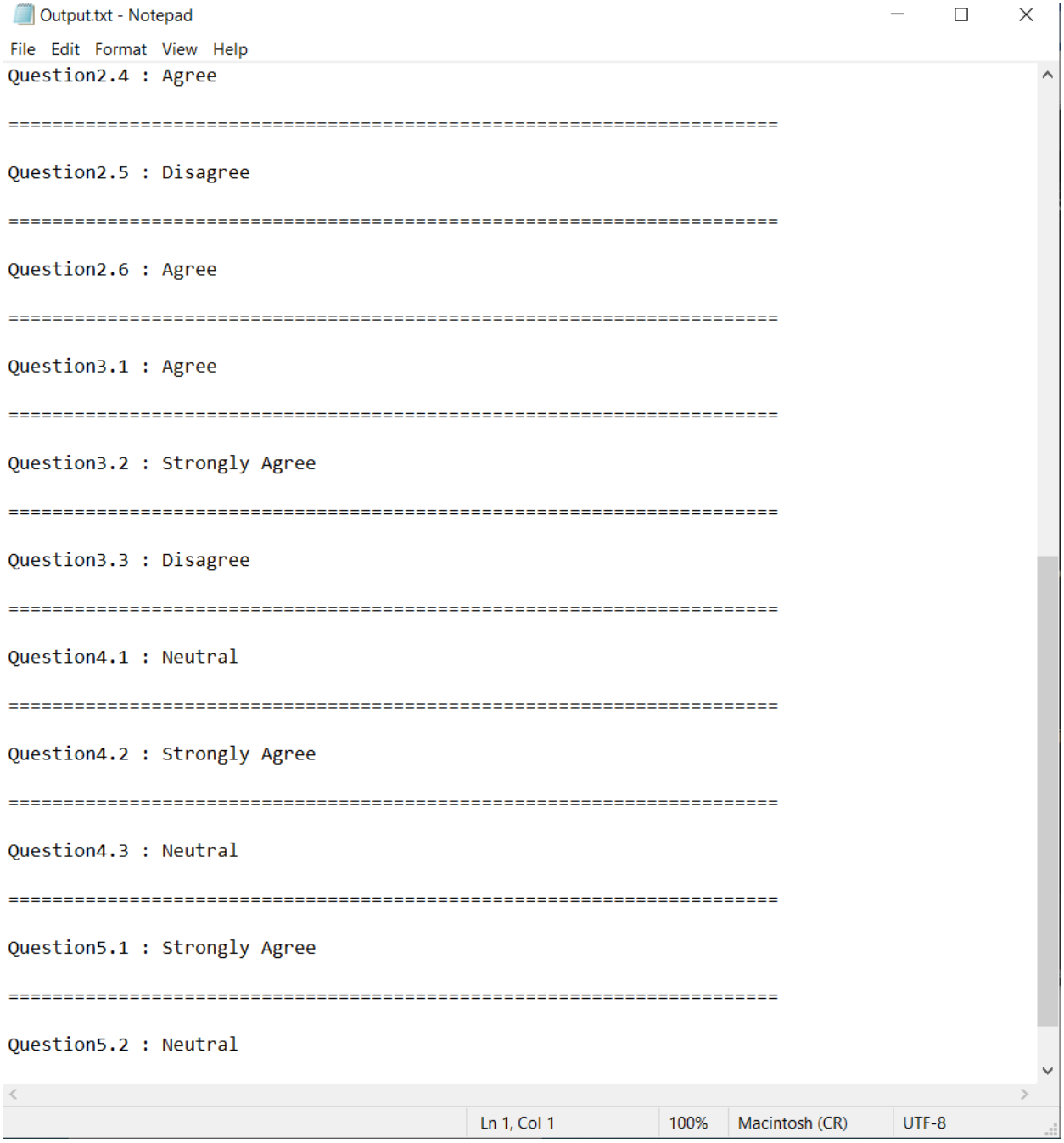
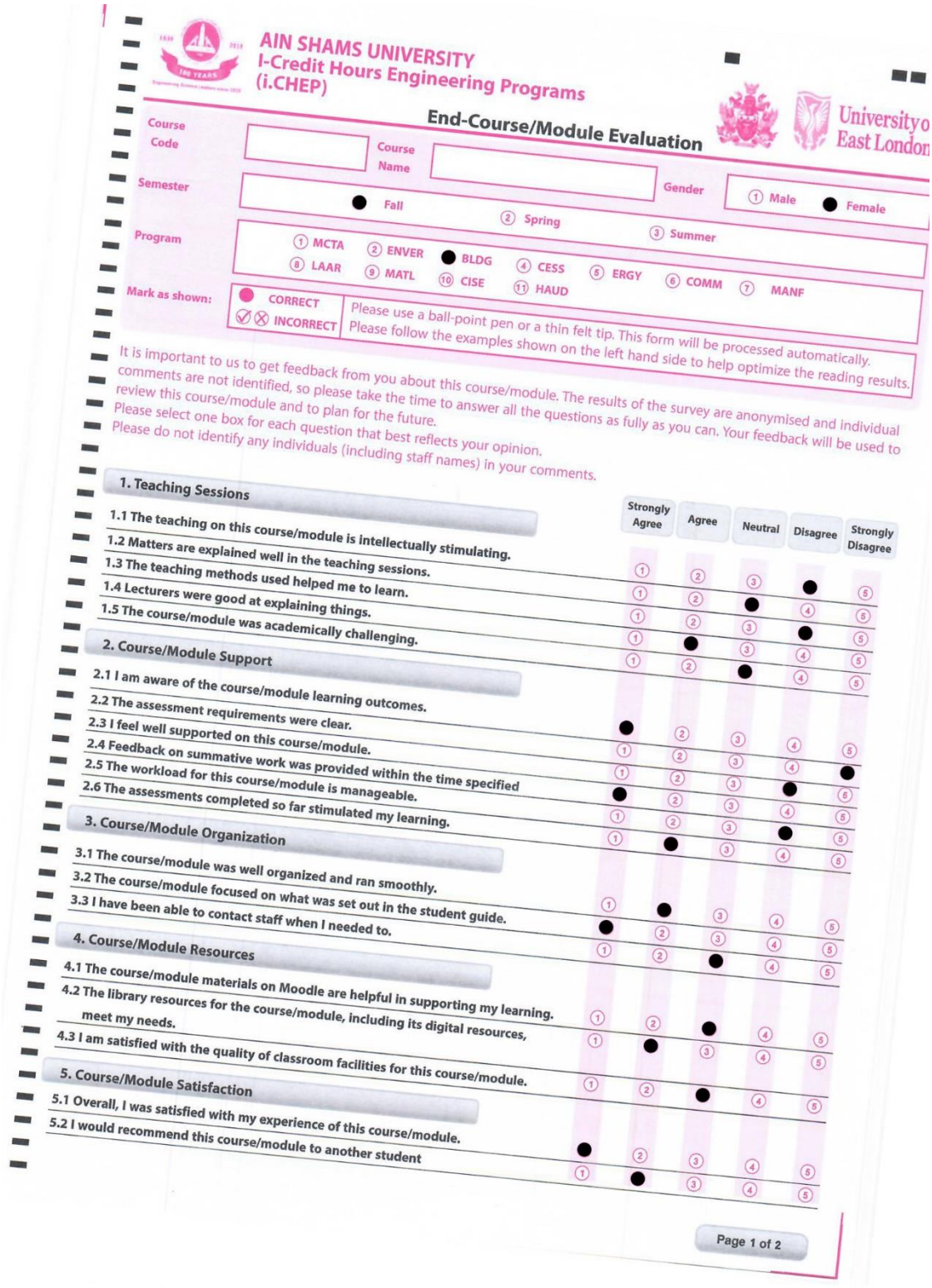


Figure 3 Test Case 1 Output File (Cont.)

Test Case 2 :



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Please select one box for each question that best reflects your opinion.
Please do not identify any individuals (including staff names) in your comments.

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
1. Teaching Sessions					
1.1 The teaching on this course/module is intellectually stimulating.	1	2	3	●	5
1.2 Matters are explained well in the teaching sessions.	1	2	●	4	5
1.3 The teaching methods used helped me to learn.	1	2	3	●	5
1.4 Lecturers were good at explaining things.	1	●	3	4	5
1.5 The course/module was academically challenging.	1	2	●	4	5
2. Course/Module Support					
2.1 I am aware of the course/module learning outcomes.	●	2	3	4	5
2.2 The assessment requirements were clear.	1	2	3	4	●
2.3 I feel well supported on this course/module.	●	2	3	●	5
2.4 Feedback on summative work was provided within the time specified	1	2	3	4	5
2.5 The workload for this course/module is manageable.	1	●	3	●	5
2.6 The assessments completed so far stimulated my learning.	1	2	3	4	5
3. Course/Module Organization					
3.1 The course/module was well organized and ran smoothly.	1	●	3	4	5
3.2 The course/module focused on what was set out in the student guide.	●	2	3	4	5
3.3 I have been able to contact staff when I needed to.	1	2	●	4	5
4. Course/Module Resources					
4.1 The course/module materials on Moodle are helpful in supporting my learning.	1	2	●	4	5
4.2 The library resources for the course/module, including its digital resources, meet my needs.	1	●	3	4	5
4.3 I am satisfied with the quality of classroom facilities for this course/module.	1	2	●	4	5
5. Course/Module Satisfaction					
5.1 Overall, I was satisfied with my experience of this course/module.	●	2	3	4	5
5.2 I would recommend this course/module to another student	1	●	3	4	5

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Figure 4 Test Sample 2

Test Case 2 Output :

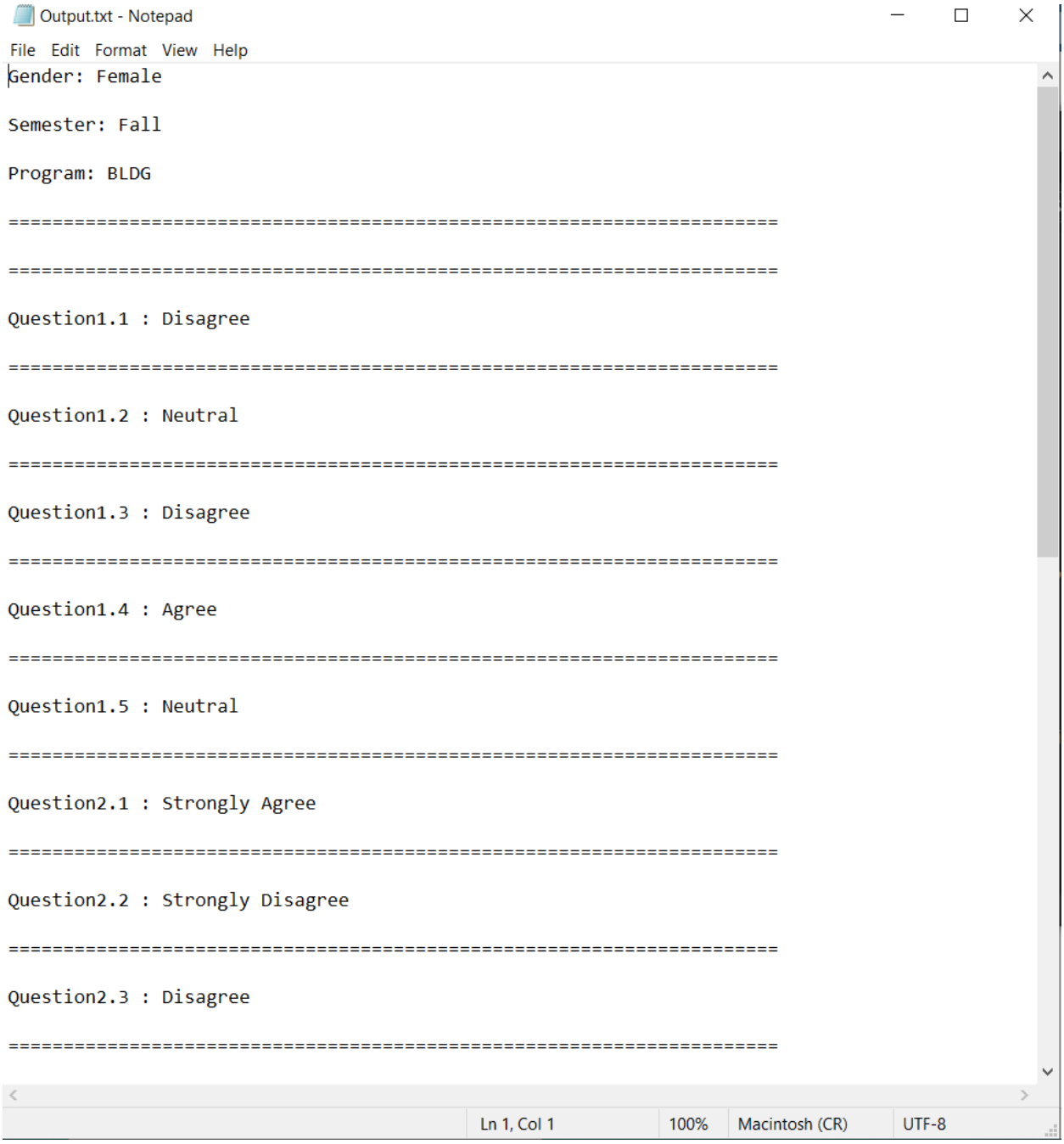


Figure 5 Test Case 2 Output File

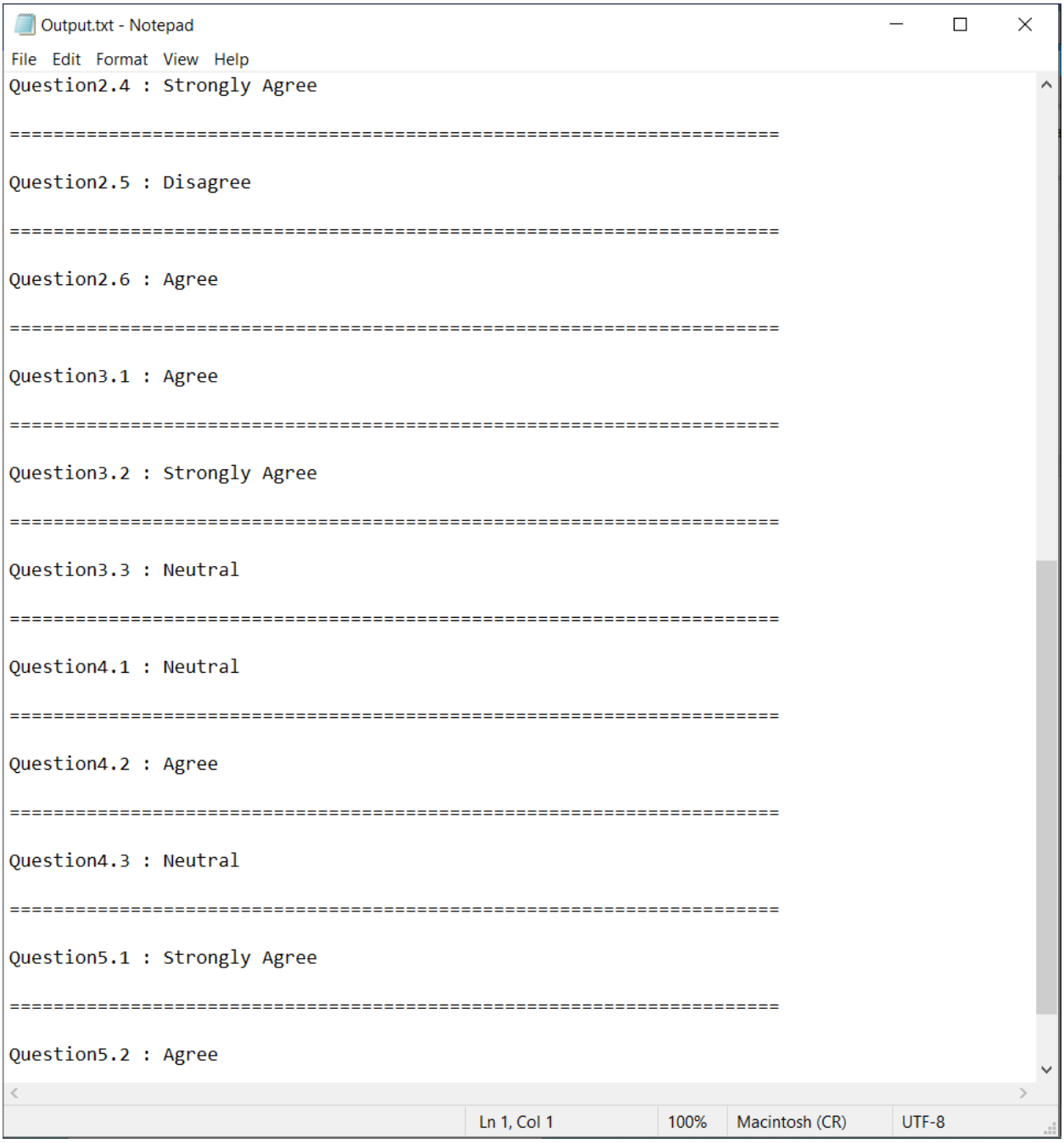
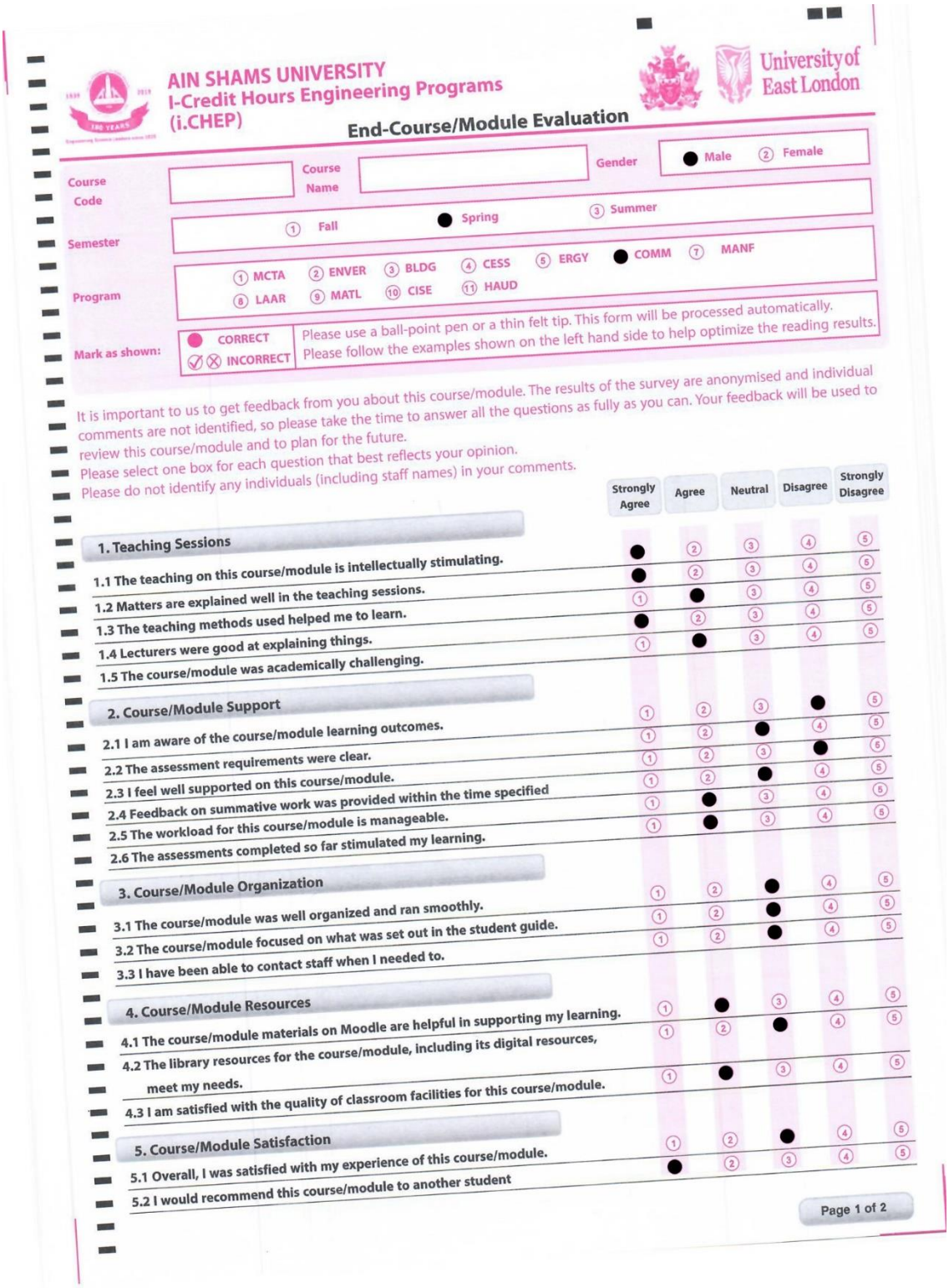


Figure 6 Test Case 2 Output File (Cont.)

Test Case 3 :



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End-Course/Module Evaluation

Course Code:
Course Name:
Gender: ● Male ② Female

Semester: ① Fall ● Spring ③ Summer

Program: ① MCTA ② ENVER ③ BLDG ④ CESS ⑤ ERGY ● COMM ⑦ MANF ⑧ LAAR ⑨ MATL ⑩ CISE ⑪ HAUD

Mark as shown: ● CORRECT ⊘ ⊗ INCORRECT

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It is important to us to get feedback from you about this course/module. The results of the survey are anonymised and individual comments are not identified, so please take the time to answer all the questions as fully as you can. Your feedback will be used to review this course/module and to plan for the future.
Please select one box for each question that best reflects your opinion.
Please do not identify any individuals (including staff names) in your comments.

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
1. Teaching Sessions					
1.1 The teaching on this course/module is intellectually stimulating.	●	②	③	④	⑤
1.2 Matters are explained well in the teaching sessions.	●	②	③	④	⑤
1.3 The teaching methods used helped me to learn.	①	●	③	④	⑤
1.4 Lecturers were good at explaining things.	●	②	③	④	⑤
1.5 The course/module was academically challenging.	①	●	③	④	⑤
2. Course/Module Support					
2.1 I am aware of the course/module learning outcomes.	①	②	③	●	⑤
2.2 The assessment requirements were clear.	①	②	●	④	⑤
2.3 I feel well supported on this course/module.	①	②	③	●	⑥
2.4 Feedback on summative work was provided within the time specified	①	②	●	④	⑤
2.5 The workload for this course/module is manageable.	①	●	③	④	⑤
2.6 The assessments completed so far stimulated my learning.	①	●	③	④	⑤
3. Course/Module Organization					
3.1 The course/module was well organized and ran smoothly.	①	②	●	④	⑤
3.2 The course/module focused on what was set out in the student guide.	①	②	●	④	⑤
3.3 I have been able to contact staff when I needed to.	①	②	●	④	⑤
4. Course/Module Resources					
4.1 The course/module materials on Moodle are helpful in supporting my learning.	①	●	③	④	⑤
4.2 The library resources for the course/module, including its digital resources, meet my needs.	①	②	●	④	⑤
4.3 I am satisfied with the quality of classroom facilities for this course/module.	①	●	③	④	⑤
5. Course/Module Satisfaction					
5.1 Overall, I was satisfied with my experience of this course/module.	①	②	●	④	⑤
5.2 I would recommend this course/module to another student	●	②	③	④	⑤

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Figure 7 Test Sample 3

Test Case 3 Output :

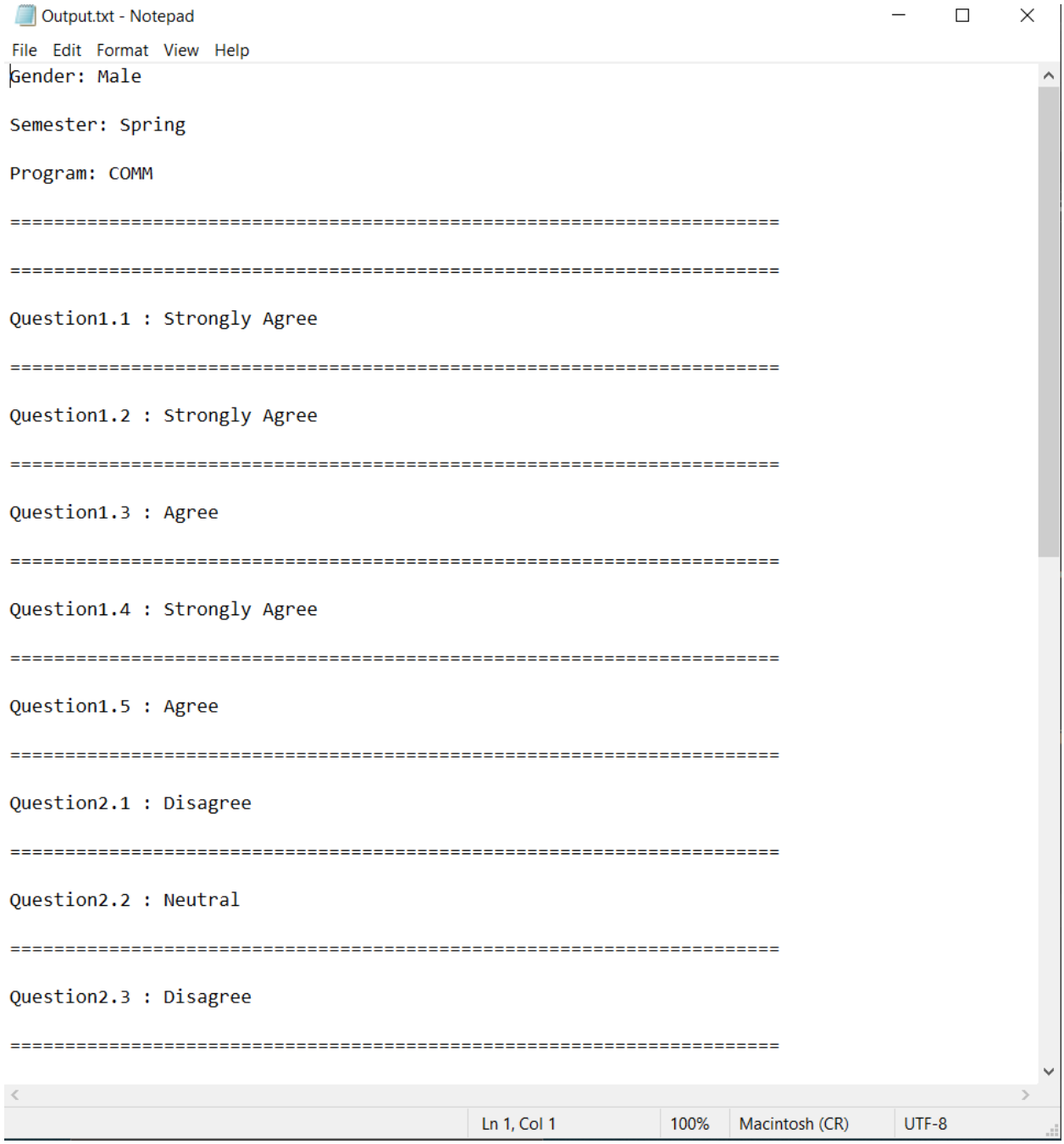

Figure 8 Test Case 3 Output File

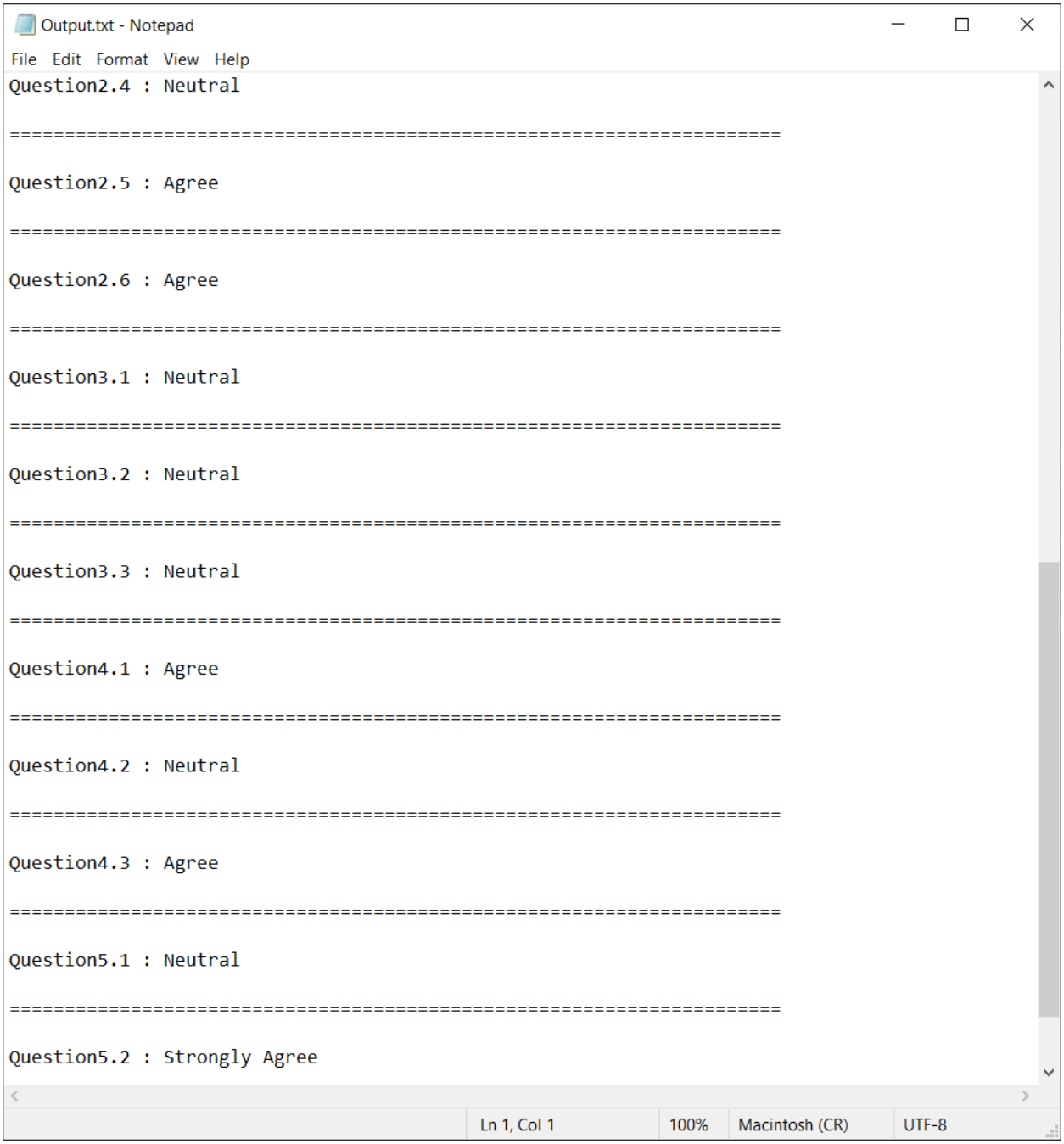

Figure 9 Test Case 3 Output File (Cont.)