

THE HONG KONG POLYTECHNIC UNIVERSITY  
HONG KONG COMMUNITY COLLEGE

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| <b>Subject Title</b> : Introduction to Internet Technology<br><b>Session</b> : Semester Two, 2016/17<br><b>Date</b> : 17 May 2017<br><b>Subject Examiner(s)</b> : Dr Bede LEUNG | <b>Subject Code</b> : CCN1016<br><b>Time</b> : 09:30 – 12:30<br><b>Time Allowed</b> : 3 Hours |
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This question paper has a total of **SEVENTEEN** pages (including this covering page).

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**Instructions to Candidates:**

1. There are THREE sections in this paper.
  - Section A (30%) – Multiple-choice Questions. Answer ALL questions in this section on the multiple-choice answer sheet provided. Each question carries 1 mark. Choose the BEST option for each question.
  - Section B (45%) – Short Questions. Answer any NINE out of the TEN questions in the answer book provided. Each question carries 5 marks. If you answer more than nine questions, only the first nine attempted questions will be marked. Indicate in your answer book clearly which nine questions you are attempting.
  - Section C (25%) – Long Questions. Answer any ONE out of the TWO questions in this section in the answer book provided. Each question carries 25 marks. If you answer more than one question, only the first one attempted questions will be marked. Indicate in your answer book clearly which one question you are attempting.
2. Candidates are NOT allowed to retain the multiple-choice answer sheet, the answer book and the examination question paper.
3. Show all your work clearly and neatly. Marks will be deducted for untidy work.
4. Electronic calculators, including programmable calculators, may be used provided that the calculators are battery powered, silent in operation, with neither printout nor graphic / word display facilities and do not use dot-matrix technology in the main display. All programmes stored in the calculator should have been cleared. Other electronic devices with graphic / word-display facilities (such as databank watches) are not permitted.

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**Authorised Materials:**

|  | YES | NO  |
|--|-----|-----|
| CALCULATOR<br>(All programmes stored should be cleared.) | [✓] | [ ] |
| SPECIFICALLY PERMITTED ITEMS                             | [ ] | [✓] |

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**DO NOT TURN OVER THE PAGE UNTIL YOU ARE TOLD TO DO SO**

**Section B (45%) – Short Questions**

Answer any **NINE** out of the **TEN** questions in the answer book provided. Each question carries 5 marks. If you answer more than nine questions, only the first nine attempted questions will be marked. Indicate in your answer book clearly which nine questions you are attempting.

Question B1

Peter would like to know more about the current TCP/IP network configuration values he is using. Mary typed a command in the command prompt using a Windows environment and part of the result is shown below.

Ethernet adapter Local Area Connection:

```

Connection-specific DNS Suffix  . :
Physical Address. . . . . : 6C-0B-84-A7-64-AB
DHCP Enabled. . . . . : Yes
Autoconfiguration Enabled . . . . : Yes
IPv4 Address. . . . . : 192.168.128.146
Subnet Mask . . . . . : 255.255.255.248
Default Gateway . . . . . : 192.168.128.2
DNS Servers . . . . . : 192.168.128.11
                          192.168.128.12

```

- (a) Which command did Mary use in order to display the **FULL** TCP/IP configuration for all adapters? (1 mark)
- (b) What is the MAC address of the machine displayed above? Which OSI layer is used for the MAC address to communicate on the same network? (1 mark)
- (c) What is the number of usable hosts in each subnet? (1 mark)
- (d) What is gateway? (1 mark)
- (e) What is the full name of DNS? Briefly describe the function of a DNS server. (1 mark)

Question B2

POP is a classic email protocol.

- (a) What is the function of POP? (1 mark)
- (b) Four states are involved in POP. Briefly describe **EACH** of the states. (4 marks)

Question B3

The following news is captured from South China Morning Post (SCMP) web site.

## Hero Hong Kong police officer who made headlines worldwide: 'I was just doing my duty'

Constable Ifzal Zaffar persuaded a suicidal man to come down from a crane on a construction site in West Kowloon by speaking to him in his native Urdu

PUBLISHED : Saturday, 18 March, 2017, 9:43am  
UPDATED : Saturday, 18 March, 2017, 2:25pm

COMMENTS: 47

Reference:

<http://www.scmp.com/news/hong-kong/education-community/article/2079933/hero-hong-kong-police-officer-who-made-headlines>

- (a) There are many characteristics of News-Oriented websites, name and explain the **TWO** characteristics being circled which SCMP used. (2 marks)
- (b) In the middle of the web page, there is media as shown in Figure 1.

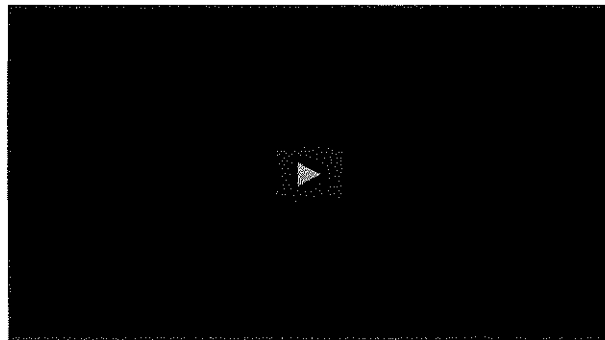


Figure 1

- (i) Which type of technique is commonly used in order to deliver the above media to the audience? (1 mark)
- (ii) List **ONE** advantage of the above technique. (1 mark)
- (iii) List **ONE** protocol (in full name) which is commonly used to implement the above technique. (1 mark)

Question B4

- (a) Peter is running a brick-and-mortar business and he found that his business becomes more and more difficult to survive. Explain **THREE** limiting factors for his current business. (3 marks)
- (b) Mary suggested Peter to run a brick-and-click business instead. Peter wondered whether this kind of business can provide a good customer service or not. Mary introduced personalization and customization to Peter. Briefly explain **EACH** of these terms. (2 marks)

Question B5

Peter would like to put some confidential files to his web server so that his colleagues can download them. Mary mentioned that the files should not be put in a web server but a file server instead. She explained that the two servers use different protocols which do the job differently.

- (a) Identify which protocol (in full name) is used in a web server and which protocol (in full name) is used in a file server. (1 mark)
- (b) Explain the function of the protocol used in the file server. (1 mark)
- (c) State **ONE** advantage of protocol used in the file server for the above application. (1 mark)
- (d) Mary further suggested using a private setting instead of an anonymous setting for the file server. Provide **ONE** reason for that. (1 mark)
- (e) Peter accepted the suggestion and put the files in the file server. Which type of program should his colleagues use in order to download the files from the file server? (1 mark)

Question B6

Peter is planning to set up a household network which can share Internet access. On the network, one computer is required to manage and provide video and audio on-demand service for other computers on the network.

- (a) Suggest **ONE** type of local area network which should be used for Peter. (1 mark)
- (b) Suggest **TWO** reasons to explain why the above type of network suggested in part (a) of this question should be used. (2 marks)
- (c) Suggest **ONE** local area network physical topology which is suitable for the above application. (1 mark)
- (d) Suggest **ONE** reason to explain why the above type of physical topology suggested in part (c) of this question should be used. (1 mark)

Question B7

Peter is trying to send an important message to Mary and he is planning to use the public key infrastructure.

- (a) Explain the term public key. (1 mark)
- (b) Which organisation creates the public key? (1 mark)
- (c) What is the function of a digital certificate? (1 mark)
- (d) Briefly explain how the message can be delivered safely from Peter to Mary making use of the public key infrastructure. (2 marks)

Question B8

- (a) In 1870s, circuit switching is used for communication. In 1960s, Leonard Kleinrock developed packet switching. Explain the terms circuit switching and packet switching. (2 marks)
- (b) Compare and contrast circuit switching and packet switching in terms of call setup, bandwidth and congestion. (3 marks)

Question B9

- (a) Peter and Mary are using two different broadband connection services for their homes. They made different comments on their applications. Peter said, "I am happy with the connection speed during the day-time. However, the download speed decreases dramatically at night!" Mary said, "My connection is fine for web surfing all the time. However, I found that it takes a long time for me to upload the files to the company server."
- (i) What type of broadband connection service did Peter subscribe? (1 mark)
- (ii) What type of broadband connection service did Mary subscribe? (1 mark)
- (b) When using a regular telephone line to transit signal, one device is necessary.
- (i) Provide the name of the device. (1 mark)
- (ii) Explain the function of the device. (1 mark)
- (iii) Provide a full name of the protocol used to transmit TCP/IP packets. (1 mark)

Question B10

- (a) During the early days, directory is used as a search tool.
- (i) Breadcrumb trail can help the users when they are using a directory. What is the function of breadcrumb trail? (1 mark)
- (ii) Suggest **ONE** protocol (in full name) which is used to access directories. (1 mark)
- (b) Later, search engine is used as a search tool. Explain the three step process of a search engine. (3 marks)

- End of Section B -

## Section C (25%) – Long Questions

Answer any **ONE** out of the **TWO** questions in this section in the answer book provided. Each question carries 25 marks. If you answer more than one question, only the first one attempted questions will be marked. Indicate in your answer book clearly which one question you are attempting.

### Question C1

Suppose you are an information technology (IT) consultant for a travel company. You are requested to provide IT solutions to the company. An Apache web server has been set up in the company. The Apache web server is installed with PHP and configured that the web pages and PHP files are located at C:\apache\htdocs.

- (a) In the web server machine, you open a browser and type `http://localhost` in the address bar, you see a web page as shown in Figure 2 instead of a common homepage.

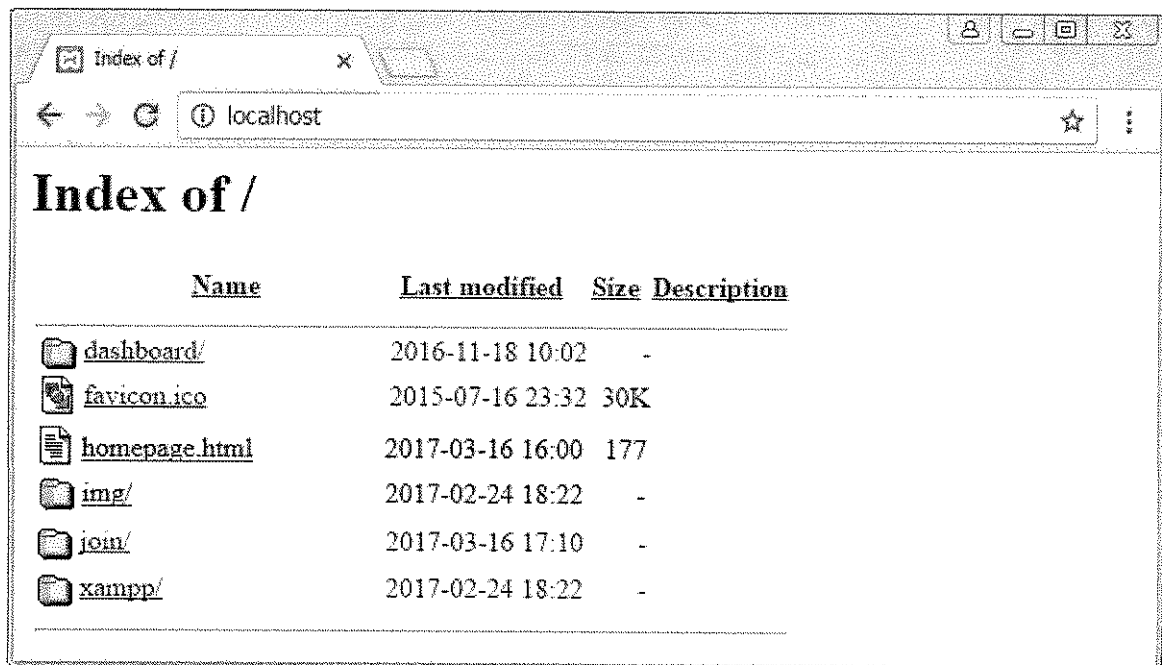


Figure 2

- (i) Suggest a reason why this is happened. (1 mark)
- (ii) Without changing anything in C:\apache\htdocs, what should you do in the Apache web server in order to visit the homepage of the company when you type `http://localhost` in the address bar? Explain your answer. (3 marks)

Question C1 (continued)

- (b) After fixing the situation in part (a) of this question, you are asked to design a web page as shown in Figure 3. This web page allows a user to input data, details of the design is shown in Table 1.

The screenshot shows a web browser window with the title 'Win a prize'. The address bar shows 'localhost'. The main heading is 'Please suggest and win a prize'. Below the heading are three questions:

Q1: What is your Member ID?  
 [Not a member yet?](#)

Q2: What is your favourite country/countries:

Q3: Did you buy insurance for your previous travel?  
☒ Yes  
☐ No

At the bottom are two buttons: 'Reset the form' and 'Click and win a prize'.

Figure 3

| Q | Description  | Variable Name used in HTML |
|---|--|----------------------------|
| 1 | Member ID is made up of a 8-digit number. If a visitor is not a member, further instructions in another web page called join.html located in the join folder (as shown in Figure 2) will be displayed in another tab when the visitor click the “Not a member yet?” hyperlink.   | <i>id</i>                  |
| 2 | Select from three countries. The default value “United Kingdom” is selected when the page appears.<br><br>When the “Click and win a prize” button is pressed, the following will happen:<br><br>If France is selected, then the value <i>fr</i> will be assigned to the variable country. If Italy is selected, then the value <i>it</i> will be assigned to the variable country. If United Kingdom is selected, then the value <i>uk</i> will be assigned to the variable country. | <i>country</i>             |
| 3 | Radio buttons for the value of <i>yes</i> or <i>no</i> . The default value of <i>yes</i> is shown when the page appears.   | <i>buy</i>                 |

Table 1

Question C1 (continued)

When the button with the label “Click and win a prize” is pressed, a POST method will be used to forward the request to the file called win.php in the server’s root directory.

- (i) For Q3, why radio button is suggested instead of checkbox? (1 mark)
  - (ii) What should be happened when the user click the “Reset the form” button? (1 mark)
  - (iii) Based on the above information, use HTML to design the web page in Figure 3. (12 marks)
  - (iv) Although not shown in the browser, an extra information (sale=summer\_2017) is also sent to the web server. Describe how this can be achieved by making use of HTML code. (2 marks)
- (c) When the button with label “Click and win a prize” is pressed, data will be passed to the PHP program and the program will compute which prize the user can get according to Table 2.

| Prize  | Description   |
|--------|---|
| Gold   | If the member ID is a multiple of 19, the user will win a gold prize.   |
| Silver | If the user did not win the gold price and the member ID is a multiple of 11, the user will win a silver prize. |
| Bronze | If the user did not win any of the above prizes, the user will win a bronze prize.                              |

Table 2

The result will be returned to the user. An example result with member ID 11111111 who won a **silver** prize is shown in Figure 4.

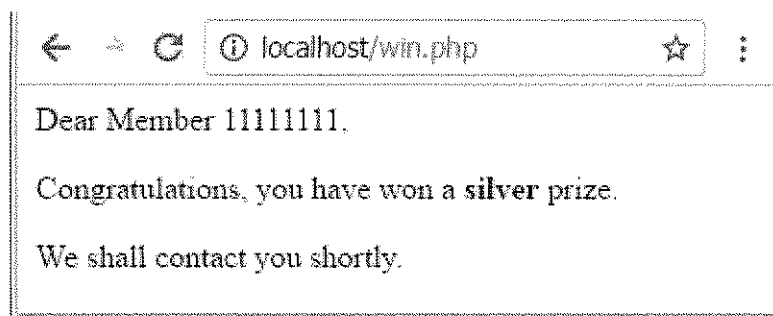


Figure 4

Assume that the member ID is input correctly, use if...else structure to write this PHP program which displays the member ID as well as the prize the member wins. (5 marks)



Question C2

Suppose you are an information technology (IT) consultant for an e-learning company. You are requested to provide IT solutions to the company. As advised by you, an Apache web server has just been installed and your team member is going to test whether the server is working or not.

- (a) In the web server machine, your team member opens a browser and types `http://localhost:8080` in the address bar, you see a web page as shown in Figure 5 instead of a default Apache web page.

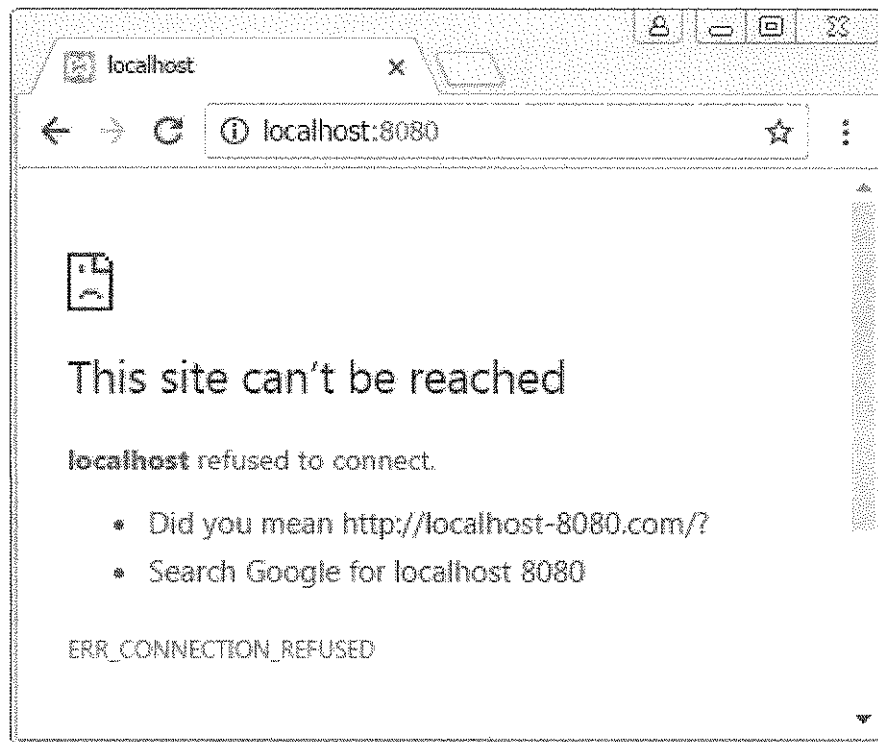


Figure 5

- (i) Suggest a reason why this is happened. (1 mark)
- (ii) Without changing the URL, what should you do in the Apache web server in order to display the default Apache webpage? Explain your answer. (3 marks)
- (b) After fixing the situation in part (a) of this question, you are asked to design a web page as shown in Figure 6. This web page displays a table which consists the area formulae of different shapes. The title of the table is "Area of different shapes". The top row indicates the column headings. The width and border of the table are 280 and 2 pixels respectively. The RGB code of the background colour is BBBB BB. The images are placed in the folder named shapes inside the root directory of the server. The file names of the rectangle and triangle are rectangle.jpg and triangle.jpg respectively. When the images are displayed, they must be displayed in the size of  $110 \times 160$ .

## Question C2 (continued)

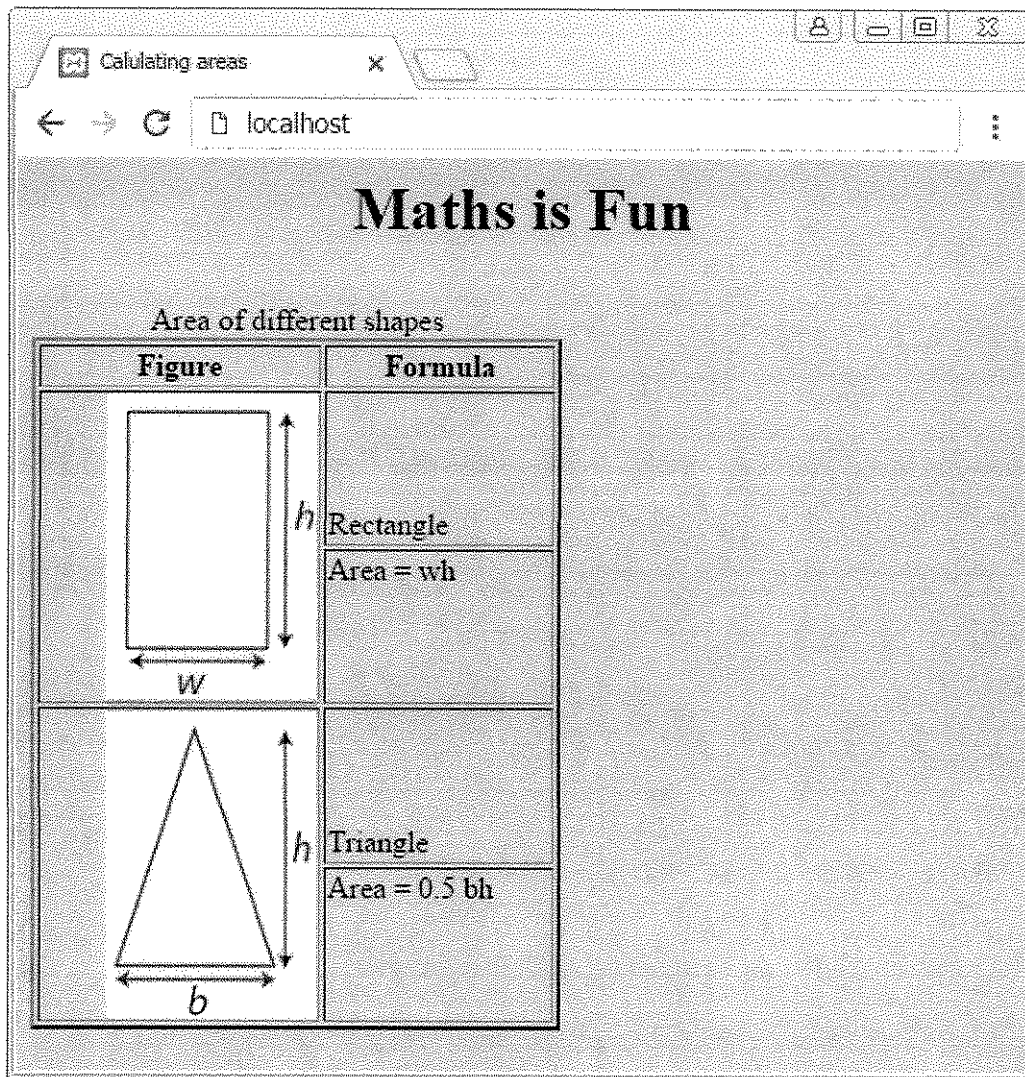


Figure 6

- (i) Suggest a suitable file name for the web page in Figure 6. (1 mark)
- (ii) Based on the above information, use HTML to design the web page in Figure 6. (14 marks)
- (c) The above web page will be further extended so that users are allowed to provide input and the web server will calculate the area. For example, the variable *radius* can be used for a user to enter a radius. This data will be passed to a PHP program by GET method in a web server. The PHP program will calculate the area of the circle using the formula as follows:

$$a = r^2 \pi \text{ (where } \pi = 3.14 \text{)}$$

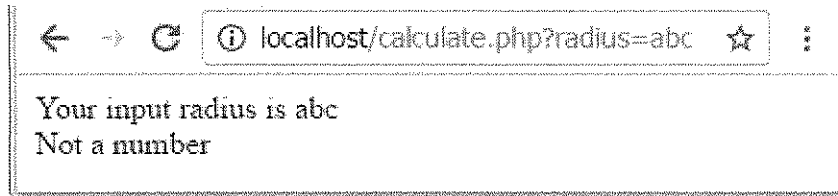
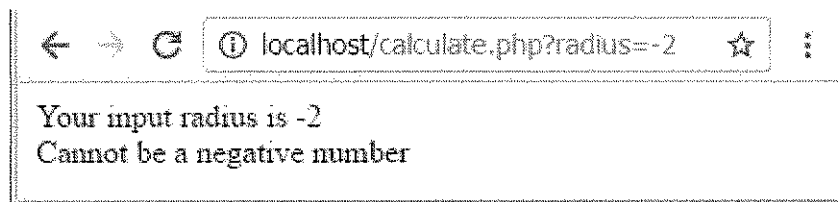
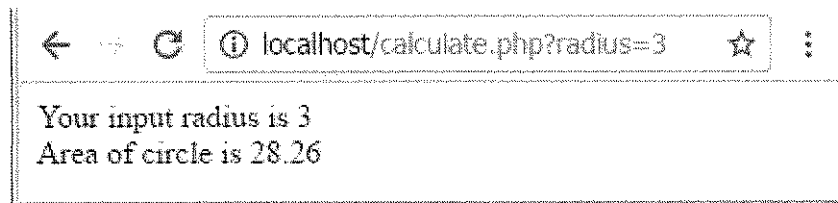
In order to check the user input, a function is introduced as follows:

**is\_numeric(\$var)**

This function finds whether the given variable is numeric. It returns TRUE if var is a number or a numeric string, FALSE otherwise.

Question C2 (continued)

Design a PHP program which fulfils the following requirements. If the input of the user is not numeric, displays the message “Not a number”. If the input of the user is a negative number, displays the message “Cannot be a negative number”. If the input of the user is not a negative number, calculate the area and display the answer. Three example results with different input are shown in Figures 7a, 7b and 7c.

Figure 7aFigure 7bFigure 7c

Use if...else structure to write this PHP program.

(6 marks)

- End of Section C -

**- END OF PAPER -**