PRIFYSGOL ABERYSTWYTH UNIVERSITY

SEMESTER TWO 2026

COMPUTER SCIENCE

CS22620 : WEB DESIGN AND USER EXPERIENCE

Time allowed: **2 HOURS**

Answer all **FOUR** questions

All questions carry equal marks.

YOU MAY BRING THE FOLLOWING INTO THE EXAMINATION:
UP TO 3 SHEETS OF NOTES ON A4 PAPER (WHICH MAY BE DOUBLE-SIDED). THERE ARE NO ADDITIONAL RESTRICTIONS ON CONTENT OR FORMATTING OF THESE NOTES.
NO ELECTRONIC DEVICES.

CALCULATORS ARE PERMITTED (CASIO FX991, FX83 OR FX85 MODELS ONLY)

STUDENTS MAY SUBMIT ANSWERS TO THIS PAPER IN EITHER WELSH OR ENGLISH

Once seated, students may complete the front cover of the answer book(s) and the attendance slip ONLY.

DO NOT TURN THE EXAMINATION QUESTION PAPER OVER UNTIL INSTRUCTED TO DO SO.

1. *This question concerns the theoretical aspects of human-computer interaction*

a) What is a user's mental model and how does it get constructed and used? Illustrate your answer using a cash-machine (also known as a cash dispenser, automatic telling machine, ATM, "hole in the wall", etc). [20 marks]

b) This question concerns Gestalt.

Figure 1 shows the three buttons commonly seen in the top right corner of a window that enable you to minimise (i.e. take up no screen space), maximise (i.e. occupies the whole screen) and close a window.

(i) Which two Gestalt principles groups the three buttons? [2 marks]

(ii) Which Gestalt principle divides the buttons into two groups, one with the minimise and maximise buttons, the other with just the close button? [1 mark]

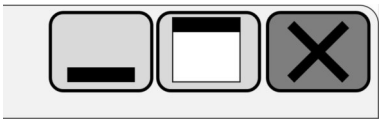


Figure 1: Windows controls

c) Fitt's Law is a predictive model used to determine how fast a user can click on a item. What two factors that a designer control that impacts the result produced? [2 marks]

2. *This question concerns usability evaluation.*

a) A usability study was performed using paper prototypes, comparing the newly designed website with the previous (old) process. Users were tested on either the old or new versions. Ease of use was rated by the test subjects on a scale Very Easy (VE) to Very Hard (VH).

The results are shown in the table 1 below.

Measurement	**Old**				**New**				
Time taken	130	150	120	60	15	16	14	11	19
Ease of use	E	E	H	VE	VE	VE	VE	E	E

Table 1: Experiment results

(i) What type of [usability] study has been performed? [1 mark]

(ii) Identify what type of value (not unit) is recorded for each measurement. [2 marks]

(iii) Calculate the *average* values for the above data. Explain how you calculated your averages. [6 marks]

(iv) Identify at least one possible flaw with the experiment. [1 mark]

b) For each of the interfaces described below:

- identify a Nielsen heuristic that is broken,
- describe how the interface breaks that heuristic,
- suggest how the interface could be changed to fix the problem (you may include more than one solution).

(i) As part of signing up for TV channel subscription, a user is required to enter their date of birth. The date picker (figure 2) shows one month at a time, with the user swiping left/right to change the month.

(ii) The sign shown in figure 3 from outside a lift at an airport.

(iii) An electric toothbrush has one button and one LED light. It is started by pressing the button, and will stop automatically after 2 minutes. Every 30 seconds the toothbrush will beep to indicate the user it is time to change the set of teeth being cleaned. When there is no charge in the battery the toothbrush stops immediatly, even if the user has not completed cleaning their teeth.

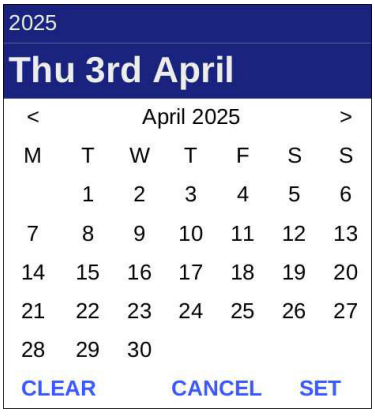


Figure 2: Sign-up calendar

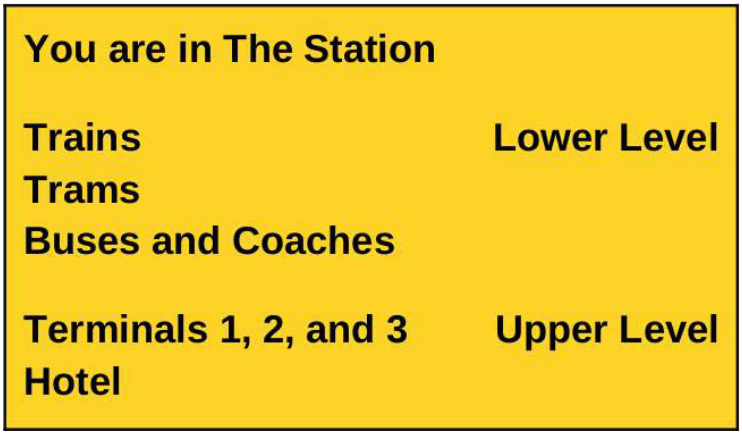


Figure 3: Lift/elevator sign

[15 marks]

3. *This question concerns design of interactive systems.*

a) For the website shown in figure 5 (at the end of the exam paper), describe or show how each of the responsive web pages could appear on a:
(i) mobile phone with a 6 inch screen,
(ii) tablet (e.g. eg 9.6 inches screen, 2160x1856 pixels) [12 marks]

b) Describe how the *Book A Tour* form in the website (figure 5(e)) could be faked if this design was tested as a paper prototype. [5 marks]

c) A cheap audio book player that can only hold a single title. It has two buttons, one labelled Power and the other FF (short for Fast Forward). When the player is turned on by pressing the power button it plays the track from the point it was at when the player was turned off. Pressing the power button again will turn off the player. Pressing the FF (Fast Forward) button whilst playing will speed up the playing speed to x1.2, pressing it again will increase the playback speed to x1.5, and pressing it again will return to normal speed (i.e. x1). Pressing power has no effect when at x1.2 or x1.5 speed.
Draw the state [transition] diagram representing the operation of this MP3 player. [8 marks]

4. *This question concerns aesthetics, multimedia, and website design.*

a) Explain the quote "*If you really hate someone, teach them to recognise bad kerning*" (from <https://xkcd.com/1015/>). [4 marks]

b) Sketch what the slope of the roof of the house shown in Figure 4. would be if zoomed in over 1000 times:



Figure 4: House and tree

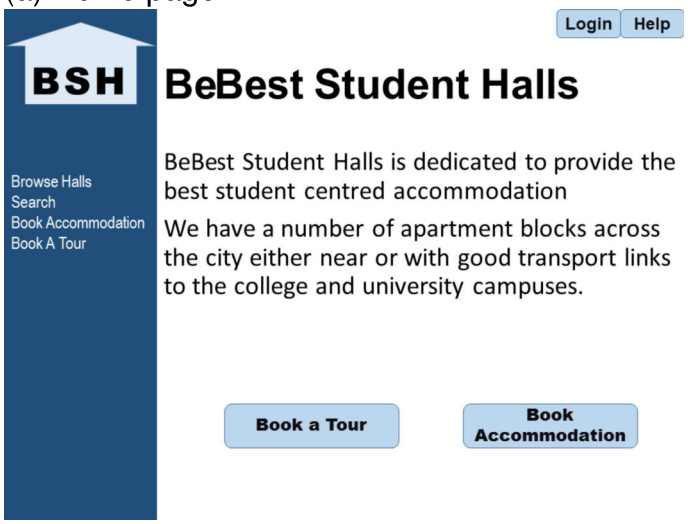
(i) When the scene was stored in a vector format. [2 marks]

(ii) When the scene was stored in a bitmap format. [2 marks]

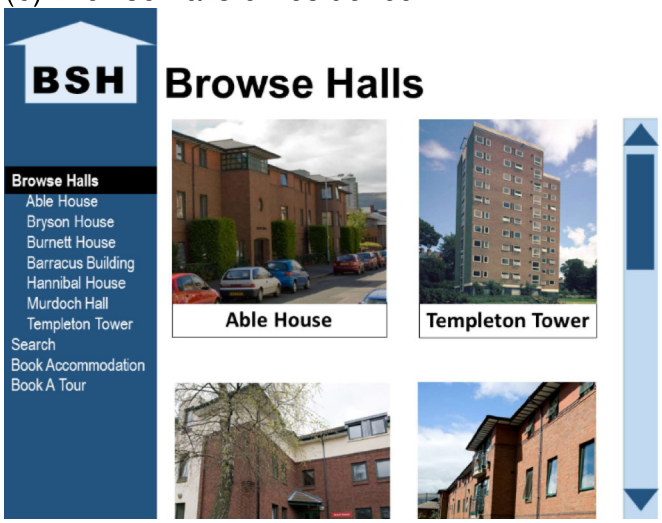
c) List three types of asset that can be used when creating videos. [3 marks]

d) Deconstruct the website shown in in figure 5 (at the end of the exam paper) using JJ Garrett's Planes Model. You can decide on the colours used in the website. [14 marks]

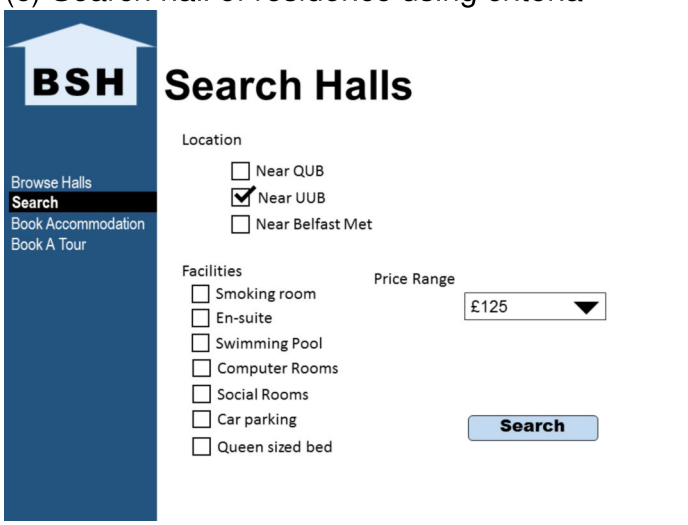
(a) Home page



(b) Browse halls of residence



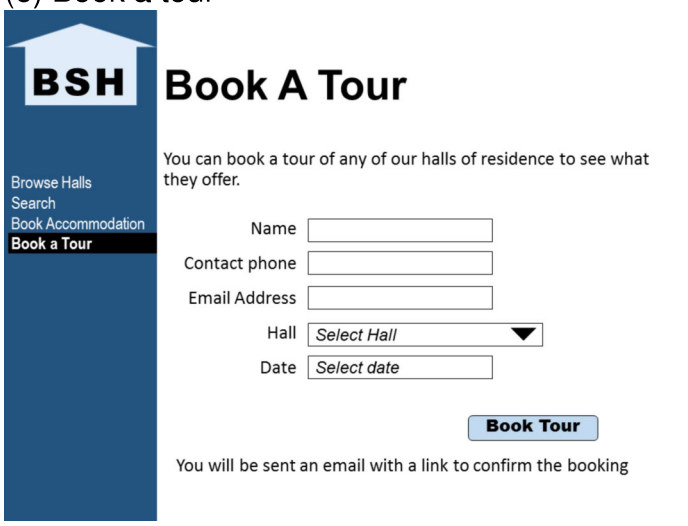
(c) Search hall of residence using criteria



(d) Details of a hall of residence



(e) Book a tour



(f) Book accommodation

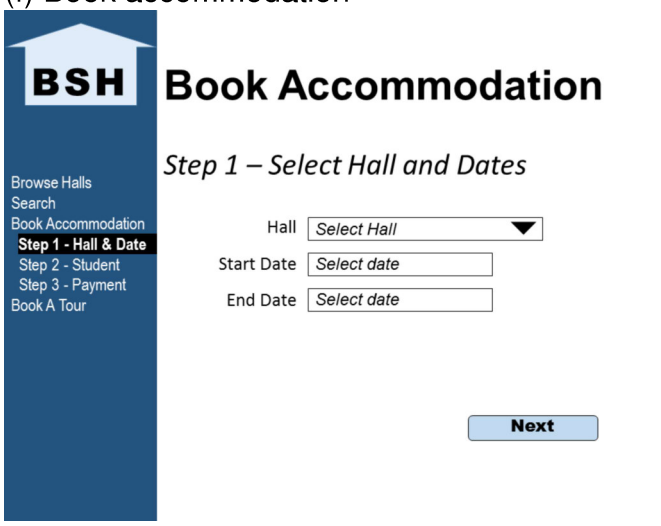


Figure 5: Mockups of webpages

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