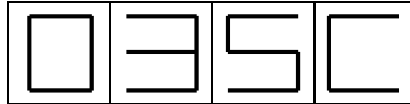


**0478 and 0984(9-1)
COMPUTER SCIENCE
TOPIC QUESTIONS SET-8
SMART EXAM RESOURCES**

Unit 1.1 Number Systems

1. Each seat on a flight is uniquely identified on an LCD above the seat. For example, seat 035C is shown as

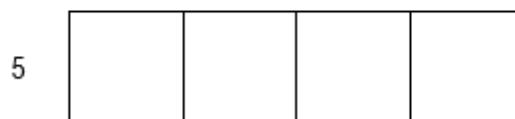
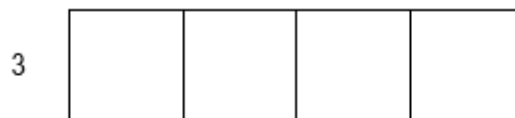


The first three characters are digits that represent the row.
The fourth character is the seat position in that row. This is a single letter, A to F, that is stored as a hexadecimal value.

Each of the four display characters can be stored in a 4-bit register. For example, 0 and C would be represented as:

| | | | | |
|----|---|---|---|---|
| | 8 | 4 | 2 | 1 |
| 0: | 0 | 0 | 0 | 0 |
| C: | 1 | 1 | 0 | 0 |

- (a) Show how the 4-bit registers would store the remaining two characters, 3 and 5. [2]



- (b) Identify which seat is stored in the following 4-bit registers [2]

| | | | | | |
|---|---|---|---|---|-------|
| 0 | 0 | 0 | 1 | → | |
| 1 | 0 | 0 | 1 | → | |
| 0 | 1 | 0 | 0 | → | |
| 1 | 1 | 1 | 0 | → | |

Unit 1.1 Number Systems

2. (a) Convert the following hexadecimal number into 12-bit binary:

4A F

| | | | | | | | | | | | |
|--|--|--|--|--|--|--|--|--|--|--|--|
| | | | | | | | | | | | |
|--|--|--|--|--|--|--|--|--|--|--|--|

[3]

(b) The 2016 Olympic Games will be held in Rio de Janeiro. A timer that counts down to the opening of the Games is shown on a microprocessor-controlled display.

The number of hours, minutes and seconds until the Games open are held in three 8-bit registers.

The present register values are:

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 0 | 1 | 1 | 0 | 1 | 0 | 0 | 1 |
|---|---|---|---|---|---|---|---|

 105 hours

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 |
|---|---|---|---|---|---|---|---|

 32 minutes

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 |
|---|---|---|---|---|---|---|---|

 20 seconds

The timer will count **down** in seconds.

i. Show the values in each 8-bit register **30 seconds** after the time shown above:

| | | | | | | | |
|--|--|--|--|--|--|--|--|
| | | | | | | | |
|--|--|--|--|--|--|--|--|

 hours

| | | | | | | | |
|--|--|--|--|--|--|--|--|
| | | | | | | | |
|--|--|--|--|--|--|--|--|

 minutes

| | | | | | | | |
|--|--|--|--|--|--|--|--|
| | | | | | | | |
|--|--|--|--|--|--|--|--|

 seconds

(ii) Write the hexadecimal value of the **minutes** register from **part (b)(i)**

.....[1]

Unit 1.1 Number Systems

3. (a) A manufacturer of aeroplane engines assigns a denary identification number (ID) to each engine.

One engine has the ID: **0431**

- (i) Convert this denary number to a 12-bit binary format.

| | | | | | | | | | | | |
|--|--|--|--|--|--|--|--|--|--|--|--|
| | | | | | | | | | | | |
|--|--|--|--|--|--|--|--|--|--|--|--|

[2]

- (ii) Show how this number would be represented in hexadecimal.

.....
.....

[3]

- (b) The current status of the engine is sent to a computer in the aeroplane.

Each piece of data collected is 8 bytes in size. Data collection occurs every 30 seconds.

Calculate the number of kilobytes that would be needed to store the data collected during a 10-hour flight. Show your working.

.....
.....
.....
.....

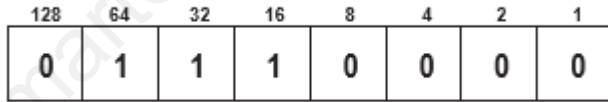
..... kilobytes
[3]

Unit 1.1 Number Systems

4. A computer uses an 8-bit register.

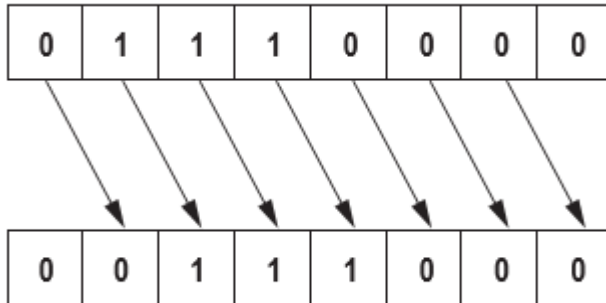
The 8-bit register contains binary integers.

(a) Write the denary (base 10) value represented by:



.....[1]

(b) All the bits in the register are shifted **one** place to the **right** as shown below.



Write the denary number that is represented after this shift.

.....[1]

(c) State the effect the shift to the right had on the original denary number from **part (a)**.

.....[1]

(d) The original number in **part (a)** is shifted **three** places to the **right**.

(i) Show the new binary number:



[1]

(ii) Write the equivalent denary number.

.....[1]

Unit 1.1 Number Systems

- (e) Describe the problems that could be caused if the original binary number in part (a) is shifted five places to the right.

.....

.....

.....

.....

.....

.....[2]

Unit 1.1 Number Systems

5. A security system is installed in a house. A hexadecimal number is entered to activate or deactivate the alarm.

The alarm code is set to hexadecimal number **2 A F**

Show how this number would be stored in a 12-bit binary register.

| | | | | | | | | | | | |
|--|--|--|--|--|--|--|--|--|--|--|--|
| | | | | | | | | | | | |
|--|--|--|--|--|--|--|--|--|--|--|--|

[3]