



Review Exercise

1) A pop group are guaranteed a hit single if they produce a good video to go with the song *and* their record company includes a free gift with the record, *or* if they appear on Top of the Pops. Draw a truth table to show all the possible outcomes. If each event is equally likely, what are the chances of the group having a hit single?

2) A school is setting up a chess club and membership cards are to be given out. The committee decides that membership should be restricted so that members must be:

- i) A member of staff
- ii) A fourth or fifth year pupil studying maths and science
- iii) A sixth form pupil studying maths or science

Design an automatic membership card dispenser that is operated by pressing the buttons that best describe the prospective member. These buttons are:

- A = Fourth year pupil
- B = Fifth year pupil
- C = Sixth year pupil
- D = Member of staff
- E = Pupil studying maths
- F = Pupil studying science

Draw a circuit diagram for the machine.

3) A certain microcomputer has a register with address 23148 (decimal) that is used to control the video display. Bit 0 is the least significant bit in the register and bit 7 is the most significant. The screen can be switched into high resolution mode by setting bits 4 and 5 to one. As the other bits in the register are used to control other functions it is important that their values are not altered. Write BASIC commands that will:

- a) Turn on the high resolution screen
- b) Turn it off again

4) A bank's strongroom lock is based on key-operated switches. The manager, his deputy and the chief cashier all have keys. The door to the strongroom can be opened by two out of the three keys, subject to the following restrictions:

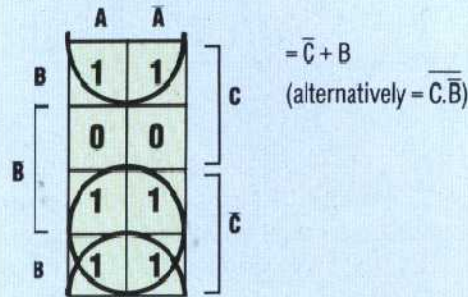
- a) Between the hours of 9am and 5pm on weekdays the strongroom can be opened only in the presence of the chief cashier
- b) At other times the strongroom can be opened only by the manager in conjunction with one of the other two people

Design a circuit to control the switching system.

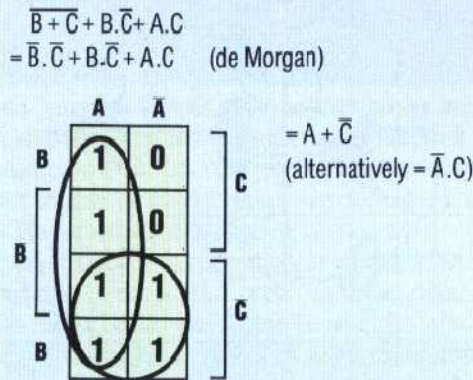
5) In a binary digital data transmission system, where a high degree of reliability is required, each bit of data is fed simultaneously to three parallel channels which, at the receiving end, are fed into a 'vote taker'. If no transmission errors have occurred then all three bits should be the same. Under fault conditions the vote taker will correct an error in one channel by giving a single output that corresponds to the majority of the inputs. Design a circuit for the vote taker.

Answers To Exercise 5 On Page 107

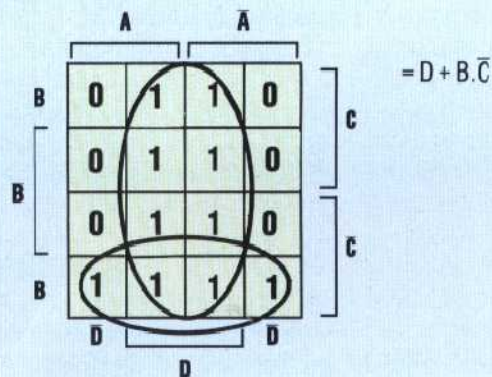
1a)



b)

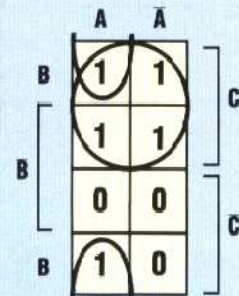


c)

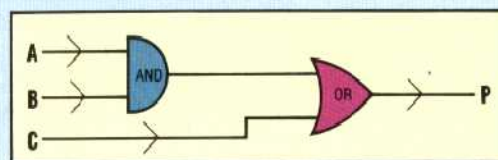


2) The truth table is:

Decimal	A	B	C	P
0	0	0	0	0
1	0	0	1	1
2	0	1	0	0
3	0	1	1	1
4	1	0	0	0
5	1	0	1	1
6	1	1	0	1
7	1	1	1	1



From the k-map we get the expression $P = C + A \cdot B$. The resulting circuit is:



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