(a) A school intends to select candidates for an Inter-School Essay Competition as per the criteria are given below: [5]  
The student has participated in an earlier competition and is very creative.  
OR  
The student is very creative and has excellent general awareness, but has not participated in any competition earlier.  
OR  
The student has excellent general awareness and has won a prize in an inter-house competition.  
The inputs are:

|  |  |
| --- | --- |
| **Inputs** |  |
| A | participated in a competition earlier |
| B | is very creative |
| C | won a prize in an inter-house competition |
| D | has an excellent general awareness |

(In all the above cases 1 indicates yes and 0 indicates no).  
Output: X [1 indicates yes, 0 indicates no for all cases]  
Draw the truth table for the inputs and outputs given above and write the POS expression for X(A, B, C, D).  
(b) State the application of a Half Adder. Draw the truth table and circuit diagram for a Half Adder. [3]  
(c) Convert the following Boolean expression into its canonical POS form: [2]  
F(A, B, C) = (B + C’).(A’ + B)

Q2

Question 6.  
(a) A passenger is allotted a window seat in an aircraft if he/she satisfies the criteria given below: [5]  
The passenger is below 15 years and is accompanied by an adult.  
or  
The passenger is a lady and is not accompanied by an adult.  
or  
The passenger is not below 15 years but is travelling for the first time.  
The inputs are:

|  |  |
| --- | --- |
| **Inputs** |  |
| A | The passenger is below 15 years age. |
| C | The passenger is accompanied by an adult. |
| L | The passenger is a lady. |
| F | The passenger is travelling for the first time. |

(In all the above cases 1 indicates yes and 0 indicates no).  
Output: W – Denotes the passenger is allotted a window seat (1 indicates yes and 0 indicates no)  
Draw the truth table for the inputs and outputs given above and write the SOP expression for W(A, C, L, F).  
(b) State the complement properties. Find the complement of the following Boolean expression using De Morgan’s law: [3]  
AB’ + A’ + BC  
(c) Differentiate between Canonical form and Cardinal form of expression. [2]