Chapter-1, Section-2

Exercise-09

Solution:

Let p be the proposition "The system is in multiuser state."

Similarly,

q be "The system is operating normally."

r be "The kernel is functioning."

s be "The system is in interrupt mode."

So, the system specifications can be written as,

$$p \longleftrightarrow q. \quad (1)$$

$$q \longrightarrow r. \quad (2)$$

$$\neg r \vee s. \quad (3)$$

$$\neg p \longrightarrow s. \quad (4)$$

$$\neg s. \quad (5)$$

S must be false, since ¬S has to be true for the above set of propositions to be consistent. Then, (4) is only true when ¬p is false or p is true. If p is true, then q must also be true, from the bi-implication in (1). In the same way, r is also true from the implication in (2). But we see that, proposition (3), ¬r ∨ S is only true when ¬r is true or r is false, since S is already false. So, we got ourselves a contradiction.

Therefore, the given system specifications are inconsistent.