

Algorithms – Q3 (20/11/23)

A library needs to store away some of its books (to make way for more computers). Each of the storage boxes can contain 100 books. The shelves to be stored have the following contents, and each shelf has to be stored in a single box.

Photography: 7 books

Fiction: 45 books

Pastimes: 13 books

History: 27 books

Art: 6 books

Computers: 19 books

Biographies: 44 books

Self-help: 15 books

Science : 21 books

- (i) Apply the First-fit algorithm.
- (ii) Apply the First-fit Decreasing algorithm.
- (iii) Apply the Full bins method.

Solution

(i) Box 1: 7, 45, 13, 27, 6 (98)

Box 2: 19, 44, 15, 21 (99)

(ii) In decreasing order: 45, 44, 27, 21, 19, 15, 13, 7, 6

Box 1: 45, 44, 7 (96)

Box 2: 27, 21, 19, 15, 13 (95)

Box 3: 6

[So the First-fit Decreasing algorithm can, in some cases, be less effective than the First-fit algorithm.]

(iii) For example,

Box 1: 7, 45, 15, 27, 6 (100)

Box 2 : 13, 19, 44, 21 (97)