Questions: 1, 3, 5, 7, 9, 11, 13, 15 and 16

1.

Platter – computer hard disk consists of one or more circular aluminum disks called platter. Both surfaces of platter are coated with a magnetic substance which can be magnetized to store data bit by bit. (Recording Surface)

Track – each surface of the platter is divided into concentric rings which are called tracks, and these are divided into sectors. Tracks are used for finding information on hard disk, for example data is stored at “Surface 2, Track 7, Sector 4”.

Cylinder – each surface has a head mechanism to read and write data. If the head for one surface is on a track 1, the other heads for other surfaces are also on track 1, those tracks taken together are called a cylinder. All of them make up a form of cylinder if you try to imagine that scene.

Read/Write Head – standard hard drive has an “access-arm mechanism” with arms that can reach in between the disks. At the end of each arm are two read/write heads, one for storing and retrieving data from the recording surface above the arm and the other for the surface below the arm. Reads and writes data bit by bit.

It is important to understand that the entire access-arm mechanism always moves as a unit in and out, so the read/write heads are always aligned exactly one above the other in a straight line, forms shape of a cylinder.

3.

Move the access-arm mechanism to correct cylinder from its current position.

Selecting the needed head to access the required track of the cylinder.

Waiting for the desired data on the track to arrive on spinning platter.

Read data from the disk to primary memory.

5.

Index – list of pointers to correct data location on the hard drive, sometimes called direct access method. Important portions of data are copied to separate location without affecting the original data itself. Sorted alphabetically with pointers to location of full version of original data on the hard drive.

Same as book’s index, book is a storage medium, there is an index at the back of the book, sorted alphabetically by item or topics of the book. When we want to find something we quickly go over the index which is in alphabetical order and we go through it quickly, finding the correct topic we looking for – and next to it we will find a page number, which will point us to correct page with desired topic. Information System’s index work similarly to the book’s index.

7.

Index-sequential file – the file which is stored on the disk, in order based on a set of field values and an index is built over that same field. This allows both sequential and direct access by the key field, which can be an advantage when applications with different retrieval requirements share the file.

9.

Let’s say we are looking for number 361 using B+-tree index. Search routing would start at the root and scan its key values from left to right, looking for the first key value greater than or equal to 361. When that number is found, could be anything like 369 or so, the routine then will follow the pointer associated with key value 369 to the second three index records at the next level, and so on. So basically it will go following the same rule as described until the record is found. (Or it will stop if record is not in there)

11.

A. Yes (B+-tree indexes can be and are used to also index non-key, non-unique fields)

B. Yes

C. Yes

D. No, but query will slow down with many indexes.

E. When new record is inserted into a file, an existing record is deleted, or an indexed field is updated, all of the affected indexes must be updated.

F. No

13.

In the division-reminder method, we divide the key value of the record that we want to insert or retrieve by the number of record locations that we have reserved. We perform the division, discard the quotient, and use the reminder to tell us where to locate the record.

15.

Physical database design is the process of modifying a database structure to improve the performance of the run-time environment, ranging from simply adding indexes to making major changes to the table structures.

16.

Physical database design is necessary for performance. Regardless of how elegant an application and its database structures are, if the application runs so slowly that it is unacceptable in the business environment, it will be a failure.