

# AEC 1

## Multiple Choice

Identify the choice that best completes the statement or answers the question.

- \_\_\_ 1. Why was automatic exposure control (AEC) originally developed?
  - a. To decrease the need for technique charts
  - b. To make the radiographer more of a "button pusher"
  - c. To reduce repeats and improve image quality
  - d. To increase productivity and patient dose
  
- \_\_\_ 2. Which automatic exposure device works by using a gas-filled chamber?
  - a. Phototimer
  - b. Diode sensor
  - c. Ionization chamber
  - d. Bucky proliferator
  
- \_\_\_ 3. Where is the sensor located in an automatic exposure device with a gas-filled chamber?
  - a. In front of the patient
  - b. Behind the Bucky tray
  - c. In front of the image receptor
  - d. On the tabletop
  
- \_\_\_ 4. Which exposure variable is controlled by the automatic exposure control device?
  - a. kVp
  - b. Focal spot size
  - c. Seconds
  - d. mA
  
- \_\_\_ 5. What describes the shortest exposure time required for the AEC device to operate?
  - a. Backup time
  - b. Minimum response time
  - c. Master density time
  - d. A and C
  
- \_\_\_ 6. AEC eliminates the need for the radiographer to select the actual \_\_\_\_\_ the examination will require.
  - a. kVp
  - b. SID
  - c. Exposure time
  - d. Focal spot size
  
- \_\_\_ 7. When using AEC, what should the radiographer adjust to manipulate the contrast of the image?
  - a. kVp
  - b. Detector selection
  - c. Exposure time
  - d. Focal spot size
  
- \_\_\_ 8. What is the appropriate setting for backup time/mAs?
  - a. 50% of the expected mAs
  - b. 100% of the expected mAs
  - c. 150% of the expected mAs
  - d. 400% of the expected mAs

- \_\_\_ 9. What is the purpose of setting a backup time/mAs?
- To prevent excessive exposure of the patient
  - To make certain the contrast is acceptable if the chosen kVp is too low
  - To make certain the density is acceptable if the patient moves
  - To prevent the selection of the wrong detector
- \_\_\_ 10. What does *APR* stand for?
- All programming radiology
  - Anatomically programmed radiography
  - Accurately positioned radiographs
  - None of the above
- \_\_\_ 11. When doing a CR study using AEC, what will happen to the brightness in the area of interest when changing from the -1 to +1 density setting?
- Brightness will increase.
  - Brightness will decrease.
  - Brightness will not change.
- \_\_\_ 12. When doing a CR study using AEC, what will happen to the patient exposure when changing from the -1 to +1 density setting?
- Patient exposure will increase.
  - Patient exposure will decrease.
  - Patient exposure will not change.
- \_\_\_ 13. In order to become familiar with manual technical factors (i.e., setting mAs and kVp and not using AEC), it is very helpful to pay attention to the:
- Exposure time
  - Heat units
  - Density control
  - mAs readout
- \_\_\_ 14. With modern x-ray equipment, the AEC system's minimum response time is typically:
- 1 ms
  - 10 ms
  - 50 ms
  - 100 ms
- \_\_\_ 15. The mAs readout:
- Is of little value because it's not necessary to know mAs when using AEC
  - Reports the actual mAs used for an exposure
  - Reports the patient dose for the entire imaging study
  - Allows the radiographer to better set the mAs for an AEC examination
- \_\_\_ 16. With a CR system, when using AEC to image a patient who is having difficulty holding still, increasing the mA (if the unit allows) will:
- Be a bad idea because the patient will be overexposed
  - Be a bad idea because the patient will be underexposed
  - Be a good idea because the exposure time will increase
  - Be a good idea because the exposure time will decrease
- \_\_\_ 17. If the backup time/mAs is automatically set by the x-ray unit, the exposure should end when a maximum of \_\_\_\_\_ has been reached.

- a. 600 s
- b. 600 kVp
- c. 600 mA
- d. 600 mAs

\_\_\_\_\_ 18. When doing a tabletop forearm study with CR, you should:

- a. Use AEC
- b. Set manual technique
- c. A and B
- d. None of the above

\_\_\_\_\_ 19. When a digital IR is overexposed due to poor use of AEC:

- a. Image contrast will be increased.
- b. Quantum noise may be highly visible.
- c. Patient exposure is increased.
- d. Patient exposure is unaffected.

\_\_\_\_\_ 20. Exposure time will \_\_\_\_\_ using AEC when patient thickness decreases.

- a. Decrease
- b. Remain the same
- c. Increase
- d. Double

## AEC 1 Answer Section

### MULTIPLE CHOICE

1. ANS: C  
The purpose of AEC is to produce consistently quality images, thereby requiring fewer repeats.  
  
PTS: 1                    OBJ: 3
2. ANS: C  
The ionization chamber contains air and, when exposed to x-radiation, creates an electrical charge due to ionization.  
  
PTS: 1                    OBJ: 4
3. ANS: C  
The ionization chamber is located immediately in front of the image receptor, measuring radiation after it has passed through the patient, tabletop, and grid.  
  
PTS: 1                    OBJ: 4
4. ANS: C  
AEC only controls the length of the exposure (seconds). The radiographer must select the appropriate focal spot size, kVp, and mA (some units).  
  
PTS: 1                    OBJ: 3
5. ANS: B  
Minimum response time is the minimum amount of time that it takes for the exposure to be terminated.  
  
PTS: 1                    OBJ: 3
6. ANS: C  
The role of AEC is to terminate the exposure at the right time. The radiographer must still select the SID, kVp, and focal spot size appropriate to the exam.  
  
PTS: 1                    OBJ: 3
7. ANS: A  
As with radiography in general, kVp is the controlling factor for image contrast.  
  
PTS: 1                    OBJ: 7
8. ANS: C  
Backup time should be set at 150% to 200% of the expected exposure time (or mAs).  
  
PTS: 1                    OBJ: 7
9. ANS: A  
The backup time or mAs is the maximum amount of time that the x-ray exposure will stay on while using AEC. This is a safety mechanism to protect the patient from excessive exposure.  
  
PTS: 1                    OBJ: 7
10. ANS: B  
APR, or anatomically programmed radiography, is a system of preprogrammed technical factors that are displayed once a specific anatomic area and position (i.e., PA chest, oblique knee) is selected.

- PTS: 1                    OBJ: 12
11. ANS: C  
Changing the density settings from -1 to +1 will result in no change in the brightness of the CR image, because the computer will automatically adjust for the additional exposure to the imaging plate.
- PTS: 1                    OBJ: 7
12. ANS: A  
Changing the density settings from -1 to +1 will require more radiation to be detected before the exposure is terminated. Whether using film-screen or CR, the patient will receive additional exposure in order to make that happen.
- PTS: 1                    OBJ: 10
13. ANS: D  
The mAs readout will briefly show the exact amount of mAs used for the previous exposure. It is important for the radiographer to pay attention to this readout so that there's a greater familiarity with the mAs needed to produce optimal images.
- PTS: 1                    OBJ: 3
14. ANS: A  
The minimum response time for most of today's equipment is 1 ms.
- PTS: 1                    OBJ: 3
15. ANS: B  
The mAs readout shows the actual mAs used for the exposure just made. Awareness of this value helps in producing non-AEC images.
- PTS: 1                    OBJ: 3
16. ANS: D  
Increasing the mA will result in a shorter exposure time, always helpful in reducing the impact of patient motion. The exposure to the patient and IR will remain the same.
- PTS: 1                    OBJ: 7
17. ANS: D  
It is required that x-ray units with AEC have a preset backup time or mAs which is 600 mAs.
- PTS: 1                    OBJ: 10
18. ANS: B  
AEC cannot be used when the IR is tabletop, so mAs and kVp must be set manually.
- PTS: 1                    OBJ: 3
19. ANS: C  
Overexposing the digital IR means that the patient was overexposed as well, even if the image quality is satisfactory.
- PTS: 1                    OBJ: 10
20. ANS: A  
Whether digital or film-screen imaging is being done, it will require a shorter exposure time for sufficient radiation to exit a thinner patient.

PTS: 1

OBJ: 7