

**BIOMEDICAL INSTRUMENTATION**

**SYSTEMS**

**INSTRUCTOR SOLUTIONS MANUAL**

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NOTE TO INSTRUCTORS:

The author has **intentionally** left out pertinent information in certain areas of the textbook. The intent here is to encourage students to use the Internet to search out this missing information when working on some of the quiz and the end-of chapter problems. In some cases, the student must assume a proper value of the parameter. This provides insight to a given problem.

Similarly, solutions to some of the end-of-chapter problems have not been included in this Solutions Manual. The intent here is to encourage instructors and students to work together to find the answers to these problems when necessary.

Note that the symbol used to represent multiplication is an asterisk (\*), the symbol used for division is a slash (/), and the symbol used for subtraction is a hyphen (-).

## **CHAPTER 1**

### **QUIZ ANSWERS:**

- 1) b) Brain waves
- 2) b) Heart
- 3) c) Safety
- 4) a) True
- 5) d) Asking the patient a series of questions
- 6) b) False
- 7) b) CT scans
- 8) b) Positron emission tomography
- 9) The main responsibility of a Respiratory Therapist is: to work with patients requiring respiratory and cardiopulmonary care.
- 10) The main responsibility of a Circulation Therapist is: to work with surgeons managing heart-lung machines or cardiopulmonary assist devices.

### **PROBLEMS ANSWERS:**

- 1) There are several biomedical engineering societies or organizations that publish information about major hospital machines on a regular basis.
- 2) Use the Internet or ask a Respiratory technologist

- 3) Ask a BMET technician in a hospital
- 4) Interview an RN
- 5) Use the Internet to research information on biohazards
- 6) Contact a biomedical engineering society
- 7) Use the Internet to research information on government agencies that regulate hospital medical devices.
- 8) Ask a physician or a BMET technician about their PDA use in hospitals
- 9) Matching:

Professional responsibility	Health care provider
Diagnosis of eye diseases	c) Ophthalmologist
Women's sexual health	f) Gynecologist
Treatment of urinary diseases	i) Nephrologist
Diagnosis of cancer	g) Oncologist
Reading CT scans	a) Radiologist
Treatment of lung problems	j) Respiratory therapist
Treatment of arthritis	h) Rheumatologist
Diagnosis of feet disorders	e) Podiatrist
Cardiopulmonary care	b) Pulmonologist
Correction of joints	d) Orthopedic surgeon

- 10) Matching:

Health care provider	Professional responsibility
Dermatologist	e) Prevention of skin diseases
Occupational specialist	c) Treatment of workplace illnesses
Gastroenterologist	a) Diagnosis of upper GI
Otolaryngologist	b) Treatment of head or neck diseases
Endocrinologist	d) Treatment of gland diseases

## **CHAPTER 2**

### **QUIZ ANSWERS:**

1. c) Lungs
2. b) False
3. a) Sagittal plane
4. d) All of the above
5. c) Pericardium
6. b) SA node
7. d) None of the above
8. a) Myelitis
9. Pulmonary edema is: fluid accumulation in the lungs
10. Arteriosclerosis occurs when the arterial walls thicken because of the loss of elasticity

### **PROBLEMS ANSWERS:**

Students should research the answers for Problems 1-5 on their own.

6. Matching:

Function	Body part
Moving muscles	d) Brain

Filtering water from blood plasma	a) Glomerulus
Storing vitamins	e) Liver
Storing bile	c) Gallbladder
Receiving oxygenated blood	b) Left atrium

Students should research the answers for Problems 7-10 on their own.

### **CHAPTER 3**

#### **QUIZ ANSWERS:**

1. b) EEG
2. The three signal parameters are: amplitude, frequency, and phase
3. c)  $3\sin(628 \text{ radians}) = 3*(-0.313) = -0.939$ , or  $-0.94$
4. b) 128
5. d) 80 Hz
6. -30 mV to 50 mV
7. d) None of the above
8. The number of harmonics increases as pulse width decreases
9. a) 6,000 (a 100Hz sampling rate = 100 samples per second)
10.  $0.15625 \text{ V} = 10 \text{ V} \text{ divided by } 2^6$