MCQ on Biomedical instrumentation

Branch: EE/EEE/ETC (6TH sem)

1. Source of Bioelectric potential is _____ in nature.
a) Electronic
b) electric
c) **ionic**
d) mechanical

2. The principal ion that is not involved with the phenomena of producing cell potentials is _____
a) sodium
b) potassium
c) chlorine
d) **hydrogen**

3. What is the relatively static membrane potential of quiescent cells called?
a) Half-cell potential
b) action potential
c**) resting membrane potential**
d) cell potential

4. The variation of the electrical potential associated with the passage of a pulse along the membrane of a muscle cell or a nerve cell is called _____
a) muscle potential
b) **action potential**
c) resting potential
d) half cell potential

5. Cells depolarize and action potential in generated as soon as a stimulus is applied.
a) True
b) **False**

6. After a cell is stimulated, a finite period of time is required for the cell to return to its pre-stimulus state. This period is known as _____
a) restoration period

b**) refractory period**
c) regain period
d) regenerative period

7. Electrooculography (EOG/E.O.G.) is a technique for measuring what?
a) Abnormal function of the retina
b) heart rate
c) respiration rate
d**) cornea-retinal standing potential**

8. EKG stands for _____
a) **Electrocardiography**
b) Electroencephalography
c) Electromyography
d) Electrtokinetcography

9. Phonocardiography is listening to _____
a) arm muscle sound
b) lungs sound
c) **heart sound**
d) respiratory tract sound

10. The filter used to reject the 50Hz noise picked up from power lines or machinery is called?
a) band reject filter
b) band stop filter
c) **notch filter**
d) all reject filter

11. Devices that pass the signal from its source to the measurement device without a physical or galvanic connection by using transformer, optical or capacitive coupling technique are called?
a) filters
b) rectifiers
c) bridges
d) **isolators**

12. Which of the following technique is not employed in isolation devices?
a) **Resistance**
b) optical
c) inductance
d) capacitance

13. Besides breaking ground loops, isolation blocks high voltage surges and rejects high common mode voltages.
a) **True**
b) False

14. Strain gauges are resistance devices in a Wheat stone bridge configuration _____
a) which does not require bridge completion circuitry and an excitation source
b) **which requires bridge completion circuitry and an excitation source**
c) which neither requires bridge completion circuitry nor an excitation source
d) which requires bridge completion circuitry but does not an excitation source

15. Which of the following voltage regulator IC gives a variable positive voltage?
a) **LM317**
b) LM337
c) 7805
d) 7812

16. _____ IC is a variable negative voltage regulator.
a) 7912
b) 7905
c) **LM337**
d) LM317

17. Digital filters are sensitive to temperature as compared with analog filters.
a) True
b) **False**

18. Signal conditioning is not of much importance in the measuring and recording system.

a) True
b) **False**

19. Electrodes make a transfer from the _____ in the tissue to the electronic conduction which is necessary to make measurements.
a) electronic conduction
b) **ionic conduction**
c) electric conduction
d) impulsive conduction

20. Surface electrodes damage the living tissues.
a) True
b) **False**

21. Deep-seated electrodes indicates the electric potential difference arising _____ the living tissues or cells.
a) **Inside**
b) outside
c) around
d) adjacent

22. Impedance pneumography is a commonly-used technique to monitor a person's _____
a) **respiration rate**
b) heart rate
c) pulse rate
d) skin impedance

23. Electrode paste _____
a) increases contact impedance
b) equates contact impedance
c**) reduces contact impedance**
d) absorbs contact impedance

24. All electrode potentials are measured with respect to which reference electrode?
a) hydrogen electrode

b) platinum electrode
c) calomel electrode
d**) hydrogen absorbed on platinum electrode**

25. What is the frequency range of ECG?
a) 70-120 Hz
b**) 0.05-120 Hz**
c) 5-120 Hz
d) 12-120 Hz

26. What is the signal amplitude of EEG?
a**) 2-200 µV**
b) 2-200mV
c) 2-2000 µV
d) 2-2000mV

27. Needle electrode is used to measure _____
a) EKG
b) EEG
c) EOG
d**) EMG**

28. From equipment point of view, the respiratory system in the human body is a _____ system.
a) Hydraulic
b) **pneumatic**
c) mechanical
d) electrical

29. Off-set potential is _____
a) **difference in half-cell potentials between two electrodes**
b) sum of half-cell potentials between two electrodes
c) average of half-cell potentials between two electrodes
d) complement of half-cell potentials between two electrodes

30. Which of the following is not preferred for electrode making?
a) Ag-AgCl

b) Copper
c) **Stainless-steel**
d) Gold

31. Which of the following statement is false about polarizable electrodes?
a) they are made using stainless steel
b) used for recording resting ECG
c) retain a residual charge when exposed to large pulse of energy
d) **can transmit small bioelectric signals even after getting exposed to large pulse of energy**

32. Which electrodes can work even after being induced to large electric discharge such as defibrillation?
a) polarizing electrodes
b) magnetic electrodes
c) **non-polarizing electrodes**
d) electrolytic electrodes

33. On increasing the chloride deposit the Ag-AgCl electrode _____
a**) increases the impedance**
b) reduces impedance
c) has no effect on impedance
d) cannot be determined

34. Ag-AgCl electrodes are _____
a) polarized
b**) non-polarized**
c) partially polarized
d) cannot be said

35. Silver -Silver Chloride electrodes are prepared by the process of _____
a) centrifugation
b) etching
c) manually
d**) electrolysis**

36. Electrocardiography was invented by _____

a**) Willem Einthoven**

b) Robert Koch

c) Werner Forssmann

d) Gertrude B.Elion

37. MRI stands for _____

a) Mechanical Resonance Imaging

b) **Magnetic Resonance Imaging**

c) Mutually Related Imaging

d) Magnetic Resultant Imaging

38. The interior of the neuron is at a potential of about _____ mV relative to the exterior.

a**) -70**

b) +70

c) -170

d) +170

39. Tricuspid valve is also called _____

a) Left Atrio-ventricular valve

b**) Right Atrio-ventricular valve**

c) Pulmonary valve

d) Cardiac valve

40. From instruments point of view, heart is a _____ system.

a) pneumatic

b) electric

c) electronic

d) **hydraulic**

41. The basic functional unit of nervous system is _____

a) nerves

b) axon

c) **neuron**

d) dendrite

42. The material used in limb surface electrode is _____

a**) German silver**
b) Copper
c) Gold
d) Platinum

43. Welsh cup electrodes have _____
a) low contact impedance
b) negligible contact impedance
c**) high contact impedance**
d) zero contact impedance

44. In floating electrodes metal electrode does not make direct contact with the skin.
a**) True**
b) False

45. The main design feature of pregelled disposable electrodes which helps to reduce the possibility of artefacts, drift and baseline wandering is _____
a) low absorbency buffer layer with isotonic electrolyte
b**) high absorbency buffer layer with isotonic electrolyte**
c) high absorbency buffer layer without isotonic electrolyte
d) low absorbency buffer layer without isotonic electrolyte

46. Recording electrical activities associated with heart is known as _____
a) EEG
b) EOG
c) EMG
d) **ECG**

47. Buffer amplifier converts _____
a) low impedance signals to high impedance signals
b**) high impedance signals to low impedance signals**
c) ac impedance signals to dc impedance signals
d) dc impedance signals to ac impedance signals

48. Which of the following is a wireless ECG acquiring system?
a) pregelled disposable electrodes

b) limb electrodes
c) pasteless electrodes
d**) smart pad**

49. Before placing the electrodes the skin should be _____
a) wet
b**) dry**
c) hairy
d) oily

50. Which of the following is a preferred electrode for measuring EMG?
a) surface electrodes
b**) needle electrodes**
c) pregelled electrodes
d) scalp electrodes

51. Generally what is the material of needle electrodes?
a**) Stainless steel**
b) copper
c) lead
d) iron

52. Monopolar needle electrodes are having coatings of which material over the stainless steel wires which are bare only at the tips?
a) carbon
b) calcium
c) sodium
d) **Teflon**

53. Which electrode can be used to pick up signals from individual fibers of muscle tissues?
a) biopolar needle electrode
b) concentric core needle electrode
c) **multi-element needle electrode**
d) monopolar needle electrode

54. _____ instrument is used to hold patients head and guide the placement of electrodes.
a) Monotaxic
b) Stereotonic
c) **Stereotaxic**
d) Monotonic

55. Number of cloud deployment models that are recognized are _____
a) 2
b) 5
c) **3**
d) 4

56. The ground electrode is usually positioned over which body structures?
a) **bony**
b) hairy
c) fleshy
d) sweaty

57. When intramuscular EMG is required to look into the electrical activities of deeper or overlaid muscles, _____ electrodes are used.
a) plate shape electrodes
b) surface electrodes
c) thin thread electrodes
d**) fine wire electrodes**

58. The contraction of the skeletal muscles results in the generation of action potential in the individual muscle fibers. Record of this action potential is called _____
a) ECG
b**) EMG**
c) EEG
d) EKG

59. In voluntary contraction of the skeletal muscles, the muscle potential ranges from _____
a**) 50 uV – 5 mV**

b) 50 mV – 5 V
c) 0.05 uV – 2 mV
d) 50 mV – 500 mV

60. Electrodes to measure EEG are placed on _____
a) forehead
b) **scalp**
c) cheek
d) ears

61. According to the international 10/20 system to measure EEG, even number denotes which side of the brain?
a) left
b) top
c) bottom
d) **right**

62. Letter F in the EEG electrode placement system denotes?
a) front
b) face
c) **frontal lobe**
d) fast

63. Normal EEG frequency range is _____
a) 50-500Hz
b**) 0.5-50HZ**
c) 0.05-5Hz
d) 1-200Hz

64. The letter T in the EEG electrode placement system denotes?
a) **temporal lope**
b) temper lobe
c) trace
d) timpanic

65. According to the international 10/20 system to measure EEG, odd number denotes which side of the brain?

a) **left**
b) right
c) top
d) front

66. The delta wave in EEG ranges from _____
a) **0.5-4Hz**
b) 4-8Hz
c) 8-13Hz
d) 13-22Hz

67. Disturbance in the EEG pattern resulting from the external stimuli is called _____
a) provoked response
b) ckoored response
c) **evoked response**
d) impulse response

68. The peak to peak amplitude of the waves that can be picked from the scalp is _____
a) 100mV
b) 100V c) **100uV**
d) 10mV

69. Which rhythm is the principal component of the EEG that indicates the alertness of the brain?
a) theta rhythm
b) gamma rhythm
c) beta rhythm
d**) alpha rhythm**

70. Which type of electrodes are employed to study the electrical activities of individual cells?
a) milli-electrodes
b**) micro-electrodes**
c) surface-electrodes
d) pre-jelled electrodes

71. Glass micro-capillaries are a type of micro electrode.
a) **True**
b) False

72. Metallic micro electrodes have impedance _____ compared to conventional electrodes?
a) equal
b) smaller
c) high
d**) very high**

73. Which of the following metal is preferred for manufacturing micro electrodes?
a) Stainless steel
b) **Tungsten**
c) Iron
d) Copper

74. _____ are devices which convert one form of energy into another.
a**) transducers**
b) electrodes
c) impulses
d) opamp

75. Which type of transducer requires energy to be put into it in order to translate changes due to the measurand?
a) active transducers
b**) passive transducers**
c) powered transducers
d) local transducers

76. Active transducers work on the principle of _____
a**) energy conversion**
b) mass conversion
c) energy alteration
d) volume conversion

77. Accuracy is _____
a) ability of the transducer or sensor to see small differences in reading
b) ability of the transducer or sensor to see small differences in reading
c) **algebraic difference between the indicated value and the true or theoretical value of the measurand**
d) total operating range of the transducer

78. The smallest change in measurant that will result in a measurable change in the transducer output is called _____
a) offset
b) linearity
c) resolution
d**) threshold**

79. Unwanted signal at the output due either to internal sources or to interference is called _____
a) offset
b) **noise**
c) drift
d) threshold

80. The ability of the sensor to see small differences in reading is called _____
a**) resolution**
b) drift
c) offset
d) linearity

81. Change is signal over long period of time is called _____
a) noise
b) offset
c) hysteresis
d**) drift**

82. Linearity of transducer is _____
a) Closeness of the transducer's calibration curve to a special curved line within a given percentage of full scale output
b) **Closeness of the transducer's calibration curve to a special straight line**

within a given percentage of full scale output
c) Closeness of the transducer's calibration curve to a special straight line within a given percentage of half scale output
d) Closeness of the transducer's calibration curve to a special curved within a given percentage of half scale output

83. The minimum input of physical parameter that will create a detectable out change is called _____
a) threshold
b) **sensitivity**
c) span
d) precision

84. The total operating range of the transducer is called _____
a) **span**
b) threshold
c) offset
d) drift

85. Hysteresis is no change in output with the same value of input.
a) True
b) **False**

86. The region in which the output does not changes with increase in input is called _____
a) input range
b) threshold
c) offset
d) **saturation**

87. Ability of the sensor to repeat a measurement when put back in the same environment is called _____
a) conformance
b) saturation
c) **repeatability**
d) threshold

88. Closeness of a calibration curve to a specified curve for an inherently non linear transducer is called _____

a) **conformance**
b) linearity
c) saturation
d) hysteresis

89. The range between the maximum and minimum values is applied to a parameter which can be measured is _____

a) repeatability
b) **span**
c) input range
d) output range

90. Which of the following is not a static property?

a) repeatability
b) hysteresis
c) **frequency response**
d) saturation

91Time for the sensor to reach a stable output once it is turned on is called _____

a) frequency response
b) span
c) response time
d) **settling time**

92. Which of the following is not a dynamic property?

a) frequency response
b) **saturation**
c) settling time
d) response time

93. Potentiometer works on which of the following principle?

a**) variable resistance**
b) variable inductance

c) variable capacitance
d) variable electromagnet

94. On increasing the distance between the plates of a variable capacitor, the displacement- capacitance characteristics changes _____
a) proportionally
b) linearly
c) exceptionally
d) **hyperbolically**

95. Lateral displacement of capacitance plates with respect to each other gives linear displacement capacitance characteristics.
a) **True**
b) False

96. LVDT stands for _____
a) Linear Virtual Double Transformer
b) Linear Virtual Differential Transducer
c) Linear Variable Differential Transducer
d**) Linear Variable Differential Transformer**

96. LVDT works on the principle of _____
a) variable resistance
b) **variable inductance**
c) variable capacitance
d) variable pressure

97. In LVDT the secondary coils are energized with sine wave oscillator.
a) True
b) **False**

98. How many coils are required to make LVDT?
a) 4
b) 6
c) 3
d) 2

99. LVTD is a _____ transducer.
a) **displacement**
b) photoelectric
c) thermal
d) chemical

100. Which of the following is a displacement transducer?
a) Thermistor
b**) LVDT**
c) Strain gauge
d) Thermocouple

101. Linear encoders gives _____ output.
a) angular
b**) analog**
c) digital
d) unstable

102. Which of the following is not a piezo-electric material?
a) quartz
b) rochelle salt
c) **aluminium**
d) barium titanate

103. Piezo-electricity is _____
a) sound electricity
b) **pressure electricity**
c) temperature electricity
d) photo electricity

104. On applying electricity to piezo-electric material mechanical deformation occurs in the material.
a) **True**
b) False

105. Which of the following is a material employed making diaphragm to measure pressure?

a) tourmaline
b) barium titanate
c) **phosphor bronze**
d) zirconate titanate

106. Principle behind strain gauge is _____
a) **variable resistance**
b) variable inductance
c) variable capacitance
d) variable contact area

107. On applying pressure to piezo-electric crystal, electricity is not generated.
a) True
b**) False**

108. The figure of merit which describes the overall behaviour of the wire under stress is determined from?
a) elastic modulus
b) **gauge factor**
c) elastic factor
d) gauge resistance

109. Gauge factor is defined as _____
a**) (incremental change in resistance due to stress/resistance of an unstretched wire)*(unstretched length of wire/incremental change in length**)
b) (incremental change in resistance due to strain/resistance of an unstretched wire)*(unstretched length of wire/incremental change in length)
c) (incremental change in resistance due to stress/resistance of an unstretched wire)*(incremental change in length/unstretched length of wire)
d) (resistance of an unstretched wire/incremental change in resistance due to stress)*(unstretched length of wire/incremental change in length)l

110. Compensation for temperature variation in the leads can be provided by using _____ lead method.
a) six
b) four

c) **three**
d) two

111. Strain gauge is used to measure _____
a) temperature
b) **pressure**
c) height
d) displacement

112. Sudden involuntary drop in body core temperature below 35*C (95*F) is called _____
a) Accidental hyperthermia
b) Accidental misothermia
c) Accidental exothermia
d) **Accidental hypothermia**

113. Which of the following has the widest range of temperature measurement?
a) RTD
b) **Thermocouple**
c) Thermistor
d) Mercury thermometer

114. The junction at a higher temperature in thermocouple is termed as measuring junction.
a) **True**
b) False

115. When two wires of different material are joined together at either end, forming two junctions which are maintained at a different temperature, a thermo-motive force is generated causing a current to flow around the circuit. This arrangement is called _____
a) thermal pair
b) thermistor
c**) thermocouple**
d) thermostat

116. When two wires of different material are joined together at either end, forming two junctions which are maintained at a different temperature, a _____ force is generated.

a**) thermo-motive**

b) electro-motive

c) chemical reactive

d) mechanical

117. The junction at a lower temperature in the thermocouple called measuring junction.

a) True

b**) False**

118. The lower temperature junction in thermocouple is maintained at _____

a) -273 K

b) 0 K

c) -327 K

d**) 273 K**

119. The resistance Rt of a metallic conductor at any temperature t is given by _____

a) **Rt = Ro(1+αt)**

b) Rt = Ro(1-αt)

c) Rt = Ro(αt-1)

d) Rt = Ro(10+αt)

120. RTD stands for _____

a) resistance temperature device

b) **resistance temperature detector**

c) reluctance thermal device

d) resistive thermal detector

121. Thermister is used to measure _____

a) t**emperature**

b) pressure

c) height

d) displacement

122.What is the principle behind photoelectric transducers?
a) conversion of wind energy to electrical energy
b**) conversion of light energy to electrical energy**
c) conversion of mechanical energy to electrical energy
d) conversion of electrical energy to light energy

123. Which of the following material is used to build photovoltaic cells?
a) **Selenium**
b) celenuim
c) silicon
d) iron

124. Selenium cells are sensitive to almost the entire range of wavelengths of the spectrum.
a) **True**
b) False

125. Which of the following is not a photo emissive cell?
a) high vacuum photocells
b) barrier layer cell
c) **gas-filled photocell**
d) photomultiplier tubes

126. Photo-diodes work in _____
a) forward biased
b) **reverse biased**
c) independent of forward and reverse biasing
d) any configuration

127. Photovoltaic cells need an external electrical supply to function.
a) True
b) **False**

128. The instruments which give a direct reading of the temperature at the thermistor position are known as _____
a) thermistor
b) **telethermometers**

c) rtd
d) tempothermometer

129. Which of the following is a photoemissive cell?
a) **photomultiplier tubes**
b) barrier layer cell
c) galvanic cell
d) rochell-salt cell

130. Cesium-silver oxide cells are sensitive to the near infrared wavelengths.
a**) True**
b) False

131. Thermister is used to measure _____
a) temperature
b) pressure
c) height
d) displacement

132. Optical fiber sensors are electrically _____
a) active
b) **passive**
c) active as well as passive
d) cannot be determined

133. Optical fibers are not immune to _____
a) electronic disturbances
b) magnetic disturbances
c) **ambient light interference**
d) electromagnetic disturbances

134. Optical fiber sensors are not immune to electromagnetic disturbances.
a) True
b**) False**

135. In which of the following optic fiber sensor the fiber is simply used to carry light to and from an external optical device where the sensing takes place?
a) **extrinsic fiber optic sensor**

b) energized fiber optic sensor
c) all fibers are used to simply carry light to and from the external optical devices
d) intrinsic fiber optic sensor

136. On the bases of application of optic fiber sensor, which of the following is not considered to be the classification of fiber optic sensor?
a) biomedical/photometric sensors
b) physical sensors
c) **thermal sensors**
d) chemical sensors

137. The type of sensor that detects the analyte species directly through their characteristic spectral properties is called _____
a) chemical sensor
b) thermal sensor
c) light sensor
d) **spectroscopic Sensors**

138. A chemical transduction system is interfaced to the optical fibre at its end. This type of sensor is called?
a) **chemical sensor**
b) thermal sensor
c) photoelectric sensor
d) light sensor

139. Doppler velocimetry works on the principle of _____
a) **frequency measurement of fiber optic sensor**
b) amplitude measurement of fiber optic sensor
c) phase measurement of fiber optic sensor
d) time shift measurement of fiber optic sensor

140. Fluoroptic temperature sensors work on the principle of _____
a) thermistor
b) thermocouple
c) **optical fiber**
d) rtd

141. Monopolar needle electrode have a coating of which material over the stainless steel wires which are bare only at the tips?
a) carbon
b) calcium
c) sodium
d) **Teflon**

142. Endoscopic imaging uses _____
a) thermal sensors
b) chemical sensors
c**) optic fiber sensors**
d) pressure sensors

143. _____ converts biochemical events into measurable signals.
a) amplifier
b) opamp
c) rectifier
d**) transducer**

144. The biological response of the biosensor is determined by _____
a**) biocatalytic membrane**
b) physio-chemical membrane
c) chemical membrane
d) artificial membrane

145. Home blood glucose sensor works on which principle?
a) electro-physiological
b) **electrochemical**
c) physio-chemical
d) chemical

146. The chemical reaction of glucose with oxygen is catalyzed in the presence of _____
a) **glucose oxidase**
b) monoglucose carbodase
c) glusoce dioxidase
d) biglucose oxidase

147. Home blood glucose measurement devices measure the glucose level through non-invasive method.
a) True
b) False

148. Blood glucose level measurement device uses a biosensor works on the principle of electrochemical.
a**) True**
b) False

149. Which of the following is not a fundamental block in recording systems?
a) electrodes and transducers
b) signal conditioner
c) **analysis for the output**
d) writing system

150. In medical recorders, the signal of interest is of the order of _____
a) nanovolts
b) **microvolts**
c) megavolts
d) volts

151.In medical devices, the amplifiers that are used for the amplification purpose of the input signal must have _____
a) **low frequency response**
b) high frequency response
c) average frequency response
d) frequency response has no role to play in it

152. To achieve the low frequency response for medical applications, the amplifier configuration must contain?
a) higher resistance
b**) higher capacitance**
c) lower resistance
d) lower capacitance

153. Filter that amplifies frequency above a certain value is called?
a) low pass filter
b) high pass filter
c) band pass filter
d) band stop filter

154. _____ amplifies all the frequencies except those in a certain band.
a) high pass filter
b) low pass filter
c) band pass filter
d) **band stop filter**

155. Active filters use opamps in addition to passive components in order to obtain better performance.
a**) True**
b) False

156. Which of the following component is not a part of the passive filter?
a) resistor
b**) operational amplifier**
c) capacitor
d) inductor

157. Which amplifier will reject any common mode signal that appears simultaneously at both amplifier input terminal and amplifies only the voltage difference that appears across its input terminals?
a) ac coupled amplifiers
b**) differential amplifiers**
c) carrier amplifiers
d) dc amplifiers

158. Which amplifier has a limited frequency response?
a) differential amplifier
b) dc amplifiers
c**) ac coupled amplifiers**
d) carrier amplifiers

159. _____ are used with transducers which require an external source of excitation.
a) **carrier amplifiers**
b) dc amplifiers
c) ac coupled amplifiers
d) differential amplifier

160. DC amplifiers are employed with _____ feedback type.
a) positive
b) negative
c) depends on the application
d) can be any positive or negative does't matter

162. DC amplifiers are mostly used for very low level applications because they offer very less dc drift and high common mode rejection capabilities.
a) True
b**) False**

163. Chopper stabilized dc amplifiers are complex amplifiers having _____ amplifiers incorporated in the module.
a) 1
b) 2
c**) 3**
d) 4

164. Which of the following amplifier is employed with resistive transducers which require an external source of excitation?
a) differential amplifier
b) ac coupled amplifier
c) carrier amplifier
d) **dc bridge amplifier**

165. Chopper input dc amplifiersare preferred for low level inputs to instrumentation systems because of their high sensitivity, negligible drift and excellent common mode rejection capability.
a**) True**
b) False

166. Bio potential amplifiers have _____ input terminals.
a) 3 b) 4
c) 5 d) 6

167. The ability of the amplifier to reject common voltages on its two input leads is known as _____
a) common mode rejection rate
b) coupled mode rejection rate
c) **common mode rejection ratio**
d) coupled mode rejection ratio

168. CMRR is measured in _____
a) V/s
b**) dB**
c) dB/s
d) dB/ms

169. CMRR of the preamplifiers should be as high as possible.
a) True
b) False

170. . The common mode rejection for most op-amps is typically between _____
a) 10-50dB
b) 20-40dB
c) 60-90dB
d) 100-120dB

171. The output of differential gain is given by _____
a) (difference of the two input voltage)*(feedback resistance/input resistance)
b) (sum of the two input voltage)*(feedback resistance/input resistance)
c) (difference of the two input voltage)*(input resistance/feedback resistance)
d) (sum of the two input voltage)*(input resistance/feedback resistance)

172. In order to be able to minimize the effects of changes occurring in the electrode impedances, it is necessary to employ a preamplifier having a high input impedance.

a) True
b) False

173. he impedance of the input should be _____ in order to obtain high CMRR in the differential amplifier.
a) low
b) High
c) Does not matter
d) Very low

174. Which of the following statement is true for an instrumentational amplifier?
a) the input resistance of both the inputs is very high and does not change as the gain is varied
b) the input resistance of both the inputs is very low and does not change as the gain is varied
c) the input resistance of both the inputs is very high and does change as the gain is varied
d) the input resistance of both the inputs is very low and does change as the gain is varied

175. . Which of the following is not the property of the instrumentational amplifier?
a) Extremely high input impedance
b) Low bias and offset currents
c) High slew rate
d**) Very low CMRR**

176. The carrier amplifier consists of an oscillator and a capacitance coupled amplifier.
a) True
b) False

177. Electromagnetic coupling cannot be reduced by _____
a) shielding
b) wire twisting
c) **multiple grounding**
d) common grounding

178. Which on the following is not a type of isolation amplifier?
a) capactively coupled isolation amplifiers b) optically isolated isolation amplifiers
c**) resistive coupled isolation amplifiers**
d) transformer type isolation amplifiers

179. The isolation includes different supply voltage sources and different grounds on each side of the isolation barrier.
a) **True**
b) False

180. . _____ are commonly used for providing protection against leakage currents.
a**) Isolation amplifiers**
b) Differential amplifiers
c) Instrumentational amplifiers
d) Inverting amplifiers

181. The term _____ is used when referring to the frequency content of a signal.
a) angular momentum
b) spectrum
c) scope
d) bandwidth

182. The process of obtaining the spectrum of a given signal using the basic mathematical tools is known as _____
a) time domain analysis
b) mathematical analysis
c) **spectral analysis**
d) pseudo analysis

183. Most biomedical signals of practical interest can be decomposed into a sum of sinusoidal signal components. For the class of periodic signals, such a decomposition is called a _____ series.
a) fourier
b) discontinuous

c) continuous
d) frequency

184. For faithful reproduction of the input signal linearity over the required range of signal, amplitudes must be satisfied by the individual parts of the system.
a**) True**
b) False

185. CRO stands for _____
a) Common Ray Oscilloscope
b) **Cathode Ray Oscilloscope**
c) Cathode Ray Oscillator
d) Common Ray Oscillator

186. Which of the following is not a passive transducer?
a) Strain gauge
b) Ultrasonic transducer
c) IR sensor
d) Doppler effect transducer

187. _____ refers to the degree of repeatability of a measurant.
a) accuracy
b) precision
c) resolution
d) sensitivity.

188. AAMI stands for _____
a) American Association of Medical Instrumentation
b) **Association for the Advancement of Medical Instrumentation**
c) Association of American Medical Instrumentation
d) American Association of Measurement Instruments

189. How many kidneys does a human have?
a) one **b) two**
c) three d) four

190. The removal of waste products from blood plasma is performed by _____

a) kidney b) liver
c) heart d) lungs

191. The regulation of the composition of blood plasma is done by which of the following organ?
a) skin
b) heart
c) kidney
d) lung

192. Each kidney consists of about a million individual units, all similar in structure and function. These tiny units are called _____
a) nerves
b) neurons
c) capillaries
d**) nephrons**

193. Which of the following is the correct anatomical position of the kidney?
a) front of the abdominal cavity just below the diaphragm
b) **back of the abdominal cavity just below the diaphragm**
c) back of the abdominal cavity just above the diaphragm
d) front of the abdominal cavity just above the diaphragm

194. The total amount of glomerular filtrate is about _____ per day.
a) 180 liters
b) 18 liters
c) 18 ml
d) 180 ml

195. The amount of urine formed by an average kidney in one day is _____
a) 10-10.5 L
b) 10-15 ml
c) 1-1.5 L
d) 5 L

196. The frequency range of ECG is _____
a**) 0.05-150 HZ**

b) 500-1500 Hz
c) 5-500 kHz
d) 0.5-150 MHz

197. Which of the following amplifier circulatory is employed to reduce the hum noise generated by the power supply in the ECG circuit?
a) band pass filters
b) high pass filters
c) notch filters
d) low pass filters

198. The branch of medicine that deals with the provision and use of artificial devices such as splints and braces is _____
a) prosthetics
b) orthotics
c**) laproscopic**
d) augmentative communication

199. The sensitivity of an electrocardiograph is typically set at 10 mm/mV.
a**) True**
b) False

200. The volume of blood within the dialyzer is known as _____
a) secondary volume
b) quarterly volume
c) **priming volume**
d) residual volume

201. The ideal membrane should possess _____ to water.
a) low permeability to water
b) **high permeability to water**
c) medium permeability to water
d) high permeability to waste

202. The blood is a poor conductor of electricity.
a) True
b) False

203. In floating electrodes metal electrode does not make direct contact with the skin.
a) **True**
b) False

204. Which gas saturation is of great importance in clinical practice?
a**) oxygen**
b) carbon dioxide
c) hydrogen
d) nitrogen

205. Liquid part of blood is _____
a) Platelets
b) Red Blood Cells
c) White Blood Cells
d) Plasma

206. What does red blood cells contain for combining with a large volume of oxygen?
a) Proteins
b) **Haemoglobin**
c) Lipids
d) Platelets

207. . How much quantity of oxygen bound with haemoglobin in the normal arterial blood?
a) 20.3ml %
b) 21.5ml %
c) 19.4ml %
d) 20.1ml %

208. When blood is withdrawn from the subject under anaerobic conditions and measurement for oxygen saturation is made at a later time in the laboratory, the procedure is referred to as _____ oximetry.
a) in vitro
b) in vivo

c) transmission
d) reflection

209. For discrete blood samples, a spectrophotometric measurement of oxygen saturation can be made by which method?
a) in vitro
b) in vivo
c) transmission
d) cannot be determined

210. Which principle is used by ear oximeter usually?
a) in vivo
b**) transmission**
c) reflection
d) in vitro

211. Blood in _____ must be made similar to arterial Blood in composition.
a) heart
b) brain
c) ear
d) eyes

212. By keeping the ear warm, maximum vasodilatation is achieved.
a) True
b) False

213. What is time taken for the ear to become fully dilated after ear unit has been placed?
a) 5-10 min
b) 10-15 min
c) 15-20 min
d) 20-25 min

214. . Pulse oximetry is used to measure the oxygen level in blood & heart rate.
a) True
b) False

215. Which of the following instrument is used to measure the oxygen saturation level of blood in localized areas of oxygen?
a) Ear Oximeter
b) Pulse Oximeter
c) **Skin reflectance Oximeter**
d) Intravascular Oximeter

216. Who considered "Human tissues are composed of parallel semi-infinite layers of homogenous materials".
a) Cohen and Wadsworth
b**) Cohen and Logini**
c) Cohen
d) Wadsworth

217. Who has poorer signal-to-noise ratio?
a) Transmission Pulse Oximeter
b) **Reflection Pulse Oximeter**
c) Ear Oximeter
d) Pulse Oximeter

218. What was utilized around the light source to enhance the signal?
a) **Photodiodes**
b) Optical Shied
c) Ceramic Substrate
d) Red and infrared LED's

219. What are used as light source in Skin Reflectance Oximeter?
a) Photodiode
b) **Red and infrared LED's**
c) Flashtube
d) Arc Lamp

220. The reflected light from the skin at wavelengths of 665nm(red) and 935nm(infrared) is detected by _____
a) Photo diode
b) Laser diode

c) **Silicon diode**
d) Zener diode

221. What is incorporated in sensor to warm the tissue so as to increase local blood flow?
a) heater
b) heating plate
c) thermostat
d) thermometer

222.Law obeyed by Pulse Oximeter is _____
a) Lambert-Bouguer law
b) Beer ‘s law
c) Beer-Lambert law
d**) Lamber-Bouguer, Beer’s and Beer-Lambert Law**

223. . Ear probe which connects the patient to instrument is _____ m long.
a) 1.5
b) 2.0
c) 2.5
d) 3.0

224. This technique involves measuring the optical transmittance of the ear at how many wavelengths?
a) 12
b) 6
c) 8
d) 10

225. What is time taken for the ear to become fully dilated after ear unit has been placed?
a**) 5-10 min**
b) 10-15 min
c) 15-20 min
d) 20-25 min