

FINAL ANSWER KEY

Question 117/2024/OL

Paper Code:

Category 506/2023

Code:

Exam: Assistant Engineer(Biomedical)

Date of Test 22-10-2024

Department Animal Husbandry

Question1:-Which of the following is not true about cardiac muscle?

A:-Unbranched spindle shaped muscle fibre

B:-Presence of intercalated discs

C:-Single nucleus located centrally

D:-Involuntary in action

Correct Answer:- Option-A

Question2:-Myelination of neurons in the central nervous system is produced by:

A:-Ependymal cells

B:-Microglia

C:-Schwann cells

D:-Oligodendrocytes

Correct Answer:- Option-D

Question3:-Which of the following factor increases erythropoietin production?

A:-Hypoxia

B:-Protein deficiency

C:-Cirrhosis of liver

D:-Chronic renal diseases

Correct Answer:- Option-A

Question4:-Which of the following is an example sesamoid bone?

A:-Clavicle

B:-Talus

C:-Patella

D:-Malleus

Correct Answer:- Option-C

Question5:-Pseudostratified ciliated columnar epithelium is located in:

A:-Trachea

B:-Thyroid

C:-Skin

D:-Ureter

Correct Answer:- Option-A

Question6:-Which part of the cerebellum is associated with control of body posture and equilibrium?

A:-Anterior lobe

B:-Pyramis

C:-Lobulus simplex

D:-Flocculo nodular lobe

Correct Answer:- Option-D

Question7:-Which of the following part of the nephron is located in the medullary part of kidney?

A:-Renal corpuscle

B:-Loop of Henle

C:-Proximal convoluted tube

D:-Distal convoluted tubule

Correct Answer:- Option-B

Question8:-"Volume of air which remains in lungs after a maximal expiration" is termed as:

A:-Tidal volume

B:-Residual volume

C:-Inspiratory reserve volume

D:-Expiratory reserve volume

Correct Answer:- Option-B

Question9:-Percentage of B Lymphocytes in peripheral blood is:

A:-20%-30%

B:-40%-60%

C:-60%-80%

D:-Above 85%

Correct Answer:- Option-A

Question10:-In which chamber of heart, Sinu atrial node (SA node) is located?

A:-Left Atrium

B:-Left Ventricle

C:-Right Atrium

D:-Right Ventricle

Correct Answer:- Option-C

Question11:-What is the correct arrangement sequence according to electromotive series?

A:-Li, Al, Zn, Cd, Pb

B:-Cd, Al, Pb, Li, Zn

C:-Al, Pb, Zn, Cd, Li

D:-Li, Al, Pb, Cd, Zn

Correct Answer:- Option-A

Question12:-Calculate the electrode potential at 298 K for the Fe^{3+}/Fe^{2+} half-cell

Fe^{3+} (aq.) [0.03 mol/l] + e^{-}

Fe^{2+} (aq.) [0.3 mol/l], $E^0 = + 0.77$ V

A:-0.69 V

B:-0.70 V

C:-0.71 V

D:-0.72 V

Correct Answer:- Option-C

Question13:-What information do the Pourbaix diagrams describe?

A:-Interrelation between Standard Electrode Potential and Temperature

B:-Interrelation between Standard Electrode Potential and pH

C:-Interrelation between Standard Electrode Potential and Concentration

D:-None of the above

Correct Answer:- Option-B

Question14:-What is/are the true statement(s)?

A:-For finite electrodes, the linear dimensions are not larger than diffusion layer thickness

B:-Transient effects in finite electrodes are due to lateral diffusion

C:-Both (1) and (2)

D:-None of the above

Correct Answer:- Option-C

Question15:-According to Debye-Hückel theory -

A:-Ions can be replaced with an ionic atmosphere

B:-Thermal motion affects the resulting charge density

C:-The effective thickness depends upon ionic strength

D:-All of them

Correct Answer:- Option-D

Question16:-Hydrogen overvoltage is associated with:

A:-Hydrogen evolution reaction

B:-Elevated voltages in electrolysis cells

C:-Both (1) and (2)

D:-None of them

Correct Answer:- Option-C

Question17:-Which of the following statement is true?

A:-Slower rhythms are observed in EEG during sleep

B:-Brain injury cannot be detected using EEG

C:-Alpha rhythms are associated with sleep stages

D:-K-complex is a low-frequency wave pattern

Correct Answer:- Option-A

Question18:-Which of the following is true about the even numbered electrodes in the 10-20 system?

A:-They are placed on the left side of the head

B:-They are placed on the right side of the head

C:-They are placed on the midline of the head

D:-They are used for reference only

Correct Answer:- Option-B

Question19:-According to Einthoven's triangle, the interrelation between the standard leads are as follows:

A:-III = I + II

B:-II = I + III

C:-II = I - III

D:-II = III

Correct Answer:- Option-B

Question20:-Which period of ECG is associated with atrial contraction?

A:-QRS complex

B:-T wave

C:-ST segment

D:-P wave

Correct Answer:- Option-D

Question21:-How does the elasticity of the material used for Intra Medullary nail affect its mechanical performance?

A:-High elasticity leads to increased risk of nonunion

B:-Low elasticity results in better load-bearing capabilities.

C:-Higher elastic modulus improves resistance bending and torsion.

D:-Material elasticity is irrelevant to nail design.

Correct Answer:- Option-C

Question22:-Which of the following equations is most relevant for calculating the

relationship between hematocrit, plasma and total blood volume in a narrow tube?

A:- $Hct = V_{RBC}/V_{total}$

B:- $Hct = V_{RBC}/(V_{Plasma}+V_{RBC})$

C:- $Hct = V_{Plasma}+V_{RBC}$

D:- $Hct = \frac{P}{R^4}$

Correct Answer:- Option-A

Question23:-What is the purpose of external reinforcement rings in certain PTFE vascular graft configurations?

A:-To enhance aesthetic appeal

B:-To facilitate easier surgical handling

C:-To improve biocompatibility

D:-To resist external compression

Correct Answer:- Option-D

Question24:-What happens to the shape recovery capability of NiTi alloys as the nickel content approaches 60%?

A:-Remains unchanged

B:-Decreases

C:-Increases significantly

D:-Becomes unpredictable

Correct Answer:- Option-B

Question25:-In a narrow tube, which factor most significantly influences the precision of hematocrit measurements?

A:-Temperature of the blood sample

B:-Diameter and length of the tube

C:-The method of blood collection

D:-The speed of centrifugation

Correct Answer:- Option-B

Question26:-Which parameter is most critical in determining the flow regime in microvessels?

A:-Reynolds number

B:-Shear stress

C:-Viscosity

D:-Temperature

Correct Answer:- Option-A

Question27:-What happens to blood flow resistance when blood vessel diameter decreases?

A:-Resistance decreases

B:-Resistance remains the same

C:-Resistance increases

D:-Resistance fluctuates

Correct Answer:- Option-C

Question28:-During hematocrit measurement in a narrow tube, which factor can lead to an artificially low reading?

A:-Hemolysis of red blood cells

B:-Incomplete mixing of the blood sample

C:-Presence of large white blood cells

D:-High plasma protein concentration

Correct Answer:- Option-A

Question29:-IM nails are not designed in which of the following shapes?

A:-Cloverleaf

B:-Diamond

C:-Hexagonal

D:-"C" (slotted cylinder)

Correct Answer:- Option-C

Question30:-What is the typical composition of a widely known NiTi alloy, 55-Nitinol?

A:-55 weight % Ni and 45 weight % Ti

B:-60 weight % Ni and 40 weight % Ti

C:-50 atomic % Ni and 50 atomic % Ti

D:-55 weight % Ti and 45 weight % Ni

Correct Answer:- Option-A

Question31:-The defibrillator paddles that are placed on the right side of the patient, near the clavicle is called

A:-apex

B:-sternum

C:-defibs

D:-none of these

Correct Answer:- Option-B

Question32:-At a greater depth of anaesthesia, the patient is supported with artificial ventilation known as

A:-Controlled Ventilation

B:-Spontaneous Ventilation

C:-Automatic Ventilation

D:-None of the these

Correct Answer:- Option-A

Question33:-The most commonly used material used for the construction of anaesthetic vapourizers is called

A:-Aluminium

B:-Nickel

C:-Tin

D:-Copper

Correct Answer:- Option-D

Question34:-The laser that is most commonly used in laser lithotripsy is

A:-CO₂ laser

B:-Free Electron laser

C:-Ho: YAG laser

D:-None of these

Correct Answer:- Option-C

Question35:-In Xero-radiographic mammographic systems, radiographs are taken at

A:-28-35 kV

B:-40-50 kV

C:-15-25 kV

D:-80-100 kV

Correct Answer:- Option-B

Question36:-The superficial tissue destruction without affecting deep seated tissues is called

A:-Fulguration

B:-Desiccation

C:-Coagulation

D:-None of these

Correct Answer:- Option-A

Question37:-In surgical diathermy, the electrodes preferred for epilation and desiccation are

A:-Loop electrodes

B:-Needle electrodes

C:-Lancet electrodes

D:-Angulated band loop electrodes

Correct Answer:- Option-B

Question38:-In stationary anode X-Ray tube, tube current is controlled by adjusting the

A:-Primary voltage

B:-Filament temperature

C:-Secondary voltage

D:-None of these

Correct Answer:- Option-B

Question39:-The atomic number of tungsten which is used in the production of X-Rays is

A:-12

B:-34

C:-74

D:-64

Correct Answer:- Option-C

Question40:-In interferential current therapy therapeutic currents are delivered at a frequency of

A:-200 Hz

B:-20 Hz

C:-4000 Hz

D:-None of these

Correct Answer:- Option-C

Question41:-M Scan recording is employed in

A:-Echo cardiogram

B:-Echo encephalogram

C:-Echo ophthalmoscope

D:-None of these

Correct Answer:- Option-A

Question42:-A body that has an emissivity which is less than one and constant whatever the wavelength is called

A:-Black body

B:-Gray body

C:-Emissive body

D:-None of these

Correct Answer:- Option-B

Question43:-In NMR Imaging system, relaxation time T_2 is called

A:-Spin lattice relaxation

B:-Spin spin relaxation

C:-Lattice lattice relaxation

D:-None of these

Correct Answer:- Option-B

Question44:-In an ultrasound imaging system, the lateral resolution is determined by the

- A:-Wavelength of the transmitted pulse
- B:-Divergence of the ultrasound beam
- C:-Frequency of the beam
- D:-None of these

Correct Answer:- Option-B

Question45:-The 'after ringing' effect in an ultrasound probe can be eliminated by using a transducer with a

- A:-High value of Q
- B:-Low value of Q
- C:-Medium value of Q
- D:-None of these

Correct Answer:- Option-B

Question46:-Which of the infrared detectors have high sensitivity?

- A:-Thermal detectors
- B:-Photodetectors
- C:-Pressure detectors
- D:-None of these

Correct Answer:- Option-B

Question47:-In X-Ray Computed Tomography, readings are taken in the form of

- A:-Pulses
- B:-Profiles
- C:-Chart
- D:-Pictures

Correct Answer:- Option-B

Question48:-The thermal detector that is commonly used in IR thermal imaging system is

- A:-Thermister
- B:-Resistance-Temperature Detector
- C:-Bolometer
- D:-None of these

Correct Answer:- Option-C

Question49:-In CT number scale used in computed tomography, -1000 is assigned to

- A:-Water

B:-Air

C:-Oil

D:-None of these

Correct Answer:- Option-B

Question50:-In helical scanning, ratio of the table movement distance in a single rotation to the slice thickness is called

A:-Frame

B:-Pitch

C:-Slice

D:-None of these

Correct Answer:- Option-B

Question51:-Which of the following region is most heavily doped in a BJT?

A:-Emitter

B:-Base

C:-Collector

D:-Gate

Correct Answer:- Option-A

Question52:-The BJT is _____ controlled device and MOSFET is _____ controlled device.

A:-Current, Voltage

B:-Current, Current

C:-Voltage, Voltage

D:-Voltage, Current

Correct Answer:- Option-A

Question53:-Which of the following is specifically used to measure unknown inductance, typically with a low Q factor?

A:-Kelvin Bridge

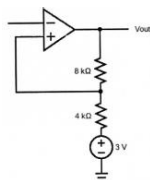
B:-Wheatstone Bridge

C:-Hay Bridge

D:-Maxwell Bridge

Correct Answer:- Option-D

Question54:-What are the upper and lower threshold voltage for the circuit, given that output saturation voltage of the OP-Amp is $\pm 15V$?



A: -+8V and -4V respectively

B: -+3V and -7V respectively

C: -+7V and -3V respectively

D: -+4V and -8V respectively

Correct Answer:- Option-C

Question55:-Which is NOT the ideal characteristic of an op-amp?

A:-Bandwidth is infinity

B:-Open loop voltage gain is infinity

C:-Output impedance is zero

D:-Input impedance is zero

Correct Answer:- Option-D

Question56:-_____ is defined as the ratio between change in output voltage to change in time between the instants of the voltages measured.

A:-Common mode rejection ratio

B:-Gain-Bandwidth product

C:-Slew Rate

D:-Supply voltage rejection ratio

Correct Answer:- Option-C

Question57:-Which standard is the primary international safety specification for medical electrical equipment, including amplifiers?

A:-ISO 9001

B:-IEC 60601

C:-ISO 14000

D:-IEC 62304

Correct Answer:- Option-B

Question58:-Minimized expression for the Boolean function $f(a, b, c, d) = \prod M(0, 4, 6, 8, 12, 14)$. $\prod D(5, 7, 10)$ is

A:- $(c + d)(b' + d)$

B:- $(c + d)(c' + d)$

C:- $(c + d)(a + b')$

D:- $(a + b)(c' + d)$

Correct Answer:- Option-A

Question59:-What will be the final value of the accumulator after the following instructions are executed?

```
MOV A, #5AH
SWAP A
RL A
```

A:-A5H

B:-5BH

C:-4BH

D:-6BH

Correct Answer:- Option-C

Question60:-Hexadecimal equivalent of octal number (64) is

A:-64

B:-40

C:-16

D:-34

Correct Answer:- Option-D

Question61:-Principle of operation of a thermocouple is based on _____.

A:-Kirchhoff's law

B:-Peltier effect

C:-Seebeck effect

D:-Ohm's law

Correct Answer:- Option-C

Question62:-What is the sensitivity of an L VDT that produces an RMS output voltage of 2.8 V for a displacement of 0.4 μm ?

A:-14 V/ μm

B:-10 V/ μm

C:-7 V/ μm

D:-2.8 V/ μm

Correct Answer:- Option-C

Question63:-Which of the following is a passive transducer?

A:-Thermocouple

B:-Thermistor

C:-Photovoltaic cell

D:-Piezoelectric sensor

Correct Answer:- Option-B

Question64:-Which of the following is NOT a physical method of enzyme immobilization?

A:-Adsorption

B:-Encapsulation

C:-Cross-linking

D:-Covalent binding

Correct Answer:- Option-D

Question65:-Which of the following is NOT an amperometric sensor?

A:-Chemically modified electrodes

B:-Amperometric biosensors

C:-Automated flow system

D:-Ion-selective electrodes (ISE)

Correct Answer:- Option-D

Question66:-What is the process called when antibodies bind to antigens, causing them to clump together?

A:-Precipitation

B:-Neutralization

C:-Agglutination

D:-Lysis

Correct Answer:- Option-C

Question67:-Which of the following type of biosensor is NOT categorized based on bioreceptor?

A:-Enzyme-based biosensor

B:-Antibody-based biosensors

C:-Aptamer-based biosensors

D:-Amperometric biosensors

Correct Answer:- Option-D

Question68:-Statement 1 : Fluorescent emission of radiation or light suddenly stops on the removal of the source of excitation.

Statement 2 : Phosphorescence emission of radiation remains for some time even after the removal of the source of excitation.

A:-Both statements are true

B:-Statement 1 is true, Statement 2 is false

C:-Statement 1 is false, Statement 2 is true

D:-Both statements are false

Correct Answer:- Option-A

Question69:-What is the gauge factor of a strain gauge that has an initial resistance of 160 Ω and experiences a change of 8 Ω for a strain of 5000 microstrain?

A:-2

B:-10

C:-5

D:-2.5

Correct Answer:- Option-B

Question70:-Which equation is commonly used to describe the temperature-resistance relationship of an NTC thermistor?

A:-Ohm's Law

B:-Arrhenius equation

C:-Steinhart-Hart equation

D:-Fourier's Law

Correct Answer:- Option-C

Question71:-Oscillator frequency in modern ECG machine is _____.

A:-72 Hz

B:-50 kHz

C:-100 kHz

D:-72 kHz

Correct Answer:- Option-C

Question72:-What is the bandwidth of a typical phonocardiograph?

A:-10 – 100 Hz

B:-20 – 2000 Hz

C:-0 – 2000 Hz

D:-100 – 2000 Hz

Correct Answer:- Option-B

Question73:-Swan-Ganz triple lumen catheter is used _____ measurement.

A:-Flow

B:-Pressure

C:-Temperature

D:-Doppler shift

Correct Answer:- Option-B

Question74:-What is the percentage composition of O_2 , CO_2 and N_2 in alveolar?

A:-20, 8, 25

B:-14, 5.5, 80.5

C:-14.5, 25, 65.5

D:-30, 10, 70

Correct Answer:- Option-B

Question75:-Holter monitor is used to record _____.

A:-EEG

B:-PCG

C:-ECG

D:-EMG

Correct Answer:- Option-C

Question76:-What is the mathematical equation of induced voltage in blood flow measurement?

A:- CH/V^2d

B:- C^2HVd

C:- V^2d/CH

D:- $CHVd$

Correct Answer:- Option-D

Question77:-Phenol Red dye is used in the measurement of _____ parameter in blood.

A:-pH

B:- CO_2

C:- N_2

D:- O_2

Correct Answer:- Option-A

Question78:-What is the wavelength of Denterium arc lamp?

A:-100-200 nm

B:-180-300 nm

C:-190-380 nm

D:-400 nm

Correct Answer:- Option-C

Question79:-Artery motion Doppler frequency is _____.

A:-72 Hz

B:-135 Hz

C:-142 Hz

D:-20 Hz

Correct Answer:- Option-B

Question80:-How much quantity of cardiogram dye is used in dye dilution method?

A:-10 mg

B:-7.5 mg

C:-3.5 mg

D:-5 mg

Correct Answer:- Option-D

Question81:-Which method is effectively used for data analysis of non-linear, non-stationary biomedical signals?

A:-Weiner filter

B:-Kalman filter

C:-Empirical mode decomposition filter

D:-Adaptive filter

Correct Answer:- Option-C

Question82:-Which is the linear, time variant method for removing baseline wander in ECG?

A:-Forward-backward IIR filter

B:-Insertion of zero into a FIR filter

C:-Polynomial fitting

D:-Sampling rate alteration

Correct Answer:- Option-C

Question83:-The disorders that can cause excessive sleep and somnolence is

A:-Parasomnia

B:-Hypersomnia

C:-Circadian rhythm disorder

D:-Insomnia

Correct Answer:- Option-B

Question84:-Which method is widely used for the edge detection for biomedical image processing?

A:-Convolution method

B:-Laplacian of Gaussian method

C:-Wavelet transform method

D:-Canny's method

Correct Answer:- Option-D

Question85:-Salt-and-Pepper noise in biomedical imaging is caused by

A:-Dust on the screen or film

B:-Inactive elements in the detector array

C:-Impulsive noise leading to black or white pixels at the extreme ends of the pixel value range

D:-Scratches on the film that appear as line segments

Correct Answer:- Option-C

Question86:-In Gamma correction, a system with a small gamma value of could result in

A:-an image with wide latitude but good contrast

B:-an image with wide latitude but poor contrast

C:-an image with narrow latitude but good contrast

D:-an image with narrow latitude but poor contrast

Correct Answer:- Option-B

Question87:-Which of the following represents the probability density function (PDF) of the Laplacian distribution?

A:- $P_x(x) = \frac{1}{\sqrt{2}\sigma_x} \exp\left\{-\frac{\sqrt{2}|x-\mu_x|}{\sigma_x}\right\}$

B:- $P_x(x) = \frac{2}{a}(x-a) \exp\left\{-\frac{(x-a)^2}{b}\right\} u(x-a)$

C:- $P_x(x) = \frac{1}{2\sigma} \exp\left\{-\frac{|x-\mu|}{\sigma}\right\}$

D:- $P_x(x) = \exp\left\{-\frac{(x-\mu)^2}{2\sigma^2}\right\}$

Correct Answer:- Option-A

Question88:-Median filter in image processing is best to describe as

A:-A linear filters that average pixel values in a neighborhood

B:-A non-linear filter that selects the average value from neighborhood of pixels

C:-A non-linear filter that selects the middle value in a sorted neighborhood of pixels

D:-A linear filter that applies a weighted average to the pixel values

Correct Answer:- Option-C

Question89:-Which linear filter designed to minimize the MSE between the output of the filter and the undergraded, unknown, original image?

A:-Wiener filter

B:-Adaptive 2D LMS filter

C:-Adaptive neighborhood filter

D:-Kalman filter

Correct Answer:- Option-A

Question90:-Which is not a model based spectral analysis?

A:-Fourier based power spectrum method

B:-Auto correlation method

C:-Burg's method

D:-Modified Covariance method

Correct Answer:- Option-A

Question91:-The recommended gradient or slope of a Ramp for wheel chair users is

A:-1:8

B:-1:10

C:-1:12

D:-1:30

Correct Answer:- Option-C

Question92:-Which of the following is true regarding Gait analysis?

- (i) Kinetics is the study of Force.
- (ii) Kinematics is the study of movement.
- (iii) Kinesiology is the study of biological fluids.

A:-Both (i) and (iii) are correct

B:-Both (i) and (ii) are correct

C:-(i) is false but (iii) is correct

D:-(ii) is false but (iii) is correct

Correct Answer:- Option-B

Question93:-One of the following terms is not directly associated with prosthetic sockets for lower limbs:

A:-Plug fit

B:-Patellar tendon bearing

C:-SACH

D:-Sleeve suspension

Correct Answer:- Option-C

Question94:-All of the following are types of unwanted complications of residual limb except:

A:-Phantom pain

B:-Phantom sensation

C:-Pressure Ulcers

D:-Neuromas

Correct Answer:- Option-B

Question95:-Some control units in a myoelectric prosthesis for upper limb uses:

A:-Movement signal from shoulder using pneumatic sensors to power the hand

B:-EMG signals from similar muscles of the normal limb to activate the hand unit.

C:-Hydraulic units to pick up signals to control the motors of the hand unit.

D:-Use targeted muscle reinnervation for control of the hand unit.

Correct Answer:- Option-D

Question96:-Medicare classification (K level descriptors) in amputation of lower limb is used to

A:-Assess level of activity of a person with amputation.

B:-Assess stump length for prosthetic fitment.

C:-Walking distance possible by a person with amputation.

D:-Prognosticate the type of complication that can develop.

Correct Answer:- Option-A

Question97:-Dislocations of the prosthesis most likely occurs after total hip replacement, when the lower limb is in

A:-Abducted position

B:-Adducted position

C:-When the knee is flexed

D:-When the patient stands before 3 weeks post surgery

Correct Answer:- Option-B

Question98:-Increasing the camber (angle of rear wheel tilt) of a wheel chair

A:-Increase shoulder abduction

B:-Cause even tire wear

C:-Increase lateral stability

D:-Put the hand in risk for injury in tight areas

Correct Answer:- Option-C

Question99:-Intrathecal drug delivery implantable pumps are mainly used in spinal cord injury for

A:-Muscle power enhancement

B:-Reduction of spinal inflammation

C:-Control of spasticity

D:-Control of autonomic dysreflexia

Correct Answer:- Option-C

Question100:-The following are spinal instrumentation systems for spinal fixation except:

A:-Steffee plate instrumentation

B:-Harrington rod

C:-Moss Miami instrumentation

D:-Inter locking nail system

Correct Answer:- Option-D