

SUB: BIOMEDICAL ENGINEERING (BM)

Instructions:

- The most abundant negative ions in our body are
 - Chlorides
 - Chlorates
 - Sulphates
 - Borates
- Pressure transducer used for measuring blood pressure normally is
 - Vortex transducer
 - Strain gauge or capacitive transducer
 - Orifice type or venture type
 - Mass flow meter
- The hydrogen ion concentration of the blood is most easily determined with a
 - Glass electrode
 - Needle electrode
 - Surface electrode
 - Hydrogen electrode
- To reduce common mode interference during recording of bio signals one can use
 - Non- inverting amplifier
 - Inverting amplifier
 - Buffer amplifier
 - Differential amplifier
- The use of notch filter in signal conditioning system is
 - to filter the signal from various noises
 - to filter spike noise
 - to filter 50 Hz noise from mains
 - to attenuate the evoked response potentials
- Among the contact media like Alcohol, Electrode pastes, Saline and multipoint electrode, which has the lowest impedance at 1 Hz?
 - Multipoint electrode
 - Alcohol
 - Electrode paste
 - Saline
- The magnitude of the polarization for a given electrode material is dependent primarily on the
 - current density at the surface of contact between electrode and tissue
 - Impedance of the electrode
 - Half-cell potential
 - shape of electrode

8. Mingographs are connected with
 - A ECG
 - B ECG and EEG both
 - C EEG
 - D EOG
9. Wax coated graph sheets are used for recording to
 - A improve the contrast
 - B Increase perseverance time
 - C avoid spreading of ink
 - D Print graphs smoothly
10. The heart sounds are registered by a recorder having an upper frequency limit of at least
 - A 500 Hz
 - B 10000Hz
 - C 50Hz
 - D 25000Hz
11. For faithful reproduction of QRS complex of ECG signal, an amplifier should have band width range of
 - A d.c. to few kHz
 - B 0-2000 Hz
 - C 0.05-100 Hz
 - D 0.05-10 Hz
12. In ECG, the calibration signal amplitude is
 - A 1 μ V
 - B 0.1 V
 - C 1 mV
 - D 0.25mV
13. The resting potential of the inside of the neuron is about
 - A -100 μ V
 - B -70 mV
 - C +70 mV
 - D 0 V
14. The brain waves with frequencies between 8 and 13Hz and a mean amplitude of 50 μ V are called
 - A Alpha waves
 - B Spike and waves due to Epilepsy
 - C Delta waves
 - D Theta waves
15. The conduction velocity in a motor nerve is normally
 - A 50 m/s
 - B 100 m/s
 - C 150 m/s
 - D 10000 m/s
16. Inflammation of the kidneys is called
 - A Toxemia
 - B nephritis
 - C Hepatitis
 - D Anemia
17. Which one of the following is not correct?
 - A Bus is a group of wires
 - B An interrupt signal is required at the start of every program
 - C Bootstrap is a technique or device for loading first instruction
 - D An instruction is a set of bits that defines a computer operation
18. Following type of electrode is not used in defibrillator
 - A Needle type
 - B Paddle type
 - C Spoon shaped
 - D Pad type
19. The application of LVDT is in
 - A Finger movement
 - B Limb Movement
 - C Heart wall motion
 - D Joint motion
20. Venturi is associated with
 - A Blood flow in heart lung machine
 - B Venous blood pressure
 - C Dialysate flow in artificial kidney
 - D Digital plethysmography
21. pH value of venous blood is
 - A 7.25
 - B 7.30
 - C 7.0
 - D 7.35

22. The capacitance microphone is used for the detection of
 A Heart rate B Heart sound
 C Foot pressure D Blood pressure
23. An image is considered to be a function of a (x,y) where a represents
 A amplitude of image B resolution of image
 C height of image D width of image
24. Which type of enhancement operations are used to modify pixel values according to the value of the pixel's neighbors?
 A point operations B global operations
 C local operations D mask operation
25. Dilation-Morphological image operation technique is used to
 A expands brighter areas of the image B shrink brighter areas of the image
 C scales pixel intensity uniformly D diminishes intensity variation over the image
26. What is the name of process used to correct the power-law response phenomena?
 A Beta correction B Gamma correction
 C Alpha correction D Pie correction
27. In which type of slicing, highlighting a specific range of gray levels in an image often is desired?
 A Gray-level slicing B Contrast stretching
 C Bit-plane slicing D Byte-level slicing
28. Histogram Equalization is mainly used for _____.
 A Contrast adjustment B Blurring
 C Image enhancement D None of the Mentioned
29. Which one of these is not a vectored interrupt in 8085 microprocessor
 A TRAP B RST 3
 C RST 5.5 D INTR
30. The transition between continuous values of the image function and its digital equivalent is called _____.
 A Sampling B Quantization
 C Rasterisation D None of these
31. Which one of the following circuits transmits two messages simultaneously in one direction?
 A Duplex B Simplex
 C Diplex D Quadruplex
32. Point detection is done using filter that is
 A Gaussian B Laplacian
 C ideal D Butterworth
33. The characteristic(s) of computed tomography (CT) which give(s) it a distinct advantage over conventional radiography is/are
 A Higher visibility of detail (resolution) B Better contrast sensitivity (low contrast detectability).
 C Lower noise. D Fewer artifacts
34. EBCT scanners stands for
 A electrical beam computed tomography B electric beam computed tomography

- C electron beam computed tomography D electronic beam computed tomography
35. The general form of log transformations is _____.
 A $s = c + \log(1 + r)$ B $s = c \cdot \log(1 - r)$
 C $s = c \cdot \log(1 + r)$ D $s = c \cdot \log(1 - r)$
36. Which is the most common form of medical imaging, using high-energy radiation to penetrate skin and tissues but not bone?
 A X-ray B Ultrasound
 C Magnetic Resonance Imaging (MRI) D Positron Emission Tomography (PET)
37. Approx. 50 years aged man comes into the emergency department complaining of stroke-like symptoms. He has a history of heart problems and high blood pressure, so the physician is concerned that there may be a blood clot blocking one of his carotid arteries, which supplies blood to his brain. Which type of scan would be most helpful in diagnosing his condition?
 A Positron Emission Tomography (PET) B Fluoroscopy
 C Endoscopy D Ultrasonography
38. X-rays are filtered out of human body by using
 A cadmium absorbers B copper absorbers
 C carbon absorbers D aluminum absorbers
39. What is the maximum strength of magnet approved for medical imaging of patient?
 A 4.5 T B 1.5 T
 C 3.0 T D 7.0T
40. How much maximum external memory can be interface with 8051 microcontrollers?
 A 64K B 128K
 C 60K D 120K
41. Impedance pneumography is a commonly-used technique to monitor a person's
 A pulse rate B respiration rate
 C skin impedance D heart rate
42. _____ is non-invasive method allowing the monitoring of the saturation of a patient's hemoglobin.
 A Ear Oximetry B Skin-Reflectance Oximetry
 C Pulse Oximetry D Intravascular Oximetry
43. Which electrode can be used to pick up signals from individual fibers of muscle tissues?
 A bipolar needle electrode B multi-element needle electrode
 C concentric core needle electrode D monopolar needle electrode
44. The volume of blood within the dialyzer is known as
 A secondary volume B priming volume
 C quarterly volume D residual volume
45. What is the role of Cupraphan in haemodialysis?

46. Voltage-divider bias provides
- | | | | |
|---|--|---|--|
| A | used to check conductivity of dialyzer | B | used to check blood leakage |
| C | used as membrane | D | not at all used |
| A | an unstable Q point | B | a Q point that easily varies with changes in the transistor's current gain |
| C | a stable Q point | D | a Q point that is stable and easily varies with changes in the transistor's current gain |
47. What is the current gain for a common-base configuration where $I_E = 4.2 \text{ mA}$ and $I_C = 4.0 \text{ mA}$?
- | | | | |
|---|-------|---|------|
| A | 16.80 | B | 0.20 |
| C | 1.05 | D | 0.95 |
48. A 4-bit R/2R digital-to-analog (DAC) converter has a reference of 5 volts. What is the analog output for the input code 0101?
- | | | | |
|---|----------|---|-----------|
| A | 0.3125 V | B | 0.78125 V |
| C | 3.125 V | D | -3.125 V |
49. The output of a particular Op-amp increases 9V in 12 μ s. The slew rate is
- | | | | |
|---|-----------------|---|----------------|
| A | 0.75 V/ μ s | B | 1.5 V/ μ s |
| C | 90 V/ μ s | D | none of these |
50. What does the discharge transistor do in the 555-timer circuit?
- | | | | |
|---|---|---|---|
| A | charge the external capacitor to stop the timing | B | charge the external capacitor to start the timing over again |
| C | discharge the external capacitor to stop the timing | D | discharge the external capacitor to start the timing over again |
51. Which of the following is required for oscillation?
- | | | | |
|---|---|---|--|
| A | Both $\beta_A > 1$ and the phase shift around the feedback network must be 90° | B | Both $\beta_A > 1$ and the phase shift around the feedback network must be 180° |
| C | The phase shift around the feedback network must be 180° | D | None of the above |
52. Which of the following systems is linear?
- | | | | |
|---|---------------------|---|---------------------|
| A | $y(t) = \sin(x(t))$ | B | $y(t) = \cos(x(t))$ |
| C | $y(t) = \log(x(t))$ | D | $y(t) = dx(t)/dt$ |
53. For an LTI discrete system to be stable, the square sum of the impulse response should be_____.
- | | | | |
|---|-----------------------------|---|--------|
| A | Integral multiple of 2π | B | Finite |
| C | Infinity | D | Zero |
54. Which of the following is introduced in the frequency sampling realization of the FIR filter?
- | | | | |
|---|---|---|---|
| A | Poles are more in number on unit circle | B | Poles and zeros at equally spaced points on the unit circle |
|---|---|---|---|

- C Zeros are more in number on the unit circle D None of these
55. Why is it desirable to optimize frequency response in the transition band of the filter?
- A Increase side lobe B Increase main lobe
C Reduce side lobe D None of these
56. What is the ROC of the system function $H(z)$ if the discrete time LTI system is BIBO stable?
- A Entire z -plane, except at $z=0$ B Contain unit circle
C Entire z -plane, except at $z=\infty$ D None of these
57. If $x(n)$ and $X(k)$ are an N -point DFT pair, then $X(k+N) = ?$
- A $X(-k)$ B $X(k)$
C $-X(k)$ D None of these
58. If $x(n)$ is a real sequence and $X(k)$ is its N -point DFT, then which of the following is true?
- A $X(N-k) = X(-k)$ B $X(-k) = X^*(k)$
C $X(N-k) = X^*(k)$ D All of these
59. The most widely used dental biomaterial in implantology is?
- A Platinum B Gold
C Aluminium D Nickel
60. Sobel gradient is not that good for detection of
- A Horizontal lines B Diagonal lines
C Vertical lines D edges
61. A latch is _____ sensitive
- A Both level and edge B level
C edge D None of these
62. How many bits are required to store one BCD digit?
- A 4 B 3
C 2 D 1
63. In an SR latch built from NOR gates, which condition is not allowed
- A $S=0, R=0$ B $S=0, R=1$
C $S=1, R=0$ D $S=1, R=1$
64. A capacitor carries a charge of 0.1 C at 5 V. Its capacitance is
- A 0.02 F B 0.05F
C 0.5 F D 0.2 F
65. If $J = K$ (J and K are shorted) in a JK flip-flop, what circuit is made
- A SR flip-flop B Shorted JK flip-flop
C T flip-flop D K flip-flop
66. Four capacitors each of 40 μF are connected in parallel, the equivalent capacitance of the system will be
- A 160 μF B 40 μF
C 10 μF D 5 μF
67. The resistance of a conductor of diameter d and length l is $R \Omega$. If the diameter of the conductor is halved and its length is doubled, the resistance will be
- A $R \Omega$ B $4 R \Omega$
C $2 R \Omega$ D $8 R \Omega$

68. Which oscillators are easy to fabricate in a monolithic IC?
- A RC phase shift oscillator B Wien bridge oscillator
- C Hartley oscillator D Relaxation oscillator
69. In a rectifier circuit, the diode converts
- A Alternating voltage to direct voltage. B Alternating current to direct voltage.
- C Alternating voltage to direct current D Both A and C are correct
70. A zener diode voltage regulator has load requirement of 12 V and 2 Amp. The zener diode's minimum current requirement is 0.2 A. The minimum voltage at input is 24 V. What is maximum efficiency of circuit?
- A 45.5% B 54.8%
- C 35.3% D 67.8%
71. Which of the following is/are the characteristics of negative feedback control system?
- A Low sensitivity to parameter variations B Rejection of disturbance signals
- C Reduction in gain at the expense of better stability D All of these
72. The open loop transfer function of a unity feedback control system is given by $G(s) = \frac{k}{s(s+1)}$. If gain k is increased to infinity, then damping ratio will tend to become
- A Zero B 0.707
- C infinite D unity
73. When compared a 1st order LPF with a 2nd order LPF has
- A Lower voltage gain B Higher cutoff frequency
- C Higher voltage gain D Faster drop in filter response
74. Total _____ pairs of spinal nerves leave the vertebral column to enter different parts of body.
- A 31 B 28
- C 30 D 32
75. If a weight lifter has done 250 J of work lifting a 50 Kg weight ,0.50m from his shoulder in 0.5 s, what was his power?
- A 330 W B 500 W
- C 350 W D 525W
76. What is the normal reaction for an athlete weighing 53 Kg on a level surface?

77. Which of the following procedure is used to identify molecular content in the solution?
 A Chromotography B Thermography
 C Spectroscopy D PDT

78. Following property is enhanced by adding chromium to steel
 A Resistance to corrosion B Ductility
 C Magnetic properties D Malleability

79. Which of the following occurs when a bone is caused to twist about longitudinal axis?
 A Tension B Compression
 C Torsion D None of these

80. Human body angles may be calculated using which of the following?
 A Goniometer B Electrogoniometer
 C Flexometer D All of these

81. If the eigen values of the 2x2 matrix $\begin{bmatrix} a & x \\ b & a \end{bmatrix}$ are $a + ib$ and $a - ib$ then x is equal to
 A ib B $-ib$
 C b D $-b$

82. The matrices $\begin{bmatrix} \cos x & -\sin x \\ \sin x & \cos x \end{bmatrix}$ and $\begin{bmatrix} a & 0 \\ 0 & b \end{bmatrix}$ commutes under multiplication if
 A $a = b$ or $x = n\pi$ B For any values of a, b and x
 C For no values of a, b and x D None

83. If $z = \sin\left(\frac{x+y}{x-y}\right)$ then the value of $x \frac{\partial z}{\partial x} + y \frac{\partial z}{\partial y}$ is
 A z B 0
 C 1 D $2z$

84. The function $f(x, y) = 2x^2 + 2xy - y^3$ has
 A Only one stationary point at $(0,0)$ B stationary points: $(0,0) \left(0, -\frac{1}{3}\right)$
 C stationary points at: $(0,0) \left(\frac{1}{6}, -\frac{1}{3}\right)$ D stationary points : $(0,0) \left(-\frac{1}{6}, \frac{1}{3}\right)$

85. $\lim_{x \rightarrow 0} \frac{\tan x - x}{\tan x + x} =$
 A 0 B 1
 C ∞ D None

86. The area bounded by the lines $x = 1$, $y = x + 1$ and the line $y = -x + 1$ is equal to
 A 1 B 2

- C 4 D none
87. Changing the order of integration of $I = \int_0^8 \int_{x/4}^2 f(x, y) dy dx$ leads to the integral $I = \int_r^s \int_p^q f(x, y) dy dx$ the value of p is
 A 0 B 1
 C $4y$ D y
88. If $y(x) = x + \sqrt{x + \sqrt{x + \sqrt{x + \dots \infty}}}$ then $y(3) =$
 A $\frac{7+\sqrt{13}}{2}$ only B $\frac{7-\sqrt{13}}{2}$ only
 C $\frac{7+\sqrt{13}}{2}$ or $\frac{7-\sqrt{13}}{2}$ D ∞
89. The directional derivative of $u(x, y, z) = x^2 + 2y^2 + 3z^2$ at a point $(1, 2, -1)$ in the direction of $i + j - k$ is
 A $16/\sqrt{3}$ B -18
 C $-16/\sqrt{3}$ D 18
90. The curl of the gradient of the scalar field $v(x, y, z) = 2yx^2 + 3zy^2 + 4xz^2$ is
 A $4xy + 6yz + 8xz$ B 0
 C $4xyi + 6yzj + 8xzk$ D 1
91. A fair coin is tossed N times the probability that head does not turn up in any of the tosses is
 A $\left(\frac{1}{2}\right)^N$ B $\left(\frac{1}{2}\right)^{N-1}$
 C $1 - \left(\frac{1}{2}\right)^N$ D $1 - \left(\frac{1}{2}\right)^{N-1}$
92. The solution of $\frac{d^2y}{dx^2} + 16y = e^{3x}$ is
 A $y = C_1 \cos 4x + C_2 \sin 4x + \frac{e^{3x}}{25}$ B $y = C_1 e^{4x} + C_2 e^{-4x} + \frac{e^{3x}}{25}$
 C $y = C_1 e^{4x} + C_2 e^{-4x} - \frac{e^{3x}}{34}$ D $y = C_1 \cos 4x + C_2 \sin 4x - \frac{e^{3x}}{25}$
93. If $f(z) = u(r, \theta) + iv(x, \theta)$ is an analytics function of complex variable z then
 A $u_r = rv_\theta, \quad u_\theta = -\frac{1}{r}v_r$ B $u_r = \frac{1}{r}v_\theta, \quad u_\theta = -\frac{1}{r}v_r$
 C $u_r = \frac{1}{r}v_\theta, \quad u_\theta = -rv_r$ D $u_r = rv_\theta, \quad u_\theta = -rv_r$
94. The solution of $25yy' + 25x = 0$ represents
 A Family of circles B Family of ellipses
 C Family of parabolas D Family of hyperbolas
95. The type of partial differential equation $\frac{\partial f}{\partial t} = \frac{\partial^2 f}{\partial x^2}$ is
 A Parabolic B hyperbolic
 C Elliptic D mixed
96. The inverse Laplace transforms of $\frac{1}{s^2(s+1)}$ is
 A $t + 1 + e^{-t}$ B $t - 1 + e^{-t}$
 C $-1 + e^{-t}$ D $2t + e^t$
97. If $f(z) = 3x^2 - 3y^2 + iv(x, y)$ is an analytic function then $v(x, y)$
 A $3y^2 - 3x^2 + \text{constant}$ B $6x - 6y + \text{constant}$

98. If $C:|z|=1$ then the value of $\oint_C \frac{-3z+4}{z^2+4z+5} dz$
- A 0 B $\frac{1}{10}$
- C $\frac{4}{5}$ D 1
99. The iteration formula to find the cube root of a positive real number b by using the Newton-Raphson method is
- A $x_{k+1} = \frac{(2x_k^3 + \sqrt[3]{b})}{3x_k^2}$ B $x_{k+1} = \frac{(2x_k^3 - \sqrt[3]{b})}{3x_k^2}$
- C $x_{k+1} = \frac{(2x_k^3 + b)}{3x_k^2}$ D $x_{k+1} = \frac{(2x_k^3 - b)}{3x_k^2}$
100. Simpson's rule for integration gives exact result when $f(x)$ is a polynomial function of degree less than
- A 1 B 2
- C 3 D 4