

Seat No. _____

SUB: BIOMEDICAL ENGINEERING (BM)

Time:1 Hour 30 minutes

Instructions:

- 1. Ensure that all pages are printed.**
- 2. Use Black ball pen only**
- 3. Change in option is not allowed**
- 4. There is no negative marking**
- 5. Use of non -programmable scientific calculator is allowed**

1. Muscle fatigue is what?
A When a muscle has too much sugar and can't function correctly
B When a muscle becomes spasmic
C When a muscle contracts too often without enough oxygen
D A muscle disease
2. During contraction actin and myosin filaments;
A Become larger
B Become smaller
C Slide over each other
D Slide between each other
3. Fibrositis is;
A Injury to a ligament
B Inflammation of a tendon
C Inflammation of a muscle
D Lack of muscle tone
4. Filtered blood is re-absorbed here;
A Distal convoluted tubules
B Loop of Henle
C Hilum
D Bowmans Capsule
5. The pelvis is what kind of joint?
A Pivot
B Hinged
C Fixed
D Gliding
6. Bones provide storage for;
A Vitamin D
B Calcium and phosphorus
C Thrombocytes
D Melatonin
7. The dermis has the ability to absorb;
A Mineral oils
B Chemical substances
C Water
D Aqueous creams
8. In which system won't you find lymph?
A Central nervous system
B Reproductive system
C Urinary system
D Muscular system
9. Where does tissue respiration take place?
A Mitochondria
B Monocytes
C Haemoglobin
D Erythrocytes
10. Which of the following does not act as a neurotransmitter?
A Acetylcholine
B Epinephrine
C Norepinephrine
D Cortisone
11. Flexion at elbow is brought about by
A Biceps
B Triceps
C Both (A) and (B)
D None of the above.
12. The bone cells which are involved in building of bone are
A Osteoblasts
B Osteoclasts
C Osteocytes
D None of the above
13. 'Lordosis' is also called
A Round back
B Hollow back

- C Lateral back
D Back curve

14. During abduction the arm moves
A Towards the body
B Away from the body
C In front of the chest
D None of the above

15. The cartilage which serves to cushion the impact of large forces on bone ends is called
A Fibrous cartilage
B Hyaline cartilage
C Notch
D fossa

16. Which plane of motion lies vertically and divides the body into left and right halves?
A The sagittal plane
B The frontal plane
C The transverse plane
D Anatomical neutral position

17. Largest bone in the human body is;
A hummers
B Femur
C Tibia
D fibula

18. Shortest bone in the human
A phalange
B metatarsal
C in nominate bone
D tarsal

19. Which of the following is responsible for limiting the range of movements of joint?
A Tendons
B Ligaments
C Both (A) and (B)
D Muscle fibers

20. Which is not a correct statement regarding stance phase
A Is usually about 60% of the cycle
B Begins at toe off
C Begins at heel strike
D Ends at heel strike

21. For a base current of $10\ \mu\text{A}$, what is the value of collector current in common emitter if $\beta_{dc} = 100$.
A $10\ \mu\text{A}$
B $100\ \mu\text{A}$
C $10\ \text{mA}$
D $1\ \text{mA}$

22. In a CB amplifier the maximum efficiency could be;
A 25%
B 50%
C 85%
D 99%

23. Generally, the gain of a transistor amplifier falls at high frequencies due to
A Skin effect
B Internal capacitance of the device
C Coupling capacitor at the output
D Coupling capacitor at the input

24. The binary number 10101 is equivalent to decimal number ;
A 19
B 12
C 21
D 27

25. The universal gate is;
A OR gate
B NAND gate
C AND gate
D None of the above

26. A 12 bit ADC is used to convert analog voltage of 0 to 10 V into digital. The resolution is;
A 24.4 mV
B 1.2 V
C 2.44 mV
D none of these

27. The output of a half adder is;
A Carry
B Sum
C Sum and Carry
D none of these

28. The first bioinformatics database was created by;
A Richard Durbin
B Dayhoff
C Michael J. Dunn
D Pearson

29. Analysing or comparing entire genome of species
A Bioinformatics
B Genomics
C Proteomics
D Pharmacogenomics

30. This will reject any common mode signal that appears simultaneously at both amplifier input terminal.
 A ac coupled amplifiers B dc amplifiers
 C carrier amplifiers D differential amplifiers
31. What is the total number of quantization errors in the computation of single point DFT of a sequence of length N?
 A $2N$ B $4N$
 C $8N$ D $12N$
32. How many number of bits are required to compute the DFT of a 1024 point sequence with a SNR of 30db?
 A 15 B 10
 C 5 D 20
33. If $x(n)$ is a discrete-time signal, then the value of $x(n)$ at non integer value of 'n' is:
 A Zero B Positive
 C Negative D Not defined
34. The odd part of a signal $x(t)$ is:
 A $x(t)+x(-t)$ B $x(t)-x(-t)$
 C $(1/2)*(x(t)+x(-t))$ D $(1/2)*(x(t)-x(-t))$
35. The function given by the equation $x(n)=1$, for $n=0$; $=0$, for $n \neq 0$ is a:
 A Triangular function B Ramp function
 C Impulse function D Step function
36. The Nyquist theorem for sampling;
 1) Relates the conditions in time domain and frequency domain
 2) Helps in quantization
 3) Limits the bandwidth requirement
 4) Gives the spectrum of the signal
 A 1, 2 and 3 are correct B 1 and 3 are correct
 C 1 and 2 are correct D All the four are correct
37. DTFT is the representation of;
 A Periodic Discrete time signals B Aperiodic Discrete time signals
 C Aperiodic continuous signals D Periodic continuous signals
38. The ROC of a system is the;
 A range of z for which the z transform converges B range of frequency for which the z transform exists
 C range of frequency for which the signal gets transmitted D range in which the signal is free of noise
39. The region of convergence of $x/(1+2x+x^2)$ is;
 A Negative B Positive
 C 1 D 0
40. Decimation is a process in which the sampling rate is;
 A Enhanced B Reduced
 C Stable D Unpredictable
41. Attenuation coefficient of bone is 600 m^{-1} for x-rays of energy 20 keV and intensity of beam of x-rays is 20 Wm^{-2} , then intensity of beam after passing through a bone of 4mm is;
 A 1.8 Wm^{-2} B 2.6 Wm^{-2}
 C 2.0 Wm^{-2} D 3.0 Wm^{-2}
42. Bones look white in x-ray photograph because;
 A they are bad absorbers of x-rays B they reflect x-rays
 C they are good absorbers of x-rays D they are bad absorbers of ultraviolet rays
43. In best piezo-electric substances, maximum value of strain is about

- | | | |
|-----|---|--|
| | A 0.050 % | B 0.030 % |
| | C 0.040 % | D 0.010 % |
| 44. | With gel between skin and transducer percentage of reflected intensity of ultrasonic is | |
| | A 0.03% | B 0.06% |
| | C 0.05% | D 0.08% |
| 45. | Soft x-rays have | |
| | A high energies | B low energies |
| | C lowest frequency | D longest wavelength |
| 46. | Interosseous skeletal tumor is best diagnosed by | |
| | A Plain X-ray | B NMR |
| | C CT scan | D Ultrasound |
| 47. | Isotope used in myocardial perfusion scan is | |
| | A Technetium | B Thallium |
| | C Stannous Pyrophosphate | D Gallium |
| 48. | Pixels are digital numbers that are composed of; | |
| | A Colour | B Intensity levels |
| | C Dots | D Bits |
| 49. | For line detection we use mask that is | |
| | A Laplacian | B Gaussian |
| | C ideal | D Butterworth |
| 50. | Reflection of rectangular SE is always | |
| | A translated | B asymmetric |
| | C symmetric | D square |
| 51. | Which of the following are examples of biomaterials? | |
| | I. Titanium | |
| | II. Ceramics | |
| | III. Bovine bone | |
| | A I, II, and III | B III only |
| | C I and II Only | D None |
| 52. | In 8085 microprocessor, how many interrupts are maskable | |
| | A 2 | B 3 |
| | C 4 | D 5 |
| 53. | Which stack is used in 8085 microprocessor | |
| | A FIFO | B FILO |
| | C LIFO | D LILO |
| 54. | Which one of the following address techniques is not used in 8085 microprocessor | |
| | A Register | B Immediate |
| | C Register indirect | D Relative |
| 55. | In how many different modes a universal shift register operates? | |
| | A 2 | B 3 |
| | C 4 | D 5 |
| 56. | SCON in serial port is used for which operation? | |
| | A Transferring data | B Receiving data |
| | C Controlling | D Controlling and transferring |
| 57. | Auxiliary carry is set during which condition? | |
| | A When carry is generated from D3 to D4 | B When carry is generated from D7 |
| | C When carry is generated from both D3 to D4 and D7 | D When carry is generated at either D3 to D4 or D7 |
| 58. | Which pin provides a reset option in 8051? | |

- A 1
 C 8
- B 9
 D 11
59. External Access is used to permit;
- A Peripherals
 C ALE
- B Power supply
 D Memory interfacing
60. Timer 0 is a _____ bit register.
- A 32-bit
 C 16-bit
- B 8-bit
 D 10-bit
61. _____ is the superimposed wave of neuron potentials operating in a non-synchronrized manner in a physical sense.
- A VCG
 C PCG
- B ECG
 D EEG
62. What are generally designed to have a very high value of input impedance to take care of high electrode impedance?
- A Montages
 C Preamplifiers
- B Electrodes
 D Filters
63. EEG machines have notch filter sharply tuned at _____ Hz as to eliminate mains frequency interference.
- A 10
 C 30
- B 50
 D 70
64. Which type of transducer requires energy to be put into it in order to translate changes due to the measurand?
- A active transducers
 C powered transducers
- B passive transducers
 D local transducers
65. The ability of the sensor to see small differences in reading is called;
- A resolution
 C offset
- B drift
 D linearity
66. Active transducers work on the principle of;
- A energy alteration
 C mass conversion
- B volume conversion
 D energy conversion
67. The frequency range of ECG IS;
- A 0.05-150 HZ
 C 500-1500 Hz
- B 5-500 kHz
 D 0.5-150 MHz
68. 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
 C notch filters
- B high pass filters
 D low pass filters
69. Liquid part of blood IS;
- A Platelets
 C White Blood Cells
- B Red Blood Cells
 D Plasma
70. How much quantity of oxygen bound with haemoglobin in the normal arterial blood?
- A 20.3ml %
 C 21.5ml %
- B 19.4ml %
 D 20.1ml %
71. Which of the following is an example of Hinge joint?
- A Hip joint
 C Ankle Joint
- B Elbow Joint
 D All the above
72. Carpal joint is the example of
- A Pivot joint
 C Hinge joint
- B Condylloid joint
 D Ball and socket joint

73. A golf ball is hit at an angle of elevation of 37° and an initial velocity of 45ms^{-1} . If all fluid forces are ignored and g is taken to 9.8ms^{-2} then what would the time to maximum height be?
- A 4.78s B 4.59s
C 5.82s D 4.48s
74. Which of the following is a protein sequence database;
- A DDBJ B EMBL
C GenBank D PIR
75. Functional residual capacity of person can be measured by;
- A Spirometer B Laryngoscope
C Colorimeter D Body plethysmograph
76. The Kidney regulates the _____ of the blood plasma
- A Concentration B Colour
C Viscosity D Composition
77. _____ is added to a polymer to make it flexible.
- A Elasticiser B Plasticiser
C Catastrophes D None of these
78. _____ rubber is used for cosmetic implants.
- A Silicon B Butyl
C Both A & B D None of these
79. In human body, Blood is;
- A Newtonian fluid B Non Newtonian fluid
C Both A & B D None of these
80. The body fluid that lubricates the joint cavities and bursae,
- A Saliva B CSF
C Synovial D Plasma
81. A reduced row echelon form invertible matrix is
- A an upper triangular matrix B a lower triangular matrix
C identity matrix C none of the other options
82. Suppose that 1 is an eigenvalue and \bar{X} is an eigenvector of a square matrix A , then which of the following statements is incorrect:
- A 1 is an eigenvalue of A^2 B \bar{X} is an eigenvector of A^2
C 1 is an eigenvalue of A^T D \bar{X} is an eigenvector of A^T
83. The function $f(x) = \sin x$ is increasing in
- A $[0, \pi]$ B $\left[\frac{\pi}{2}, \frac{3\pi}{2}\right]$
C $\left[-\frac{\pi}{2}, \frac{\pi}{2}\right]$ D $[\pi, 2\pi]$
84. The maximum value of $f(x) = \frac{1}{4}(x^4 - 2x^2)$ in $[-1, 2]$
- A 2 B -1
C 0 D 1

85. For the forward difference operator Δ , Δy_2 is
- A $y_2 - y_1$ B $y_3 - y_2$
 C $\frac{1}{2}(y_3 - 2y_2 + y_1)$ D $y_{5/2} - y_{3/2}$
86. $u = xe^{y/x}$ is
- A homogeneous function with degree 0 B homogeneous function with degree 1
 C homogeneous function with degree 2 D not homogeneous
87. $\frac{\partial}{\partial x}(x^y + y^x) =$ _____
- A $x^y \ln x + \frac{x}{y} y^x$ B $\frac{y}{x} x^y + y^x \ln y$
 C $yx^{y-1} + xy^{x-1}$ D $x^y \ln x + y^x \ln y$
88. For $f(x, y) = 5$, $\frac{dy}{dx} =$ _____
- A $\frac{f_x}{f_y}$ B $-\frac{f_x}{f_y}$
 C $-\frac{f_y}{f_x}$ D $\frac{f_y}{f_x}$
89. The order of the differential equation $(y')^2 = 4y^3$ is
- A 2 B 1
 C 3 D 4
90. $\text{grad}(xyz)$ at $\hat{i} - \hat{j} + \hat{k}$ has the value
- A $-\hat{i} + \hat{j} - \hat{k}$ B $\hat{i} - \hat{j} + \hat{k}$
 C $-\hat{i} - \hat{j} + \hat{k}$ D $\hat{i} + \hat{j} - \hat{k}$
91. For a complex variable z , $|z| = 1$ represents
- A two points $(\pm 1, 0)$ B four points $(\pm 1, 0), (0, \pm 1)$
 C Circle C Straight line
92. If $I = \oint \frac{2z}{(z+2)(z+3)} dz$ over the circle, centered at $z = 0$ and radius 1, then
- A $I = 2\pi i$ B $I = -8\pi i$
 C $I = 12\pi i$ D $I = 0$
93. If p is the probability of turning an integer on a dice rolled once, then
- A $p = 0$ B $0 < p < 1$
 C $p = 1$ D $p > 1$
94. $\int_0^1 \frac{\tan^{-1} x}{1+x^2} dx =$ _____
- A $\frac{\pi^2}{8}$ B $\frac{\pi^2}{32}$
 C $\frac{\pi^2}{24}$ D $\frac{\pi^2}{16}$
95. Which form of numbers from given below is an indeterminate form?
- A ∞^∞ B $\infty + \infty$
 C 0^∞ D ∞^∞
96. If $L\{f(t)\} = \bar{f}(s)$ then $L\left\{\int_0^t f(u) du\right\}$ is

- A $\int_s^\infty \bar{f}(u) du$ B $\frac{\bar{f}(s)}{s}$
 C $-\frac{d}{ds}\bar{f}(s)$ D $s\bar{f}(s)$
97. $L^{-1}\left\{\frac{1}{s^2-4}\right\} = \underline{\hspace{2cm}}$
- A $\cosh 2t$ B $\cos 2t$
 C $\frac{1}{2}\cosh 2t$ D $\sinh 2t$
98. $\frac{\partial^2 u}{\partial x^2} = c^2 \frac{\partial u}{\partial t}$ is
- A one dimensional steady state heat equation B one dimensional transient heat equation
 C two dimensional steady state head equation D two dimensional transient head equation
99. Which theorem represents the relationship between surface integration and volume integration?
- A Gauss divergence theorem B Stokes' theorem
 C Green's theorem D None
100. Which is a direct method to find solution of linear simultaneous equations?
- A Gauss-Jacobi method B Gauss-Seidal method
 C Gauss-Jordan method D Relaxation method