

Nepal Engineering Council Registration Examination
Model Question for Biomedical Engineering (ABmE)

(100*1 = 100)

1. Agglutination reaction is more sensitive than precipitation for the detection of
 - a) Antigens
 - b) Antibodies
 - c) Complement
 - d) Antigen-Antibody complexes
2. Haemopoiesis is a process of the production of
 - a) Blood plasma
 - b) Erythrocytes
 - c) Bone marrow
 - d) Haemoglobin
3. The corpus callosum is a
 - a) Source of hypothalamic hormones
 - b) Neural pathway that connects the right and left hemispheres
 - c) Part of the neocortex
 - d) Structure in the cerebellum
4. Which is true of the pulmonary circuit?
 - a) Blood oxygen content is higher in the pulmonary vein than in the pulmonary artery
 - b) Blood is pumped through it by the left ventricle
 - c) Resting blood pressure in the pulmonary artery is normally equal to that in the aorta
 - d) The cardiac output into the pulmonary circuit is approximately 1/6 of that into the systemic circuit
5. When substances move from the tubule into the surrounding afferent arteriole, this is known as
 - a) Re-absorption
 - b) Tubular secretion
 - c) Filtration
 - d) Excretion
6. The greatest source of elasticity in human skeletal muscle tissue is attributed to
 - a) The parallel elastic component
 - b) The series elastic component
 - c) The continuous elastic component
 - d) The active elastic component
7. Any material that once placed in the human body has minimal interaction with its surrounding tissue is called as
 - a) Membrane Lamination
 - b) Polysaccharides

- c) Bioinert Materials
 - d) Biomaterials
8. Collagen is best described as a
- a) Helical structural protein
 - b) Coiled-coil found in hair
 - c) Cross-linked globular protein
 - d) Triple-helical fibrous protein
- 9..... is to obtain a smooth surface that stimulates natural tooth surface.
- a) Condensation
 - b) Sintering
 - c) Glazing
 - d) Degassing
10. The incorporation of which of the following peptide sequences, during surface modification, has been shown to specifically increase the attachment of neural cells?
- a) REDV
 - b) KRSR and Osteopontin-1
 - c) VIPGIG and MEPE
 - d) YIGSR and IKVAV
11. In which of the technique enzyme and polymer are bridged by the use of bi-functional reagent?
- a) Covalent cross-linking
 - b) Adsorption
 - c) Physical Entrapment
 - d) Microencapsulation
12. Von Willebrand factor is synthesized by ECs and secreted into sub endothelial matrix, where it is bound by.....
- a) Collagen I, III, IV, VI.
 - b) Heparin I, III, IV, VI.
 - c) Collagen I, III, IV, V.
 - d) Collagen I, II, III, V.
13. Which of the following is not an ideal indication for a bioprosthetic valve (compared to a mechanical prosthetic valve)?
- a) Female planning pregnancy
 - b) Young adult male
 - c) Elderly female
 - d) History of endocarditis
14. What is the disadvantage of ceramic bearings in THR?
- a) Increased Wear
 - b) Lower Modulus of Elasticity

- c) More corrosion
 - d) High Cost
15. Which is a complication associated particularly with a urethral catheter?
 - a) More likely to cause urinary tract infections and bladder stones
 - b) Difficult to site the catheter for overweight people
 - c) The catheter site may produce a discharge
 - d) Mechanical irritation to the urethra provokes an intense, acute, and chronic inflammatory tissue response
 16. Which of the following is a limitation of using autologous fat as a biomaterial in plastic surgery?
 - a) It is expensive
 - b) It is difficult to obtain in sufficient quantities
 - c) It is prone to resorption and volume loss over time
 - d) It is associated with a high risk of infection
 17. What is the region enclosed by the optical cavity called in a LASER machine?
 - a) Optical region
 - b) Optical system
 - c) Optical resonator
 - d) Optical box
 18. Which one of the following statements best defines tissue engineering?
 - a) It is the replacement of tissues using techniques developed from a combination of biology and engineering principles.
 - b) It is the growth of tissue components in vitro that can be used to regenerate diseased or damaged tissue.
 - c) It is the implantation of scaffolds for the in situ repair of diseased or damaged tissue.
 - d) It is a form of bioactive fixation
 19. Which of the following is a characteristic of the photons produced by the bremsstrahlung method?
 - a) They have a single discrete energy level
 - b) They have a continuous range of energy levels
 - c) They have a negative charge
 - d) They are absorbed by atoms in the target material
 20. Which of the following is NOT true regarding dose in CT imaging?
 - a) Reducing slice thickness reduces patient dose.
 - b) Noise reduction often leads to an increased patient dose.
 - c) An obese patient requires an increased dose to produce an image with an acceptable noise level.
 - d) Good quality control is necessary to ensure the patient dose is as low as possible.
 21. Increasing the magnetic field
 - a) Produces less susceptibility artifacts.
 - b) Reduces the risk of tissue heating.
 - c) Increase the signal to noise.

- d) Reduces the danger from metallic projectiles.
22. Arrange from fastest to slowest according to penetration of ultrasound.
- a) Lung, fat, soft tissue, liver, blood, muscle, tendons, bone
 - b) Bone, tendons, muscles, blood, liver, fat, soft tissue, lung
 - c) Bone, tendons, muscles, blood, liver, soft tissue, fat, lung
 - d) Bone, Muscles, tendons, blood, liver, soft tissue, fat, lung
23. What color laser is typically used to stimulate the imaging plate in computed radiography?
- a) Red
 - b) Blue-green
 - c) Yellow
 - d) Infrared
24. The branch of radiology in which a chemical or compound containing a radioactive isotope is Called?
- a) Nuclear medicine imaging
 - b) Ultrasound
 - c) X-Ray
 - d) None
25. Montages refers to
- a) A pattern of electrodes on the head and the channels they are connected to
 - b) Asymmetrical electrodes placed on the forehead
 - c) Symmetrical electrodes placed on cheeks
 - d) The mathematical formula used to calculate EEG voltage differences
26. What is the purpose of an ambulatory monitoring system in healthcare?
- a) To monitor patients in critical care units
 - b) To monitor patient vital signs during surgeries
 - c) To monitor patients who are able to walk and move around
 - d) To monitor patients who are under anesthesia
27. What components are typically included in a wireless biotelemetry system?
- a) Sensors, transmitters, a radio antenna, and a receiver
 - b) Sensors, transmitters, a wire connection, and a receiver
 - c) Sensors, transmitters, a camera, and a receiver
 - d) Sensors, transmitters, a satellite dish, and a receiver
28. Which of the following instrument is most commonly used for measurement of blood flow?
- a) NMR Blood Flowmeter
 - b) Ultrasonic Blood Flowmeter
 - c) Electromagnetic Blood Flowmeter
 - d) Laser Doppler Blood Flowmeter

29. Modern day calorimeters and spectrophotometry instruments use light source.
- Tungsten-halogen lamp
 - Xenon-mercury lamp
 - Deuterium discharge lamp
 - Mercury arc
30. Which threshold of hearing is measured by a pure-tone audiometer?
- air-conduction thresholds of hearing
 - bone-conduction thresholds of hearing
 - speech reception thresholds for diagnostic purposes
 - air-conduction and bone-conduction thresholds of hearing
31. Which wave from ECG waveforms becomes widened when the self-triggering impulse does not arrive through the AV node?
- P wave
 - ST wave
 - QRS wave
 - T wave
32. What precaution is used in diathermy?
- Patient is made to lie on a soft pillow
 - Pads are used for grounding and completing the circuit
 - Patient is made to drink a large number of fluids
 - Wooden blocks are used for grounding
33. The types of therapeutic diathermy machines that exist are
- Short wave, microwave, and ultrasound
 - Cold compress, ultrasound, LASER
 - Electrical impulse, microwave, and ultrasound
 - Cold compress, microwave, and electrical impulse
34. Hemodialysis machine works on the principle of
- Diffusion and ultrafiltration
 - Osmosis and ultrafiltration
 - Reverse osmosis and ultrafiltration
 - Diffusion and osmosis
35. The type of ventilation that enables the patient to breathe on his or her own, at his or her respiratory rate, and with his or her depth between ventilator breaths is
- Mandatory Ventilation
 - Assist Control Mode
 - Pressure Control Mode
 - Synchronous Intermittent Mandatory Ventilation
36. Which is the “Can’t Let Go” range of current flow?
- 3-9 mA
 - 25-60 mA
 - 9-25 mA
 - 1-3 mA

37. The ($I_d - V_{gs}$) characteristics of a MOSFET in the saturation region is
- Exponential
 - Quadratic
 - Logarithmic
 - Hyperbolic
38. In a differentiator circuit, a capacitor is placed in
- Feedback loop
 - Input
 - Output
 - Feedback and input
39. In a three phase AC circuit, the sum of all three generated voltages is
- Infinite (∞)
 - Zero (0)
 - One (1)
 - One third ($1/3$)
40. Peak reverse voltage of bridge rectifier for input signal of peak value V_m is
- $2V_m$
 - $\frac{1}{2} V_m$
 - V_m
 - $4V_m$
41. A sudden increase in the total current into a parallel circuit may indicate
- A drop-in source voltage
 - An open resistor
 - An increase in source voltage
 - Either a drop in source voltage or an open resistor
42. A good voltage regulation of a transformer means
- Output voltage fluctuation from no load to full load is least
 - Output voltage fluctuation with power factor is least
 - Difference between primary and secondary voltage is least
 - Difference between primary and secondary voltage is maximum
43. For multi-input XNOR gate, the output is Logic High when the total number of Logic High in the inputs signals is
- Infinity
 - Zero
 - Odd
 - Even
44. A full binary subtractor has _____input lines and _____output lines
- 2, 2
 - 3, 3
 - 2, 1
 - 3, 2

45. A 10-bit SISO mode needs clock pulses to load an 10-bit number into a register.
- 8
 - 10
 - 8
 - 2
46. Which of the following statement is true regarding PAL (Programmable Array Logic)
- Once a PAL has been programmed it cannot be reprogrammed.
 - Its outputs are only active HIGHS
 - Its outputs are only active LOWs
 - Its logic capacity is lost
47. The BCD number 1010111 has.....priority.
- Even
 - Odd
 - Both even and odd
 - Undefined
48. The centre frequency of a bandpass filter is always equal to
- The bandwidth
 - Geometric average of the cut-off frequencies
 - Bandwidth divided by Q
 - 3-dB frequency
49. Laplace transform of a step function shown below is
- 1
 - $1/s^2$
 - 0
 - $1/s$
50. A block of mass 10 kg is attached to a spring of stiffness 360 N/m. A velocity of 6 m/s is given to the mass when the spring is in unstretched condition. The block will come to rest after moving a distance of
- 0.5 m
 - 1.25 m
 - 0.75 m
 - 1.0 m
51. For a type-I system, the intersection of the initial slope of the bode plot with 0 dB axis gives
- Steady-state error
 - Error constant
 - Phase margin
 - Cross-over frequency
52. Role of the transmitter in the communication system is to
- Decode a signal to be transmitted
 - Convert one form of energy into other
 - Detect and amplify information signal from the carrier
 - Produce radio waves to transmit data

53. Carrier swing is defined as
- a) Total variation in frequency from the lowest to the highest point
 - b) Frequency deviation above or below the carrier frequency
 - c) Width of the sideband
 - d) None of the above
54. A single tone 4 kHz message signal is sampled with 9 kHz, 7 kHz and 5 kHz. The aliasing effect will be seen in the reconstructed signal when the signal is sampled with
- a) 9 kHz
 - b) any of 9 kHz, 7 kHz, or 5 kHz
 - c) Both 9 kHz and 7 kHz
 - d) Both 7 kHz and 5 kHz
55. Standard dimensions (mm x mm) of A3 drawing sheet is
- a) 11.69×16.54
 - b) 29.7×42
 - c) 297×420
 - d) 420×280
56. Which of the following methods of charging depreciation of an asset has increased amount of depreciation as the age of asset increases
- a) Sum-of-year digit
 - b) Sinking fund
 - c) Diminishing balance
 - d) Straight line
57. The process of optimizing the project's limited resources without extending the project duration is known as
- a) Project crashing
 - b) Resource levelling
 - c) Resource smoothing
 - d) Networking
58. The process of composing/raising the required fund from different sources such as equity, preferred stock, bond and debenture is known as
- a) Capital structure planning
 - b) Project financing
 - c) Capital budgeting decision
 - d) Deducing earning per share
59. In which of the following society, people used to seek their existence on growing plants for their cattle and domestic animals
- a) Pastoral society
 - b) Tribal society
 - c) Horticultural society
 - d) Agricultural society

60. According to Nepal Engineering Council Act, 2055 (Revised, 2079), all engineering academic institutions shall be in the Council.
- a) Affiliated
 - b) United
 - c) Recognized
 - d) Associated
61. Antibodies are produced by:
- a) T lymphocytes
 - b) B lymphocytes (plasma cells)
 - c) Macrophages
 - d) Neutrophils
62. The respiratory center is located in the:
- a) Cerebellum
 - b) Hypothalamus
 - c) Medulla oblongata
 - d) Cerebral cortex
63. Which part of the brain controls balance and coordination?
- a) Medulla
 - b) Cerebellum
 - c) Hypothalamus
 - d) Pons
64. The kidney plays a key role in maintaining:
- a) Blood glucose only
 - b) Blood pressure, pH, and electrolyte balance
 - c) Oxygen transport only
 - d) Protein synthesis
65. Which metal is most commonly used in orthopedic implants?
- a) Copper
 - b) Titanium
 - c) Aluminum
 - d) Zinc
66. PMMA (Polymethyl methacrylate) is mainly used in:
- a) Heart valves
 - b) Bone cement
 - c) Blood bags
 - d) Vascular grafts
67. A common physical method of surface modification is:
- a) Plasma spraying
 - b) Genetic engineering
 - c) Enzyme immobilization

d) PCR amplification

68. Bacteria–biomaterial interaction often results in:
- a) Biofilm formation
 - b) Reduced infection risk
 - c) Sterilization of the implant
 - d) Immediate healing
69. Pacemaker electrodes are generally coated with:
- a) Silicone
 - b) Iridium oxide or platinum-iridium alloys
 - c) Stainless steel
 - d) Titanium oxide
70. Saline breast implants are usually:
- a) Pre-filled before surgery
 - b) Inflated with sterile saline during surgery
 - c) Made of collagen-filled polymer
 - d) Only used in reconstructive burn surgeries
71. The first step in tissue engineering procedure is:
- a) Scaffold implantation
 - b) Cell sourcing
 - c) Bioreactor culture
 - d) Drug delivery
72. Which device is used for tissue maturation before implantation?
- a) Microscope
 - b) Bioreactor
 - c) Centrifuge
 - d) Endoscope
73. Filters in X-ray tubes are mainly used to:
- a) Focus the X-ray beam
 - b) Remove low-energy photons
 - c) Increase radiation dose
 - d) Improve image magnification
74. The major component of CT that converts X-rays into signals is:
- a) X-ray tube
 - b) Collimator
 - c) Detector
 - d) Filter
75. T1-weighted images give good contrast for:

- a) Fat
 - b) CSF
 - c) Bone
 - d) Air
76. PACS stands for:
- a) Patient Archiving and Communication System
 - b) Picture Archiving and Communication System
 - c) Protocol Analysis for Clinical Scanning
 - d) Processing and Coding System
77. Which transducer works on the photoelectric effect?
- a) Pressure transducer
 - b) Thermistor
 - c) Photodiode
 - d) Strain gauge
78. Telemetry means:
- a) Transmission of data over distance
 - b) Local data storage
 - c) Signal filtering
 - d) Noise reduction
79. ELISA reader is used for:
- a) Blood pressure measurement
 - b) Enzyme assay detection
 - c) Oxygen saturation
 - d) Lung function
80. Blood gas analyzer measures:
- a) pH, pCO₂, pO₂
 - b) Glucose
 - c) Protein
 - d) Lipids
81. The energy source in a DC defibrillator is typically:
- a) AC mains directly
 - b) Capacitor discharge
 - c) Transformer coil
 - d) Battery only
82. Which of the following lasers is used in ophthalmology (retina therapy)?
- a) CO₂ laser
 - b) Argon laser
 - c) Nd-YAG laser

- d) Pulsed ruby laser
83. Lithotripters are used for:
- a) Crushing gallstones
 - b) Crushing kidney stones using shock waves
 - c) Blood filtration
 - d) Cardiac pacing
84. Leakage current in biomedical equipment must be kept:
- a) Above 10 mA
 - b) Below 100 μ A
 - c) At 50 Hz
 - d) At 1 A
85. Which of the following is a unipolar device?
- a) BJT
 - b) MOSFET
 - c) Diode
 - d) Triode
86. At resonance in a series RLC circuit, the impedance is:
- a) Maximum
 - b) Minimum
 - c) Zero
 - d) Infinite
87. The main function of a capacitive filter in rectifiers is to:
- a) Increase output voltage
 - b) Reduce ripple
 - c) Regulate current
 - d) Increase frequency
88. Which type of transformer is commonly used in biomedical equipment for patient safety?
- a) Step-up transformer
 - b) Step-down transformer
 - c) Isolation transformer
 - d) Autotransformer
89. Which gates are called Universal Gates?
- a) AND and OR
 - b) NAND and NOR
 - c) XOR and EX-NOR
 - d) NOT and OR

90. A multiplexer is also known as:
- a) Data Distributor
 - b) Data Selector
 - c) Data Encoder
 - d) Data Inverter
91. In EPROM, data is erased by:
- a) Magnetic field
 - b) Electrical signal
 - c) Ultraviolet light
 - d) Heat
92. Which filter is useful in removing power line interference (50/60 Hz) from ECG signals?
- a) HPF
 - b) LPF
 - c) Notch Filter
 - d) BPF
93. A spring stores energy in the form of:
- a) electrical energy
 - b) potential energy
 - c) kinetic energy
 - d) thermal energy
94. The medium through which signals travel is called:
- a) transmitter
 - b) receiver
 - c) channel
 - d) antenna
95. Noise in communication mainly causes:
- a) improved clarity
 - b) distortion of signal
 - c) increased bandwidth
 - d) better reception
96. Which one is not a basic block of communication system?
- a) transmitter
 - b) channel
 - c) receiver
 - d) actuator
97. Which document legally binds the contractor and client?
- a) Project proposal
 - b) Contract agreement
 - c) Bill of quantities

- d) Tender notice
98. Professional ethics in engineering ensures:
- a) Economic Profit
 - b) Safety and honesty in practice
 - c) Political favor
 - d) Competition
99. NEA (Nepal Engineers Association) primarily works for:
- a) Importing machines
 - b) Professional development of engineers
 - c) Business trading
 - d) Construction approval
100. NEC regulates:
- a) Unskilled laborers
 - b) Engineering education and profession
 - c) Business accounting
 - d) Environmental laws