श्री चित्रा तिरुनाल आयुर्विज्ञान और प्रौद्योगिकीसंस्थान, तिरुवनंतपुरम् -11

**SREE CHITRA TIRUNAL INSTITUTE FOR MEDICALSCIENCES & TECHNOLOGY, THIRUVANANTHAPURAM—695 011**

**ENTRANCE EXAMINATION : ACADEMIC SESSION JANUARY 2020**

**PROGRAM:** Neuro Technology

**Time: 90 minutes** **Max.Marks: 100**

**(Select the most appropriate answer)**
**(There are no negative marks for wrong answers)**

1. Most commonly used semiconductor material is

   a) Germanium
   b) Silicon
   c) Both a and b
   d) None of these

2. The separation between conduction and valence bands on the energy level diagram is called

   a) Insulation band
   b) Forbidden band
   c) Dielectric band
   d) None of these

3. The splitting of white light into its constituent colors is called

   a) Refraction.
   b) Dispersion.
   c) Deviation.
   d) Displacement.

4. Extremely pure form of semiconductor is called

   a) Doped semiconductor
   b) Extrinsic semiconductor
   c) Intrinsic semiconductor
   d) None of these

5. Speed of light in water

   a) $3.0 \times 10^8$
   b) $2.3 \times 10^8$
   c) $2.0 \times 10^8$
   d) $1.2 \times 10^8$

6. A spherical air bubble is embedded in a piece of glass. For a ray of light passing through the bubble, it behaves like a:

a) Converging lens
b) Diverging lens
c) Plano-converging lens
d) Plano-diverging lens

7. The valence and conduction bands in a semiconductor

a) Have large forbidden energy gap
b) Overlap
c) Have small forbidden energy gap
d) None of these

8. Addition of impurities to a pure semiconductor is called

a) Bonding
b) Doping
c) Diffusion
d) Fabrication

9. Which law is also called law of inertia

a) Newton first law
b) Newton second law
c) Newton third law
d) All of the above

10. What is the unit of viscosity?

a) Coulomb
b) Newton second per square meter
c) Watt per meter per degree Celsius
d) Joule per kilogram per Kelvin

11. Which among the following is an N type semiconductor?

a) Phosphorous
b) Indium
c) Gallium
d) Boron

12. The Snell's law is given by

a) $N1 \sin \theta i = N2 \sin \theta t$
b) $N2 \sin \theta i = N1 \sin \theta t$
c) $\sin \theta i = \sin \theta t$
d) $N1 \cos \theta i = N2 \cos \theta t$

13. The refractive index of a medium with permittivity of 2 and permeability of 3 is given by

a) 3.56
b) 2.45
c) 3.21
d) 1.78

14. The angle of incidence of a wave of a wave with angle of transmission 45 degree and the refractive indices of the two media given by 2 and 1.3 is

a) 41.68
b) 61.86
c) 12.23
d) 27.89

15. While Young's modulus 'E' relates to change in length and bulk modulus 'K' relates to change in volume, modulus of rigidity 'G' relates to change in:

a) weight
b) density
c) shape
d) temperature

16. Dimensions of Young's modulus are

a) $[M]^{-1}\,[L]^{-1}\,[T]^{-2}$
b) $[M]^{-1}\,[L]^{-2}\,[T]^{-2}$
c) $[M]\,[L]^{-2}\,[T]^{-2}$
d) $[M]\,[L]^{-1}\,[T]^{-2}$

17. A piston cylinder contains 0.5 kg of air at 500 kPa and 500 K. The air expands in a process so pressure is linearly decreasing with volume to a final state of 100 kPa and 300 K. Find the work in the process.

a) 56.1 kJ
b) 66.1 kJ
c) 76.1 kJ
d) 86.1 kJ

18. The latent heat of steam at atmospheric pressure is.....

a) A.1535 kJ/kg
b) B.1875 kJ/kg
c) C.2257 kJ/kg
d) D.2685 kJ/kg

19. General gas equation is.....

a) A.PV = nRT
b) B.PV = mRT
c) C.$PV^n$ = C
d) D.$C_p$ - $C_v$ = R/J

20. The amount of heat absorbed to evaporate 1 kg of water from its saturation temperature, without change of temperature, is called.....

a) Sensible heat of water
b) Latent heat of vaporization
c) Enthalpy of steam
d) Entropy of steam

21. First law of thermodynamics deals with _____

a) Conservation of mass
b) Conservation of momentum
c) Conservation of energy
d) Conservation of pressure

22. What reaction takes place during photosynthesis?

a) Exothermic reaction
b) Endothermic reaction
c) Redox reaction
d) Combustion reaction

23. The basic laws for analyzing an electric circuit are:-

a) Einstein's theory
b) Newtons laws
c) Kirchhoff's laws
d) Faradays laws

24. A junction when two (or) more than two network elements meet is known as a ___

a) Node
b) Branch
c) Loop
d) Mesh

25. The space inside inside Coolidge tube should be a

a) high vacuum
b) filled with high pressure gas
c) filled with low pressure gas
d) none of the above

26. A change in observed frequency of a wave when source or detector moves relative to transmitting medium is called

a) Doppler effect
b) Thermal effect
c) Newton's effect
d) Elastic effect

27. SI unit of volume flow rate is

a) $m^3/s$
b) m/s
c) $m^2/s$
d) $m^4/s$

28. Which of the following is used in electron microscope?

a) electron beams
b) magnetic fields
c) light waves
d) electron beams and magnetic fields

29. Electron Microscope can give a magnification up to _____

a) 400,000X
b) 100,000X
c) 15000X
d) 100X

30. Negative Staining is used for examining _____

a) Virus particles
b) protein molecules
c) bacterial flagella
d) virus particles, protein molecules and bacterial flagella

31. Chlorobenzene is one of

a) halogens
b) arenes
c) Halogenoarenes
d) all of them

32. Bromine water does not react with benzene at

a) high temperature
b) low temperature
c) room temperature
d) constant temperature

33. The temperature at which the vapour pressure of a liquid becomes equal to the external pressure (atmospheric pressure)

a) Freezing point
b) Melting point
c) Boiling point
d) None of these

34. Sublimation is used to purify

a) plasma
b) gases
c) solids
d) liquids

35. Which synthetic rubbers are blended with BR to make its extensive use in tyres?

a) NR and SBR
b) NBR and SBR
c) NR and NBR
d) NR, NBR and SBR

36. Which type polymerization is used to produce Polychloroprene commercially?

a) Solution polymerization
b) bulk polymerization
c) emulsion polymerization
d) all of the mentioned

37. Tyndal effect is seen in

a) true solution
b) colloidal solution
c) alloys
d) none of these

38. Which color is obtained by copper alloys, when nickel is added to it?

a) Red
b) Blue
c) Silver
d) Yellow

39. Which of the following materials, on adding with copper, doesn't increase its strength?

a) Cadmium
b) Silver
c) Sodium
d) Aluminium Oxide

40. The product from blast furnace is called

a) Cast Iron
b) Wrought Iron
c) Pig Iron
d) Steel

41. The crystal structure of $\alpha$ iron is

a) Simple Cubic
b) Face centered cubic
c) Body centered cubic
d) Close packed hexagonal

42. What element makes up ozone?

a) Nitrogen
b) Carbon
c) Oxygen
d) Hydrogen

43. Which of the following is not a greenhouse gas?

a) methane
b) ozone
c) carbondioxide
d) nitrogen

44. Which of the following is NOT the component of the PNS?

a) Elastic connective tissue
b) Cranial nerves
c) Spinal nerves
d) Ganglia

45. What is the speed of nerve impulse?

a) 60 m/s
b) 0.5 – 130 m/s
c) 10-30 m/s
d) 50 -150 m/s

46. Name the multipolar neuron which is located entirely within the central nervous system.

a) Motor neuron
b) Efferent neuron
c) Afferent neuron
d) Interneuron

47. Name of the instrument to measure atmospheric pressure?

a) Barometer
b) Barograph
c) Bolometer
d) Calipers

48. Which instrument is used to measure the power of electic circuit?

a) Voltmeter
b) Wattmeter
c) Wave meter
d) Viscometer

49. Maric and pierre curie invented

a) Radio
b) Radium
c) Radar
d) Refrigerator

50. Which instrument is used to measure altitudes in aircraft?

a) Audiometer
b) Ammeter
c) Altimeter
d) Anemometer

51. Which of the following has greatest affinity for haemoglobin?

a) CO
b) NO
c) $O_2$
d) $CO_2$

52. The rotational effect of a force on a body about an axis of rotation is described in terms of

a) Centre of gravity
b) Centripetal force
c) Centrifugal force
d) Moment of force

53. Energy possed by a body in motion is called

a) Kinetic energy
b) Potential energy
c) Both of above
d) None of above

54. Electric motor converts

a) Electric energy into mechanical energy
b) Mechanical energy into electrical energy
c) Electrical energy into light energy
d) None of above

55. Solar cell converts

a) Sound energy into electrical energy
b) Electrical energy into mechanical energy
c) Electrical energy into light energy
d) Solar energy into light energy

56. Force of attraction between the different substances is called

a) Surface tension
b) Cohesive force
c) Adhesive force
d) None of above

57. The force which opposes the relative motion between different layers of liquid or gases is called

a) Critical velocity
b) Streamline flow
c) Terminal flow
d) Viscous flow

58. What is the maximum value of deforming force upto which a material shows elastic property and mass above which the material loses it?

a) Elasticity
b) Strain
c) Elastic limit
d) Stress

59. Ozone layer is present in

a) Troposphere
b) Stratosphere
c) Mesosphere
d) Ionosphere

60. Optical fiber works on the principle of

a) Scattering
b) Interference
c) Total internal reflection
d) Refraction

61. Which of the following physical quantities do not have same dimensions

a) Force and Pressure
b) Work and Energy
c) Impulse and momentum
d) Weight and Force

62. Which vitamin helps in blood coagulation?

a) Vitamin A
b) Vitamin B
c) Vitamin C
d) Vitamin K

63. Brass is an alloy of

a) Copper and zinc
b) Copper and nickel
c) Nickel and tin
d) Zinc and nickel

64. The measure of light gathering capacity of the optical fibre is called

a) Acceptance angle
b) Numerical aperture
c) Acceptance cone
d) Refractive index

65. The valence and conduction bands in an insulator

a) Have large forbidden energy gap
b) Overlap
c) Have small forbidden energy gap
d) None of these

66. The value of resistor with colour code Brown, Black, Red

a) 3K
b) 2K
c) 4K
d) 1K

67. What is the decimal equivalent of 1100?

a) 10
b) 12
c) 14
d) 13

68. The principle of LVDT operation is:

a) Resistance
b) Mutual inductance
c) Capacitance
d) None of these

69. Transformer works on the principle of

a) Capacitance
b) Resistance
c) Mutual induction
d) None of these

70. The work done against gravity in taking 100Kg mass at 1m height in 1 second will be

a) 490J
b) 980J
c) 196J
d) None of these

71. Which among the following is not a f- block element?

a) Europium
b) Californium
c) Einsteinium
d) Technetium

72. Which among the following is not an isotope of hydrogen?

a) Protium
b) Ozone
c) Deuterium
d) Tritium

73. According to the Periodic Law of elements, the variation in properties of elements is related to their

a) Atomic masses
b) Atomic numbers
c) Nuclear masses
d) Valency

74. Calcium sulphate dihydrate is commonly known as

a) Ceramic
b) Plaster of Paris
c) Washing soda
d) Gypsum

75. Suspension of slaked lime in water is known as

a) Lime water
b) Quick lime
c) Milk of lime
d) None of these

76. Which India –born scientist was awarded the Nobel prize in astrophysics?

a) Sir. C.V Raman
b) Satyendra Nath Bose
c) Vikram Sarabhai
d) Prof.Chandrashekhar

77. World brain day celebrated as

a) July 22
b) July 25
c) June22
d) July 25

78. System of the body which coordinates and controls its activity is known as

a) Organ system
b) Muscular system
c) Nervous system
d) Nervous system

79. Name the basic structural and functional unit of the nervous system

a) Neuroglia
b) Glial cells
c) Neurons
d) Perikaryon

80. Which of the following cells supports, nourishes, and protect the neurons?

a) Nissl bodies
b) Perikaryon
c) Ganglia
d) Glial cells

81. What are Nissl bodies?

a) Golgi bodies
b) Lysosomes
c) Cluster of rough endoplasmic reticulam
d) Mitochondria

82. The disease of the eye in which the intraocular pressure is increased is

a) Astigmatism
b) Myopia
c) Cataract
d) Glaucoma

83. Functional unit of nervous system is

a) Myoma
b) Myocyte
c) Neurons
d) Glial cells

84. Junction of two neurons is called

a) Synapse
b) Effector
c) Neuromuscular junction
d) Dendrite

85. Which among the following is a neurotransmitter?

a) Tubocurarine
b) Rocuronium
c) Atropine
d) Acetylcholine

86. Neural signals propagate along the axon in the form of electrochemical waves called

a) Magnetic flux
b) Muscle potential
c) Action potential
d) None of these

87. Specialised cells that can transduce sensory signals to nerve impulses are

a) Receptors
b) Synapse
c) Thalamus
d) Schwann cells

88. The power house of the cell is

a) Mitochondria
b) Golgi apparatus
c) Lysosomes
d) Vacuoles

89. Organ involve in the sensation of the body is known as_____

a) Organ system
b) Muscular system
c) Nervous system
d) Sensory system

90. Which of the following helps in maintaining the shape of the eyes?

a) Neuroglia
b) Aqueous humor
c) Vitreous humor
d) Perikaryon

91. In human ear, secretion of wax is done by_____

a) Cochlea
b) Vestibule
c) Basilar membrane
d) Ceruminous glands

92. Name the light absorbing pigment present in the Rods?

a) Neuroglia
b) Aqueous humor
c) Rhodopsin
d) Perikaryon

93. Chemical messengers secreted by ductless glands are called ____

a) Lymph
b) Platelets
c) Plasma
d) Hormones

94. What is the precursor of steroid hormones?

a) Protein
b) Chloestrol
c) Phospholipids
d) Protein

95. Oxygen and haemoglobin bind in a reversible manner to form ____

a) Carboxyhemoglobin
b) Oxyhemoglobin
c) Methoglobin
d) BPG

96. Which blood group is called 'universal recipients'?

a) A
b) B
c) AB
d) O

97. Functional unit of kidneys are:

a) Cortex
b) Nephrons
c) Ureter
d) Calyx

98. The protective tissue covering brain is

a) Meninges
b) Pleura
c) Pericardium
d) None of these

99. Normal Human Blood Pressure is _____ mmHg

a) 120/80
b) 150/70
c) 100/50
d) 200/100

100. Instrument used to measure blood pressure

a) Pulse oximeter
b) Sphygmomanometer
c) Thermometer
d) None of these