RUSH B.Sc Nursing Entrance Examination 2024

[TRNB-2024] Series-A

PHYSICS

1. Three capacitors of capacitances 3 μF, 9 μF and 18 μF are connected once in series and another time in parallel. The ratio of equivalent capacitance in the two cases C_s/C_p will be:
(A) 1:15 (B) 1:30
(C) 1:1 (D) 1:3

2. The positive temperature coefficient of resistance is for:
(A) Silicon (B) Germanium
(C) Copper (D) An electrolyte

3. One ampere current flows through an infinitely long straight wire. The magnetic field produced at a point 1 m away from it:
(A) 2×10^{-3} T (B) 2/10 T
(C) 2×10^{-7} T (D) $2\pi \times 10^{-6}$ T

4. When an electric dipole **P** is kept in a uniform electric field **E**, then for what value of angle between **P** and **E**, will torque be maximum?
(A) 90° (B) 0°
(C) 180° (D) 45°

5. If in a plano-convex lens, the radius of curvature of the convex surface is 10 cm and the focal length of the lens is 30 cm, then the refractive index of the material of lens will be:
(A) 1.5 (B) 1.66
(C) 1.33 (D) 3

6. A ray of light is incident on 60° prism at the minimum deviation position. The angle of refraction of the first face (i.e. incident face) of the prism is:
(A) 30° (B) 45°
(C) 60° (D) Zero

7. Least distance of distinct vision is 25 cm. What will be the magnifying power of simple microscope of focal length 5 cm, if final image is formed at minimum distance of distinct vision?
(A) 1/5 (B) 5
(C) 1/6 (D) 6

8. In Young's experiment, the fringe width is 0.2 mm. If the wavelength of light is increased by 10% and separation between the slits is increased by 10%, then fringe width will be:
(A) 0.401 mm (B) 0.20 mm
(C) 0.165 mm (D) 0.242 mm

9. All fringes of diffraction are of:
(A) Same intensity (B) Unequal width
(C) Same width (D) Full darkness

10. Huygen's theory of secondary waves can be used to find:
(A) Velocity of light
(B) The wavelength of light
(C) Wave front geometrically
(D) Magnifying power of microscope

11. Refractive index of material is equal to tangent of polarizing angle. It is called:
(A) Brewster's law (B) Lambert's law
(C) Malus's law (D) Bragg's law

12. Magnetic susceptibility of a diamagnetic substance varies with absolute temperature as:
(A) Directly proportional to T
(B) Inversely proportional to T
(C) Exponentially decreases with T
(D) Remains unchanged with T

13. In LCR circuit, the voltage across the terminals of resistance, inductance and capacitance are 40 V, 30 V and 60 V, then the voltage across the main source will be:
(A) 130 volt (B) 100 volt
(C) 70 volt (D) 50 volt

14. Which of the following EM wave has highest frequency?
(A) Visible light (B) Infrared waves
(C) UV rays (D) Gamma rays

15. If given particles are moving with same velocity, then maximum de-Broglie wavelength will be for:
(A) Proton (B) β-particle
(C) α-particle (D) Neutron

16. The maximum kinetic energy of photoelectrons emitted from a surface when protons of energy 6 eV fall on it is 4 eV. The stopping potential in volt is:
(A) 4 (B) 6
(C) 8 (D) 10

17. Isotones have the same number of:
(A) Proton (B) Electron
(C) Neutron (D) All of the above

18. What is the respective number of α and β-particles emitted in the following radioactive decay?
$X^{200}_{90} \rightarrow Y^{168}_{80}$
(A) 6 and 8 (B) 8 and 6
(C) 8 and 8 (D) 6 and 6

19. Function of rectifier is:
(A) To convert A.C. into D.C.
(B) To convert D.C. into A.C.
(C) Both (A) and (B)
(D) None of these

20. A P-type semiconductor can be obtained by adding:
(A) Arsenic to pure silicon
(B) Gallium to pure silicon
(C) Antimony to pure germanium
(D) Phosphorus to pure germanium

21. What is the ratio of radii of the 2 nuclei with mass number 1 and 64?
(A) 1/64 (B) 1/4
(C) 1/16 (D) 1/2

22. What will be the change in the self inductance of a coil if the number of turns in a solenoid is doubled?
(A) 2-times (B) 8-times
(C) 4-times (D) 16-times

23. Kirchhoff's first law deals with the conservation of:
(A) Energy (B) Charge
(C) Momentum (D) Mass

24. Which of the following is the property of a magnetic field?
(A) It can change direction of a moving charged particle
(B) It can change speed of a moving charged particle
(C) It can create electric field
(D) It can create gravitational field

25. In Gauss law formula, Q stands for:
(A) The electric field
(B) Total charge within the given surface
(C) Magnetic field
(D) None of the above

26. Which of the following cannot be polarised?
(A) Radiowaves (B) Transverse waves
(C) Sound waves (D) X-rays

27. Two lenses of focal length 5 cm and 50 cm are to be used for making a telescope. Which lens will you use for the objective?
(A) Both (B) Neither
(C) 5 cm (D) 50 cm

28. A capacitor is having a capacity of 2 picofaraday (pf). The electric potential across the capacitor is changing with a value of 10^{12} V/s. The displacement current is:
(A) 2 A (B) 3 A
(C) 6 A (D) 9 A

29. The density of electron and holes in an intrinsic semiconductor is x and y respectively. Which of the following options are true?
(A) $x > y$ (B) $x >> y$
(C) $x < y$ (D) $x = y$

30. In nuclear reactions, there is conservation of:
(A) Energy only
(B) Mass only
(C) Mass, energy and momentum
(D) Momentum only

31. A Transformer is used to light 100 W, 25 volt lamp from 250 volt A.C. mains. The current in the main cable is 0.5 A. Calculate the efficiency of the transformer.
(A) 50% (B) 80%
(C) 90% (D) 70%

32. Which of the following is not due to total internal reflection?
(A) Working of optical fibre
(B) Brilliance of diamond
(C) Difference between apparent and real depth of pond
(D) Mirage on hot summer days

33. The average binding energy per nucleon is maximum for the nucleus:
(A) $^{4}_{2}He$ (B) $^{16}_{8}O$
(C) $^{238}_{92}U$ (D) $^{96}_{26}Fe$

CHEMISTRY

34. Which of the following solutions is not an example of ideal solution?
(A) n-hexane and n-heptane solution
(B) Benzene and toluene solution
(C) Mixture of chloroform and acetone
(D) Bromoethane and chloroethane solution

35. The osmotic pressure of a solution increases if:
(A) Temperature is lowered
(B) Number of moles of solutes is increased
(C) Volume is increased
(D) None of the above

36. On electrolysis of dilute sulphuric acid using platinum electrodes, the product obtained at the anode will be:
(A) Hydrogen (B) Oxygen
(C) Hydrogen sulphide (D) Sulphur dioxide

37. Electrolyte used in lead storage battery is:
(A) KOH solution
(B) Concentrated NaOH solution
(C) H_2SO_4 (38%)
(D) Paste of KOH and ZnO

38. The electrode potential of hydrogen dipped in solution of pH = 1 is:
(A) 0.059 V (B) 0.00 V
(C) -0.059 V (D) 0.59 V

39. Which of the following transition elements show all oxidation states from +2 to +7?
(A) Sc (B) Co
(C) Cu (D) Mn

40. Which metal is used in making electrical wires?
(A) Actinium (B) Nickel
(C) Thorium (D) Tungsten

41. The number of water molecules in Mohr's salt is:
(A) 2 (B) 4
(C) 6 (D) 8

42. The minimum energy for molecules to enter into chemical reaction is called:
(A) Kinetic energy (B) Nuclear energy
(C) Activation energy (D) Threshold energy

43. For a general chemical change, $2A + 2B \rightarrow$ products, the rate of disappearance of A is r_1 and of B is r_2. The rates of r_1 and r_2 are related as:
(A) $3r_1 = 2r_2$ (B) $2r_1 = 3r_2$
(C) $r_1 = r_2$ (D) $2r_1 = r_2$

44. Which of the following ligands is not unidentate?
(A) $C_2O_4^{2-}$ (B) Cl^-
(C) H_2O (D) NH_3

45. Which of the following is a Wilkinson catalyst used for the hydrogenation of alkenes?
(A) $[Ag(S_2O_3)_2]^{3-}$ (B) EDTA
(C) $[Ag(CN)_2]$ (D) $[(Ph_3P)_3RhCl]$

46. Which of the following has the highest boiling point?
(A) CH_3CH_2I (B) CH_3Cl
(C) CH_3I (D) CH_3Br

47. When phenol reacts with bromine water, what is the result?
(A) Brown liquid (B) Colourless gas
(C) White precipitate (D) No reaction

48. Identify the simple ether from the following:
(A) $CH_3OC_2H_5$ (B) $C_2H_5OC_6H_5$
(C) $C_6H_5OCH_3$ (D) $C_6H_5OC_6H_5$

49. Esterification of carboxylic acids is a/an _____ reaction:
(A) Irreversible
(B) Nucleophilic addition
(C) Electrophilic substitution
(D) Nucleophilic substitution

50. Wood spirit is another name for the following:
(A) Benzene (B) Phenol
(C) Methanol (D) Ethanol

51. The preparation of diazonium salts from primary aromatic amines is known as:
(A) Acylation (B) Alkylation
(C) Diazonisation (D) Benzonation

52. Hoffmann Bromamide degradation reaction is used for preparing _____ amine:
(A) Primary (B) Secondary
(C) Tertiary (D) Mixed

53. Which of the following is not a polysaccharide?
(A) Cellulose (B) Xylose
(C) Starch (D) Glycogen

54. Haloforms are trihalogen derivatives of:
(A) Ethane (B) Methane
(C) Propane (D) Benzene

55. Reaction of chloroform with KOH in presence of a primary aromatic amine is called:
(A) Carbylamine reaction (B) Reduction
(C) Hydrolysis (D) Wurtz reaction

56. The unit of rate and rate constant are same for a:
(A) Zero Order reaction (B) First order reaction
(C) Second order reaction (D) Third order reaction

57. 9.8 g of H_2SO_4 is present in 2 litre of a solution. The molarity of the solution is:
(A) 0.2 M (B) 0.05 M
(C) 0.1 M (D) 0.01 M

58. DDT is prepared by reacting chlorobenzene with:
(A) CCl_4 (B) CCl_3-CHO
(C) $CHCl_3$ (D) Ethane

59. Deficiency disease due to insufficient intake of vitamin B_6 is:
(A) Pernicious anemia (B) Convulsions
(C) Night blindness (D) Cheilosis

60. Which of the following is known as 'Green Vitriol'?
(A) $CuSO_4 \cdot 5H_2O$ (B) $CaSO_4 \cdot 2H_2O$
(C) $FeSO_4 \cdot 7H_2O$ (D) $ZnSO_4 \cdot 7H_2O$

61. The number of unpaired electrons in Fe^{2+} (Z=26) is:
(A) 4 (B) 2
(C) 6 (D) 8

62. The complex ion $[Ag(S_2O_3)_2]^{3-}$ is associated with which field?
(A) Electroplating (B) Medicine
(C) Water treatment (D) Photography

63. The correct order of reactivity of following halides for SN^2 mechanisms is:
(A) Tertiary halide > Secondary halide > Primary halide
(B) Primary halide > Secondary halide > Tertiary halide
(C) Secondary halide > Primary halide > Tertiary halide
(D) Secondary halide > Tertiary halide > Primary halide

64. Linkage isomerism is seen in compounds having _____ Ligand.
(A) Monodentate (B) Polydentate
(C) Chelate (D) Ambidentate

65. Who explained the effect of temperature on the reaction rate constant?
(A) Faraday (B) Waag & Gulberg
(C) Arrhenius (D) Le Chatelier

66. If plot of (logK) versus (1/T) gives straight line, what is the value of the slope?
(A) $E_a/2.303R$ (B) $-E_a/3.303R$
(C) $2.303/E_a$ (D) $-E_a/2.303R$

BIOLOGY

67. The body of the ovule is fused within the funicle at:
(A) Micropyle (B) Nucellus
(C) Chalaza (D) Hilum

68. Pollination in water hyacinth and water lily is brought about by:
(A) Water (B) Bats
(C) Insect or wind (D) Birds

69. The process of release of spermatozoa from sertoli cells into cavity of the seminiferous tubules is called:
(A) Spermiogenesis (B) Spermiation
(C) Spermatogenesis (D) Spermatocytogenesis

70. After birth, colostrum is released from mammary glands which is rich in:
(A) IgG antibodies (B) IgM antibodies
(C) IgA antibodies (D) IgE antibodies

71. Which of the following is not a characteristic of an ideal contraceptive?
(A) User friendly (B) Irreversible
(C) Easily available (D) Least side effects

72. Phenotypic and genotypic ratio is similar in case of:
(A) Complete dominance (B) Incomplete dominance
(C) Over dominance (D) Epistasis

73. Klinefelter's syndrome is characterised by a karyotype of:
(A) XYY (B) XO
(C) XXX (D) XXY

74. Polycistronic messenger RNA (mRNA) usually occurs in:
(A) Bacteria (B) Prokaryotes
(C) Eukaryotes (D) Both (A) & (B)

75. Which was the last human chromosome to be completely sequenced in human genome project?
(A) Chromosome 1 (B) Chromosome 11
(C) Chromosome 21 (D) Chromosome Y

76. Some amino acids are coded by more than one codon, hence the genetic code is:
(A) Overlapping (B) Degenerate
(C) Wobbled (D) Unambiguous

77. The first life form on earth was a:
(A) Cyanobacterium (B) Chemoheterotroph
(C) Autotroph (D) Photoautotroph

78. Which species is believed to be the first to use stone tools?
(A) Homo habilis (B) Homo erectus
(C) Neanderthels (D) Homo sapiens

79. Which of the following is affected by the infection of *Wuchereria bancrofti*?
(A) Lymphatic vessels (B) Respiratory system
(C) Nervous system (D) Blood circulation

80. AIDS is widely diagnosed by:
(A) Widal test (B) ELISA
(C) PCR (D) Chromatography

81. Which of the following is an opiate narcotic?
(A) Barbiturates (B) LSD
(C) Morphine (D) Amphetamines

82. Smack is a drug obtained from the:
(A) Leaves of *Cannabis sativa*
(B) Latex of *Papaver somniferum*
(C) Flowers of *Datura stramonium*
(D) Fruits of *Erythroxylon coca*

83. Statins used for lowering blood cholesterol level are extracted from:
(A) Algae (B) Bacteria
(C) Yeast (D) Viruses

84. Which of the following is the first step of sewage treatment?
(A) Precipitation (B) Chlorination
(C) Sedimentation (D) Aeration

85. Baculoviruses do not show:
(A) Host specificity
(B) Narrow spectrum applications
(C) Effects on non-target pathogens
(D) Utility in IPM programme

86. Which of the following is not a cloning vector?
(A) Cosmid (B) Sal I
(C) Phagemid (D) PBR 322

87. During isolation of genetic material, the chemical used to precipitate out the purified DNA is:
(A) Bromophenol blue (B) Chilled ethanol
(C) Ethidium bromide (D) Both (A) & (C)

88. The letter 'R' in EcoR1 is derived from:
(A) Name of genus (B) Name of species
(C) Name of strain (D) The term 'restriction'

89. In RNA i technique, genes are silenced using:
(A) ssDNA (B) dsDNA
(C) dsRNA (D) ssRNA

90. A marriage between a colourblind man and a normal women produces:
(A) All carrier daughters, 50% normal daughters
(B) 50% carriers daughters, 50% normal daughters
(C) 50% colourblind sons, 50% normal sons
(D) All carrier offsprings

91. An urn shaped population age pyramid represents:
(A) Growing population (B) Static population
(C) Declining population (D) Extinct population

92. An inverted pyramid of biomass can be found in which ecosystem?
(A) Forest (B) Grassland
(C) Marine (D) Tundra

93. The rate of formation of new organic matter by rabbit in a grassland is called:
(A) Net productivity
(B) Secondary productivity
(C) Net primary productivity
(D) Gross primary productivity

94. Which of the following is correct?
(A) *Parthenium* is an endemic species of our country
(B) African catfish is not a threat to indigenous catfish
(C) Stellar's sea cow is an extinct animal
(D) *Lantana* is popularly known as carrot grass

95. Proliferation of Endometrium during follicular phase is carried out by:
(A) LH (B) FSH
(C) Prolactin (D) Estrogen

96. Which one of the following is not required in PCR?
(A) Oligonucleotide primers
(B) Helicase enzyme
(C) DNA Template
(D) Taq Polymerase

97. The technique called gamete intra fallopian transfer (GIFT) is recommended for those females:
(A) Whose cervical canal does not allow passage for sperms
(B) Who cannot provide suitable environment for fertilisation
(C) Who fail to produce ovum
(D) Who fail to retain foetus inside uterus

98. In which of the following, endosperm persists in the mature seed?
(A) Pea (B) Bean
(C) Orchid (D) Castor

99. Which of the following enzyme inhibits transformation of R-strain bacteria to S-strain?
(A) Proteinase (B) RNase
(C) DNase (D) Helicase

100. Mass of living matter at a trophic level in an area at anytime is called:
(A) Standing state (B) Standing crop
(C) Detritus (D) Humus