Seat No.	

Paper Code(ENT202029)

B.Sc.Nano Science , MAY-2020

71145-Nanoscience and Technology(B.Sc.-M.Sc.)

Day And Date : Tuesday 10/11/2020 **Total Marks :** 100

Time : 11:00 To 12:30

Marks

1 A body of mass M hits normally a rigid wall with velocity V and bounces back with the same velocity. The impulse experienced by the body is 1

A) Zero

B) MV

C) 1.5 MV

D) 2 MV

2 Which of the following carbonyl compounds undergoes aldol condensation? 1

A) Benzaldehyde

B) Benzophenone

C) Acetophenone

D) tert-Butyl phenyl ketone

3 Which of the following is the correct name for NaHCO3 1

A) sodium hydrogen carbonate

B) sodium acetate

C) nitrogen hydrogen carbonate

D) sodium hydrogen carbon trioxide

4 Homogenous mixture is formed by mixing 1

A) phenol and water

B) iron filing and sand

C) silver chloride and water

D) ethanol and water

5 The intermolecular force of attraction between methane molecule is 1

A) dipole-dipole interaction

B) ion-dipole interaction

C) dipole-induced dipole interaction

D) dispersion forces

6 1

Which of following species can form hydrogen bond with themselves?

A) NH_3 B) C_2H_6 C) H_2S D) CH_3OCH_3

7 Which of following electron have highest energy? 1

A) 2s

B) 2p

C) 1s

D) 4p.

8 For an electron if m=0,electron is present in , 1

A) s orbital

B) p orbital

C) d orbital

D) f orbital

9 The energy of electron in the same subshell is --- 1

A) different

B) zero

C) infinite

D) same.

10 In the Modern periodic table the element are arranged in 1

A) increasing mass

B) increasing atomic volume

C) increasing atomic number

D) alphabetically

11 The lanthanoides are placed in the periodic table at 1

A) left hand side

B) right hand side

C) middle

D) bottom .

12 Total number sigma bonds involved in ethylene molecule are 1

A) 3

B) 5

C) 2

D) 1

13 When cations and anions from ionic solid a leaves its regular site and moves to occupy a place between the lattice site called interstitial position, the defect is called …….. 1

A) Vacancy defect

B) frenkel defect

C) Schottky defect

D) Impurity defect

14 1

The angle between two covalent bond is minimum

A) CH_4 B) C_2H_2 C) NH_3 D) H_2O.

15 Lateral overlap of p-orbital's leads to the formation of 1

A) Π-bond

B) Metallic bond

C) σ-bond

D) Ionic bond.

16 A convex lens of focal length 30 cm produces 5 times magnified real image of an object. What is the object distance? 1

A) 36 cm

B) 25 cm

C) 30 cm

D) 150 cm

17 An electron is moving in an orbit of a hydrogen atom from which there can be a maximum of six transitions. An electron is moving in an orbit of another hydrogen atom from which there can be a maximum of three transitions. The ratio of the velocity of the electron in these two orbits is _____. 1

(A) $\frac{5}{4}$

(B) $\frac{3}{4}$

(C) $\frac{1}{2}$

(D) $\frac{2}{1}$

18 For a series LCR circuit at resonance, the statement which is not true is 1

A) Peak energy stored by a capacitor = peak energy stored by an inductor

B) Average power = apparent power

C) Wattless current is zero

D) Power factor is zero

19 How many 6μF, 200 V condensers are needed to make a condenser of 18 pF, 600 V? 1

(A) 9

(B) 18

(C) 3

(D) 27

20 In an unbiased p-n junction 1

A) Potential at p is more than that at n

B) Potential at p is less than that at n

C) Potential at p is equal to that at n

D) Potential at p is +ve and that at n is -ve

21 A boat has green light of wavelength λ = 500 nm on the mast. What wavelength would be measured and what colour would be observed for this light as seen by a diver submerged in water by the side of the boat? Given n_w = 4/3. 1

(A) Green of wavelength 500 nm

(B) Blue of wavelength 376 nm

(C) Green of wavelength 376 nm

(D) Red of wavelength 665 nm

22 A horizontal metal wire is carrying an electric current from the north to the south. Using a uniform magnetic field, it is to be prevented from falling under gravity. The direction of this magnetic field should be towards the_____. 1

A) east

B) west

C) north

D) south

23 A capacitor and an inductance coil are connected in separate AC circuits with a bulb glowing in both the circuits. The bulb glows more brightly when _____. 1

A) separation between the plates of the capacitor is increased.

B) a dielectric is introduced into the gap between the plates of the capacitor.

C) an iron rod is introduced into the inductance coil.

D) the number of turns in the inductance coil is increased.

24 1

Q.1. The determinant of $\begin{bmatrix} 1 & 0 & 0 \\ 0 & 2 & 0 \\ 0 & 0 & 3 \end{bmatrix}$ is

A. 2

B. 3

C. 6

D. 0

25 A certain current on passing through a galvanometer produces a deflection of 100 divisions. When a shunt of one ohm is connected, the deflection reduces to 1 division. The galvanometer resistance is 1

(A) 100 Ω

(B) 99 Ω

(C) 10 Ω

(D) 9.9 Ω

26 A small conducting sphere of radius r is lying concentrically inside a bigger hollow conducting sphere of radius R. The bigger and smaller spheres are charged with Q and q (Q > q) and are insulated from each other. The potential difference between the spheres will be 1

(A) $\frac{1}{4\pi\epsilon_0}\left(\frac{q}{r}-\frac{q}{R}\right)$

(B) $\frac{1}{4\pi\epsilon_0}\left(\frac{q}{R}-\frac{Q}{r}\right)$

(C) $\frac{1}{4\pi\epsilon_0}\left(\frac{q}{r}-\frac{Q}{R}\right)$

(D) $\frac{1}{4\pi\epsilon_0}\left(\frac{Q}{R}-\frac{q}{r}\right)$

27 Vapour pressure of solution of a non volatile solute is……. 1

A) Higher than vapour pressure of pure solvent

B) Equal to the vapour pressure of pure solvent

C) Lower than vapour pressure of pure solvent

D) Constant

28 The two solutions with same osmotic pressure are called……. 1

A) Hypertonic

B) Hypotonic

C) Isotonic

D) Isometric

29 The system that can exchange both energy as well as matter with its surroundings is called……. 1

A) Closed system

B) Open system

C) Isolated system

D) All of the above

30 In DNA two adjacent nucleotides are joined together by……..Bond 1

A) Peptide

B) Phosphodiester

C) disulphide

D) amide

31 Which of the following is milk sugar 1

A) Glucose

B) Maltose

C) Lactose

D) All of the above

32 _____ of the following is water soluble vitamin 1

A) Vitamin A

B) Vitamin D

C) Vitamin K

D) Vitamin B

33 Sucrose is ……. 1

A) Monosaccharide

B) Disaccharide

C) Polysaccharide

D) All of the above

34 Which structure does NOT play a part in the motion of cells? 1

A) microvilli

B) cilia

C) flagella

D) pseudopodia

35 1

Q.3. The modulus of the complex number $Z = -1 + i$ is

A. $\sqrt{2}$

B. 0

C. 1

D. 2

36 Molecules that are mirror images of one other are called as _____ 1

A) Isomers
B) Epimers
C) Anomers
D) All of the above

37 Which of the following is NOT a mode of genetic exchange within a bacterial population? 1

A) Conjugation
B) Transduction
C) Transformation
D) Translation

38 Tissue differentiation begins at which stage? 1

A) Zygote
B) Morula
C) Blatula
D) Gastrula

39 The nervous system develops from which germ layer? 1

A) ectoderm
B) mesoderm
C) endoderm
D) none

40 During inspiration, the diaphragm moves: 1

A) down by contraction
B) down by relaxation
C) up by contraction
D) up by relaxation

41 Which of the following is NOT a function of the kidney 1

A) excretion of urea
B) regulation of fluids and electrolytes
C) elimination of toxic substancess
D) defecation

42 Which of the following is synthesized from carotene? 1

A) Vitamin B
B) Vitamin A
C) Vitamin C
D) Vitamin D

43 Sucrose is disaccharide formed from the _____ 1

A) Glucose & Fructose

B) Maltose

C) Galactose & Xylose

D) Arabinose &Ribulose

44 Of the following, which is a basic need of all living things? 1

A) oxygen gas

B) light

C) hydrogen gas

D) water

45 1

Q.6. If $y = e^{2x}$ then $\frac{dy}{dx}$ is

A. e^{2x}

B. $2e^{2x}$

C. xe^{2x}

D. $e^{x} + 2$

46 1

Q.16. $cos5xcos3x =$

A. $\frac{cos4x+cosx}{2}$

B. $\frac{cos4x-cosx}{2}$

C. $cos4x - cosx$

D. $cos4x + cosx$

47 Q.7. The equation of the line passing through (1, 0) and (0, 1) is 1

A. $x - y = 1$

B. $x + y = 1$

C. $x - y = 0$

D. $x + y = 0$

48 1

Q.10. Which of the following curve is symmetric about Y axis

A. $y = x^2$

B. $x = y^2$

C. $x = -y^2$

D. None of these

49 1

Q.12. $\int xe^{-x}dx$ is

A. $xe^{-x} - e^{-x} + c$

B. $-xe^{-x} - e^{-x} + c$

C. $xe^{-x} + c$

D. None of these

50 1

Q.18. $\lim_{x \to 0} \frac{\sin x}{x}$ is

A. 0

B. 1

C. 2

D. ∞

51 The condition for the minimum of interference of light due to reflection at the surface of parallel faced glass plate is 1

A) 2μ t cos r = nλ

B) 2μ t cos r = (n + 1/(2)) λ

C) 2μ t cos r = n λ/2

D) 2μ t cos r = (n + 1/2) λ/2

52 ν_1 is the frequency of the series limit of Lyman series, ν_2 is the frequency of the first line of Lyman series and ν_3 is the frequency of the series limit of the Balmer series. Then _____. 1

(A) $\frac{1}{\nu_2} = \frac{1}{\nu_1} + \frac{1}{\nu_3}$

(B) $\frac{1}{\nu_1} = \frac{1}{\nu_2} + \frac{1}{\nu_3}$

(C) $\nu_1 - \nu_2 = \nu_3$

(D) $\nu_1 = \nu_2 - \nu_3$

53 $_{92}U^{235}$ undergoes successive disintegrations with the end product of $_{82}Pb^{203}$. The Number of α and β particles emitted are 1

(A) $\alpha = 6, \beta = 4$

(B) $\alpha = 6, \beta = 0$

(C) $\alpha = 8, \beta = 6$

(D) $\alpha = 3, \beta = 3$

54 Each unit cell of Face centred cubic type crystal contains …….. 1

A) 1

B) 2

C) 3

D) 4

55 . The standard hydrogen electrode is represented by..... 1

A) $H_2(g, 1\ bar) \mid H_{aq}^{+}(a=1)$

B) $H_2(g, 1\ atm) \mid H_{aq}^{+}(a=1)$

C) $Pt \mid H_{aq}^{+}(a=1) \mid H_2(g, 1\ bar)$

D) $Pt \mid H_2(g, 1\ atm) \mid H_{aq}^{+}(a=1)$

56 Calomel electrode is represented as..... 1

A) $KOH\ (aq) \mid Hg_2Cl_2(s) \mid Hg$

B) $KCl^{-}(aq) \mid Hg_2Cl_2(s) \mid Hg \mid Pt$

C) $KCl^{-}(aq) \mid Hg_2Cl_2(s) \mid Hg$

D) $SO_4^{-}(aq) \mid Hg_2Cl_2(s) \mid Hg \mid Pt$

57 The number of asymmetric carbon atoms in glucose are…… 1

A) 2
B) 3
C) 4
D) 5

58 The rate of reaction is expressed in the units 1

A) $L.\ mol^{-1}\ t^{-1}$

B) $mol{\cdot}dm^{-3}t^{-1}$

C) mol. second

D) $M^{-1}s^{-1}$

59 The glands which has duct are called as 1

A) Exocrine gland
B) Endocrine glands
C) both a & b
D) none of the above

60 …… sugar is called as table sugar 1

A) a)Sucrose

B) b)Lactose

C) c)Glucose

D) d)Maltose

61 Theory of use and disuse was proposed by _____ 1

A) Darwin

B) Lamarck

C) Both a & b

D) None of the above

62 The valve between the right ventricle and the pulmonary artery is the 1

A) mitral valve

B) semilunar valve

C) bicuspid valve

D) tricuspid valve

63 1

Q.14. $\int_0^1 (x+1)\,dx$ is

A. $\frac{2}{3}$

B. $\frac{1}{2}$

C. $\frac{3}{2}$

D. $\frac{1}{4}$

64 Racemate is…… 1

A) Optically active

B) Optically dextro rotator

C) Optically inactive

D) Optically laevorotatory

65 The geometry of carbonium ion is 1

A) Tetrahedral

B) Planar

C) Linear

D) Pyramidal

66 The number of sp2 and sp3 hybridized carbon atoms in fructose are respectively….. 1

A) 4 and 2

B) 2 and 4

C) 1 and 5

D) 5 and 1

67 n-Propylamine can be prepared by catalytic reduction of……. 1

A) n-propyl cyanide

B) propionaldoxime

C) acetoxime

D) nitroethane

68 28.α-halogentaion used as synthetic lemonade is……. 1

A) Gattermann reaction

B) Riemer – Tiemer reaction

C) Sandmeyer's reaction

D) HVZ reaction

69 It is difficult to break C-CI Bond in CH2 = CH-CI due to…….. 1

A) Hyper conjugation

B) Resonance

C) Electromeric effect

D) Inductive effect

70 The smell of bitter almond is given by the compound…….. 1

A) Benzoic acid

B) Benzaldehyde

C) vanillin

D) cinnamaldehyde

71 The number of electrons surrounding the carbonium ion is…….. 1

A) 6

B) 8

C) 10

D) 7

72 The total number of electrons present in the central carbon atom of a free radical is……. 1

A) 7

B) 8

C) 9

D) 6

73 Acetoxime on catalytic reduction gives…… 1

A) Acetic acid

B) acetic anhydride

C) ethylamine

D) isopropylamine

74 Schiff's reagent gives pink colour with…… 1

A) acetone

B) acetic acid

C) acetaldehyde

D) methylacetate

75 A botanist is most likely to study 1

A) Monerans

B) Protistans

C) Fungi

D) Virions

76 A virus must do what to reproduce? 1

A) form a latent virus

B) undergo transformation

C) infect a cell

D) conjugate

77 Process of meiosis occurs in _____ 1

A) Gametic cells

B) Somatic cells

C) Both a & b

D) None of the above

78 When CO2 (carbon dioxide) is dissolved in water, it yields a solution that 1

A) has acidic properties

B) has basic properties

C) is neutral

D) none

79 Food preservative in tomato ketchup is…… 1

A) Sodium acetate

B) sodium benzoate

C) sodium salicylate

D) sodium propionate

80 Mendel used _____ plant for performing the his genetics experiment 1

A) Pea

B) banana

C) potato

D) rose

81 Once the erythrocytes enter the blood in humans, it is estimated that they have an average lifetime of how many days 1

A) 10

B) 120

C) 200

D) 360

82 Starch is homo polysaccharide formed by joining of many _____units together. 1

A) Mannose

B) Arabinose

C) Glucose

D) Ribose

83 Which of the following is cane sugar 1

A) Glucose

B) Maltose

C) Lactose

D) Sucrose

84 Pyramid of energy is always _____ 1

A) Inverted

B) Upright

C) Average

D) None of the above

85 Q.22. The differential equation $\frac{dy}{dx} = \frac{1}{x}$ has the solution 1

A. $y = -logx + c$

B. $y = \frac{1}{x} + c$

C. $y = \frac{-1}{x} + c$

D. $y = logx + c$

86 Phenol molecule contains how many hydroxyl groups? 1
A) Three
B) Four
C) One
D) Many

87 An ester can be prepared by reacting 1
A) Carboxylic acid and alcohol
B) Amine and ketone
C) Ketone and alkyne
D) Alcohol and phenol

88 Natural rubber contains 1
A) Polyisoprene
B) Polyethylene
C) Polypropylene
D) Polystyrene

89 Lactose is ……. 1
A) a)Monosaccharide
B) b)Disaccharide
C) c)Polysaccharide
D) d)All of the above

90 Codeine is……. 1
A) Tranquilizer
B) Antibiotic
C) Analgesic
D) Antacid

91 Q.24. What is the center of a circle given by $x^2 + y^2 + 2x = 0$ 1

A. (0, 1)

B. (1, 1)

C. (1, 0)

D. (-1, 0)

92 Which of the following represents the correct formula for aluminum oxide? 1

A) AlO

B) Al2O3

C) AlO2

D) Al2O

93 Actinoides belong to following type of elements 1

A) s-block elements

B) d-block elements

C) f-block elements

D) p-block elements .

94 The weakest bond among the following is 1

A) Ionic bond

B) Metallic bond

C) Covalent bond

D) Hydrogen bond

95 1

Q.20. If A is invertible matrix, then the system AX=B has

A. No solution

B. More than one solution

C. Only one solution

D. None of these

96 How many milligrams are in 0.2 decigrams? 1

A) 20

B) 2000

C) 0.002

D) 0.00002

97 1

Among the following, the molecule with linear geometry is

A) C_2H_4 B) BeF_2 C) NH_3 D) H_2O

98 When a chemical bond between two atom is formed, the potential energy of system 1

A) decreases

B) increases

C) remains the same

D) cannot be predicted

99 …… blood group is universal acceptor 1

A) a)A

B) b)AB

C) c)O

D) d)All of the above

Q.26. Which of the following formula is correct

A. $cos2x = cos^2x + sin^2x$

B. $cos2x = 1 + 2sin^2x$

C. $cos2x = 1 - 2sin^2x$

D. $cos2x = 2cos^2x + 1$