Seat No.	

Paper Code(ENT202030)

M.Sc Entrance Exam , MAY-2020

71144-Nano Science and Technology Ent. Exam

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

Time : 13:30 To 15:00

		Marks
1	. In redox titration of $CuSO_4$ solution, the cell formed by using SCE as reference electrode is..... A) SCE || Cu^{+2} | Cu B) SCE || Cu^{+} || Cu C) SCE || Cu^{+2} | Cu^{+} | Pt D) Cu | Cu^{+2} || SCE	1
2	The CFSE for a high-spin octahedral complex of a d^6 ion is -A) -0.6 Δ_0 B) 1.2 Δ_0 C) 1.8 Δ_0 D) - 0.4 Δ_0	1
3	Passive transducers are based on ..... principle. A) Energy conversion B) Energy controlling C) None of Above D) Both A and B	1
4	A typical example of chromophore is ..... A) C=O B) OH C) NH2 D) Cl	1
5	Geometrical isomerism is shown only by compounds containing ……. Center. A) Chiral B) Achiral C) Olefinic D) All of these	1
6	What is the Colour emission & Wavelength of Silver Nanoparticles? A) Red,650nm B) Indigo Light,444nm C) Yellow,570nm D) Green,510nm	1
7	Following is the secondary pollutants..... A) PAN B) CO C) SO2 D) None of the above	1

8 S layer are composed of 1
A) Glycoproteins
B) Proteins
C) Both
D) None

9 Nanochemistry is the combination of ……. 1
A) Chemistry and Nanoscience
B) Chemistry and engineering
C) Chemistry and Physics
D) All of the above

10 Which disease is a major focus for nanotechnology? 1
A) Hair loss
B) AIDS
C) Cancer
D) Tooth decay

11 The growth of small nuclei clusters to nanoparticles is referred to as 1
A) Condensation
B) Nucleation
C) Supersaturation
D) Agglomeration

12 Temperature is a measure of…….. 1
A) degree of hotness
B) the heat of the body
C) both (a) and (b)
D) none of the above

13 The total emf of cell is represented by…… 1

A) $E_{cell} = E_L(oxd.) + E_R(red.)$

B) $E_{cell} = E_L(oxd.) - E_R(Oxd.)$

C) $E_{cell} = E_R(red.) - E_L(red.)$

D) All of the above

14 The line integral of $\vec{B}$ around a closed path is equal to μ_o times the total ……... 1
enclosed by the closed path.
A. Voltage (V)
B. Current (I)
C. Power (W)
D. All

15 1

Gauss's low in magnetostatic is expressed by the relation

A. $\vec{\nabla} \mathrm{X} \vec{B} = \mu \vec{J}$

B. $\vec{\nabla}. \vec{B} = 0$

C. $\vec{\nabla} \mathrm{X} \vec{B} = 0$

D. $\vec{\nabla}. \vec{B} = \mu_0 \vec{J}$

16 In-plane diffraction grating with white light as the source the central fringe is …….. 1

A) white
B) blue
C) red
D) dark (black)

17 Plane of vibration and plane of polarization are mutually …….. 1

A) perpendicular
B) parallel
C) antiparallel
D) inclined at 45 degree

18 In which process entropy of a system increases? 1

A) a reversible process
B) an adiabatic process
C) a natural process
D) none of the above

19 1

The direction of Hall voltage is

A. Perpendicular to both applied electric field and magnetic field
B. Parallel to applied electric field
C. Perpendicular to applied magnetic field only
D. Perpendicular to applied electric field

20 In Maxwell Bridge, the balance equation is independent of ……. 1

A) Resistance
B) Capacitance
C) Frequency
D) Charge

21 …… an error cannot be treated mathematically. 1

A) Gross
B) Instrumental
C) Observational
D) Human

22 Mercury in a glass thermometer is an example of …….. order instrument 1

A) Zero
B) First
C) Second
D) Third

23 The load cell is used to measure ……. 1

A) Stress

B) Temperature

C) Resistance

D) Current

24 A catalyst increases the rate of a reaction by: 1

A) Increasing activation energy

B) Increasing temperature

C) Decreasing activation energy

D) Decreasing temperature

25 The efficiency of today's best solar cell is about 1

A) 15-20%

B) 40%

C) 50%

D) 75%

26 Which of the following is the principal factor which causes the properties of nanomaterials to differ significantly from other materials? 1

A) Size distribution

B) Specific surface feature

C) Quantum size effects

D) All the mentioned

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

28 The time taken for 10% completion of a first order reaction is 20 min. Then, for 19% completion, the reaction will take…….. 1

A) 40 mins

B) 60 mins

C) 50 mins

D) 30 min

29 The magnitude of $\Delta 0$ value will depend upon 1

A) Charge of the central metal ion

B) Nature of ligand

C) Principal quantum number of the d –electron

D) All the above.

30 The size of E.coli Bacteria is 1

A) 30nm

B) 300nm

C) 3000nm

D) 1nm

31 Which of the following nanoparticles mostly uses for antimicrobial purpose in water pollution treatment 1

A) Magnesium

B) Iron

C) Silver

D) Cadmium

32 In, Photolithography technique, radiation sensitive materials that usually consist of a photo-sensitive compound, a polymeric backbone, and a solvent is called as 1

A) Wafer

B) Mask Alignment

C) Photoresist

D) Substrate

33 The interference fringes due to a thin wedge-shaped film are fringes of ……. 1

A) equal thickness

B) equal length

C) equal inclination

D) equal height

34 1

Diamagnetic substances when placed in a magnetic field are

A. Strongly attracted

B. Repelled

C. Weakly attracted

D. Neither attracted nor repelled

35 The intensity of any spectral line depends on …….. 1

A) Transition probability

B) No. of molecules in in each level

C) population of energy levels

D) All of above

36 1

Schottky defect is closely related to

A. Vacancies

B. Impurities

C. Electronic defect

D. Interstitialcies

37 Semiconductor have energy band gap of the order of 1

A. 1 eV
B. 10 eV
C. Zero
D. 5 eV

38 Output impendence of an Ideal Instrumentation Amplifier is …. Ω 1

A) Zero
B) Infinity
C) One
D) Ten

39 Bioinspired nanomaterials are 1

A) Biotemplate
B) Biomimic
C) Both
D) None

40 Which one of the following exhibits rotational Spectra? 1

A) H_2

B) N_2

C) CO

D) CO_2

41 Which of the following is a first biosensor 1

A) Glucose biosensor
B) Cholesterol biosensor
C) Both
D) None

42 1

The range of X-ray wavelength is

A. 0.01 A° to 10 A°
B. 10 A° to 100 A°
C. 0.01 pm to 10 pm
D. None of these

43	Aldol condensation is shown by aldehydes ……. A) Carrying hydrogen atom B) Not carrying hydrogen atom C) Other than formaldehyde D) Carrying alpha hydrogen atom	1
44	Zero valent iron nanoparticles widely use as remediation application in …….pollution A) Air pollution B) Marine pollution C) Ground water pollution D) Noise pollution	1
45	The correct order of different types of energies is A) Eel >> Evib >> Erot >> E tr B) Eel >> Erot >> Evib >> E tr C) Eel >> Evib >> Etr >> E rot D) Etr >> Evib >> Erot >> E el	1
46	The frequency separation of successive lines will be ……for heavier isotopic molecule than for a lighter one. A) greater B) smaller C) constant D) None of these	1
47	For a linear molecule having ‘n’ atoms, modes of vibrations are -------- A) 3n-5 B) 3n-6 C) n-5 D) n-6	1
48	Absorption and emission of Fluorescent molecule is observed in the ……. region of spectrum A) Infrared B) UV- Visible C) Radio waves D) X ray	1
49	Only those radiations which are absorbed by the molecule are effective in producing chemical change is the statement of …….. law A) Grotthus-Draper B) Lambert C) Lambert-Beer D) Einstein	1
50	Quantum yield depends on ……. A) Temperature B) Wavelength C) Light intensity D) All of these	1

51 The quantum number which accounts for the splitting up of spectral line (Zeeman effect)……... 1

A) Principal quantum number

B) Azimuthal or angular quantum number

C) Magnetic quantum number

D) spin quantum number

52 Most of the hard acids and hard bases form------ 1

A) Covalent

B) ionic

C) Either covalent or ionic

D) Both ionic and covalent.

53 For dimer degree of polymer is ----- 1

A) 1

B) 2

C) 3

D) 4

54 ------polymer offers a greater resistance to the oxidation and pyrolysis 1

A) Inorganic

B) b) Natural

C) Synthetic

D) Organic

55 Ethers are isomeric with ……... 1

A) Aldehydes

B) Ketones

C) Alcohols

D) Phenols

56 The size of red and white blood cells is in the range of _____μm 1

A) 2-5

B) 5-7

C) 7-10

D) 10-15

57 The relation for de Broglie hypothesis is…… 1

A) $\lambda = \frac{p}{h}$

B) $\lambda = \frac{mv}{h}$

C) $\lambda = \frac{h}{p}$

D) $\lambda = hv$

58	Liposomes are made of A) Proteins B) Phospholipids C) Cellulose D) Ribosomes	1
59	Which formulation contains nanoparticle prepared by using biologically processed metal ores A) Homeopathic medicines B) Modern antibiotics C) Ayurvedic 'Bhasmas' D) Modern cosmetics	1
60	Which of these arts contains Nanotechnology? A) Lycurgus cup B) Medieval stained glass windows in churches C) Damascus steel swords D) All of the above	1
61	Self replicating nanorobots holds A) Bacteria B) Algae C) Virus D) Fungi	1
62	Biological synthesis is synthesis of nanomaterial from A) Plant B) Microbes C) Both D) None	1
63	Which ratio decides the efficiency of Nanoparticles? A) Weight/Volume Ratio B) Surface Area/Volume Ratio C) Volume/Weight Ratio D) Pressure/Volume Ratio	1
64	Protein cage are a)Bioinspired structure A) Bioinspired structure B) Biotemplate C) Both D) None	1
65	The size of quantum dots_____nm? A) 5nm B) 10nm C) 50nm D) 100nm	1
66	The change in optical properties of Nanomaterials is due which of the following phenomenon? A) Iridescence B) Bioluminescence C) Energy Conservation D) Surface Plasmons	1

67	Liposomes are A) Lipid bilayer enclosing aqueous core B) Protein bilayer enclosing aqueous core C) Both D) None	1
68	Inorganic polymers do not contain ------in their back bone A) C B) P C) Si D) B	1
69	The prefix “Nano” comes from a word _____? A) French word meaning billion B) Spanish word meaning particle C) Latin Word meaning invisible D) Greek word meaning dwarf	1
70	What are the two most abundant elements by mass found in Earth's crust A) Al & Fe B) Na & Cl C) Ca & Mg D) O2 & Si	1
71	Which one of the following technique is used in formation of nanoemulsion A) Co-precipitation B) Sol-gel C) Hot Plate method D) High Pressure homogenization	1
72	The “Gecko Feet” adhesive is due to nanostructures called_____? A) Trichomes B) Spatulae C) Scansors D) Setae	1
73	Air pollution from automobiles can be controlled by fitting? A) Cyclone separator B) Electrostatic precipitator C) Catalytic converter D) None of the above	1
74	Biological Nanomoter are made up of A) DNA B) RNA C) Protein D) None	1
75	……are allotrope of carbon with a cylindrical nanostructure. A) Graphene B) Carbon nanotube C) Carbon dot D) Fullerene	1

76	In water pollution the parameter COD means ..... A) Chemical Oxygen Demand B) Chemical organic Demand C) Chemistry organically dextrose D) Chemical organic dextrose	1
77	Which of the following is example of biological treatment ? A) Activated sludge B) filtration C) chlorination D) none of the above	1
78	……is the process by which nanotopographical etchings are artificially produced on a surface A) Photolithography B) Electron beam lithography C) X ray lithography D) all of the above	1
79	Free electron theory was introduced by -------- A) Drude B) Pauling C) Block D) Faraday	1
80	These biological treatment use bio films of microorganism ---- A) Trickling filters B) grit chambers C) Activated Sludge Process D) None of the above	1
81	G band in Raman spectra of graphene indicate…….. A) disordered structure of graphene B) c-c vibrational mode C) impurities present D) None of these	1
82	Who first used the term nanotechnology and when? A) Eric Drexler, 1986 B) Sumio Iijima, 1991 C) Norio Taniguchi, 1974 D) Richard Feynman, 1959	1
83	Who was the first scientists to describe the substances having nanodimensions possess all together different & unique properties? A) Richard Feynmann B) Eric Drexler C) Archimedes D) Michael Faraday	1
84	Fullerene or bucky ball is made up of ____ carbon atoms. A) 100 B) 75 C) 20 D) 60	1

85 The Surface Area to Volume Ratio of a sphere with radius 1cm is R1 & that of sphere with radius 5cm is R2.Then R1=_____R2? 1

A) 3

B) 1/3

C) 5

D) 1/5

86 What is quantum dots? 1

A) A semiconductor nanostructure that confines the motion of conduction band electrons,valence band holes or exciton in all three spatial directions

B) A fictional term used in Science fiction for the end point of Wormholes

C) The sharpest possible tip of an AFM

D) Unexplained spots that appear in Electron Microscopy image of Nanostructure smaller than 1nm.

87 Fullerene or buckyball is generally made up of ……carbon atoms 1

A) 100

B) 75

C) 20

D) 60

88 1 m = _____ nm 1

25) 1 m = _____ nm.

a) 10^{8} b) 10^{-7}

c) 10^{9} d) 10^{-10}

89 Quantum confinement results in 1

A) Energy gap in semiconductor is proportional to the inverse of the square root of size

B) Energy gap in semiconductor is proportional to the inverse of the size

C) Energy gap in semiconductor is proportional to the square of size

D) Energy gap in semiconductor is proportional to the inverse of the square of size

90 Concept of superconductivity was introduced by -------- 1

A) Pauling

B) Hund

C) H.Bethe

D) Kammerling

91 _____enables the production of nanoparticles containing various elements in this process in order to avoid inhomogeneities and phase separation, all species have to be precipitated simultaneously. 1

A) Supersaturation

B) Anodization

C) Co-Precipitation

D) Molecular Self Assembly

92 In Newton's rings experiment, a plano-convex lens of ……. radius of curvature is used 1

A) Small

B) Very small

C) Moderate

D) large

93 All natural process are …… process. 1

A) isothermal

B) reversible

C) irreversible

D) isobaric

94 The electric displacement vector $\overrightarrow{D}$ is given by the relation…… 1

A. $\overrightarrow{D} = \epsilon_o \overrightarrow{E} + \overrightarrow{P}$

B. $\overrightarrow{D} = \epsilon_o \overrightarrow{E} - \overrightarrow{P}$

C. $\overrightarrow{D} = \overrightarrow{P} - \epsilon_o \overrightarrow{E}$

D. $\overrightarrow{D} = \epsilon_o \overrightarrow{E} \times \overrightarrow{P}$

95 A heat engine with 100% efficiency is…… 1

A) possible

B) impossible

C) practicable

D) none of the above

96 In a L-C-R circuit, at resonance, the current drawn is …… 1

A) maximum

B) minimum

C) zero

D) none of the above

97 1

Diamagnetic substances have …… magnetic susceptibility.

A. Positive

B. Negative

C. Both

D. None

98 Spring balance is an example of ……. Order of system 1

A) Zero

B) First

C) Second

D) Third

99 ……. is an electromechanical device which converts sound waves into an electrical signal. 1

A) Microphone

B) Loud Speaker

C) Oscillator

D) Amplifier

100 The slew rate of an Ideal Instrumentation Amplifier is … 1

A) Infinity

B) Zero

C) One

D) Ten