SET-3

M. Sc Nanoscience and Technology

Entrance Examination

Q.1	Multiple Choice Questions	Correct answer
1)	The susceptibility of magnesium at 300 °K is $1.2x10^{-5}$. At what temperature will the susceptibility increase to $2x10^{-5}$? a) 100°K b) 2000°K **c) 180°K** d) 400°K	C
2)	Which detector is used in gas chromatography? A) Photodiode **B) Flame ionization detector (FID)** C) UV-Vis detector D) Mass filter	B
3)	Which of the following is a unidirectional device? A) Resistor **B) Diode** C) Capacitor D) Inductor	B
4)	The P-N junction diode conducts current when….. A) Reverse biased B) Both directions C) No voltage is applied **D) Forward biased**	D
5)	Which of the following is used to convert AC to DC? A) Amplifier **B) Rectifier** C) Oscillator D) Transformer	B

6)	Which logic gate gives a high output only when all inputs are high? A) OR gate **B) AND gate** C) NOT gate D) XOR gate	**B**
7)	A Zener diode is primarily used for …. **A) Voltage regulation** B) Amplification C) Current boosting D) Signal generation	**A**
8)	Which device stores energy in a magnetic field? A) Capacitor B) Resistor **C) Inductor** D) Diode	**C**
9)	Unit of susceptance is …… **a) mho** b) ohm c) volt d) ampere	a
10)	Torque is the time rate of change of …… a) Linear acceleration b) Angular acceleration c) Force **d) Angular momentum**	d
11)	If the particle moves in a central force field, it's ……remains constant.	a

	a) Areal velocity b) Linear velocity c) Angular velocity d) Linear momentum	
12)	Dimensions of force = ... a) $[M^1L^2T^3]$ b) $[M^{-1}L^3T^{-2}]$ c) $[M^1L^3T^2]$ **d) $[M^1L^1T^{-2}]$**	d
13)	.....frame of reference is accelerated frame of reference. **a) Non-inertial** b) Inertial c) Both non-inertial and inertial d) Lagrangian	a
14)	Within the elastic limit the ratio of the .....strain to the corresponding .....strain is called Poisson's ratio. **a) Lateral, longitudinal** b) Longitudinal, lateral c) Lateral, shearing d) Shearing, longitudinal	a
15)	Newton's first law of motion is known as law of..... **a) Inertia**	a

	b) Momentum c) Impulse d) Force	
16)	If the surface tension of a liquid drop is 'T' then the excess pressure inside the drop of radius 'r' is..... a) (4T)/r b) (T)/r **c) (2T)/r** d) (6T)/r	c
17)	One of the pseudo force that arise in the case of circular motion is the..... **a) Centrifugal force** b) Gravitational force c) Electrostatic force d) Magnetic force	a
18)	In linear motion inertia is equivalent of ..... a) Torque **b) Mass** c) Force d) acceleration	b
19)	Bravais lattice in 3 dimensions, the following are correct for the Tetragonal lattice **a) $a1 = a2 \neq a3,\ a = b = \gamma = 90°$** b) $a1 \neq a2 \neq a3,\ a = b = \gamma = 90°$ c) $a1 = a2 \neq a3,\ a = b \neq \gamma$	a

	d) $a1 = a2 \neq a3,\ a \neq b \neq \gamma$	
20)	In a simple cubic unit cell, if Miller indices of the plane are (220) then intercepts of a plane in a crystal is… **a) (½)a, (½) b, □c** b) 2a, 2b, 1c c) 1a, (½)b, (½)c d) (½)a, 1b, (½)c	a
21)	Total number of atoms in unit cell of Face Centred Cubic crystal structure. a) 1 b) 2 **c) 4** d) 6	c
22)	Energy loss during hysteresis is the area of_____loop. a) $\chi - T$ b) $M - B$ **c)** $B - H$ d) $\chi - H$	c
23)	The Laplace's equation is represented by … a) $\vec{\nabla}.V = 0$ **b)** $\nabla^2 V = 0$ c) $\nabla^2 V = {}^{-\rho}/_{\varepsilon_0}$ d) $V X \vec{\nabla} = 0$	b

24)	The trajectory of a charged particle moving in uniform magnetic field B is….. a) straight line **b) circular** c) elliptical d) parabolic	b
25)	In a crystal structure, repeatability of basic building block is known as_____. **a) Unit Cell** b) Lattice c) Crystal d) Miller Indices	a
26)	In Ewald construction, radius of Ewald's sphere is_____. a) λ **b) 1 /λ** c) 1/ 2λ d)λ/ 2	b
27)	Packing fraction for simple cubic crystal structure is_____. a)0.68 **b)0.52** c)0.74 d) 0.57	b

28)	The wavelength of X-ray is of the order of_____. **a) 0.1nm** b) 100 nm c) 200 nm d) 500 nm	**a**
29)	Every reciprocal lattice vector is _____ to the lattice plane of the crystal lattice. **a) Normal** b) parallel c) inclined d) anti- parallel	**a**
30)	Coercivity is the magnitude of reverse magnetizing field _____ **a) required to reduce the magnetization to zero.** b) required to increase the magnetization to maximum. c) due to applied magnetizing field. d) when applied magnetizing field is zero.	**a**
31)	..... is a type of substitution reaction that is widely used in the production of aryl halides from aryl diazonium salts. a) Friedel–Crafts reaction b) Wurtz reaction c) Claisen reaction d) Sandmeyer reaction	**a**
32)	A ..... reaction is a reaction that involves the replacement of one functional group or atom with another positively charged functional group or atom. **a) electrophilic substitution** b) nucleophilic substitution	**a**

	c) both a and b d) none of the above	
33)	The optically inactive compound is. a) Glucose b) Lactic acid c) 2-Chlorobutane **d) 2-Chloropropane**	**d**
34)	The electrochemical cell stops working after some time because.... a) Electrode potential of both the electrodes becomes zero b) One of electrodes completely vanishes **c) Electrode potential of both electrodes equalizes** d) The reaction reverses its direction	**c**
35)	The entropy change involved in the isothermal reversible expansion of 2 moles of an ideal gas from a volume of 10 dm^3 at 27°C is to a volume of 100 dm^3 ..... a) 42.3 J/ mole / K **b) 38.3 J/ mole / K** c) 35.8 J/ mole / K d) 32.3 J/ mole / K	**b**
36)	The process of converting a gas into a liquid is known as..... a) sublimation b) Condensation c) Evaporation d) Vaporization	**b**
37)	The pH of a neutral solution is... a) 0 **b) 7** c) 14 d) 10	**b**
38)	The permanent hardness of water is due to the presence of... a) Calcium b) Sulphate c) Magnesium **d) All of these**	**d**
39)	Coordination number is a characteristic of which of the following? a) **Central atom** b) Ligand c) Coordination entity d) Coordination compound	**a**

40)	In a chemical reaction, what is a substance that speeds up the reaction but is not consumed? a) Reactant **b) Catalyst** c) Product d) Inhibitor	**b**
41)	In chair conformation of cyclohexane, the axial C-H bonds remain in ..... position. a) eclipsed **b) staggered** c) Skew boat d) Any one of these	**B**
42)	The potential energy of cyclohexane is maximum in ..... a) boat b) twist boat c) chair **d) half chair**	**D**
43)	Citric acid, upon dehydration at 150°C, forms ..... a) tricarboxylic acid **b) aconitic acid** c) monoacetyl citric acid d) none of these	**B**
44)	In galvanization, the iron is coated with ..... a) Cr b) Al c) Ni **d) Zn**	**D**
45)	What does nanophase electrochemistry primarily focus on? a) Studying macroscopic electrochemical reactions b) Studying the properties of bulk materials **c) Manipulating and studying electrochemical processes at the nanoscale** d) Developing large-scale industrial electrochemical processes	**C**
46)	The electrochemical theory of corrosion was introduced by ..... **a) Whitney** b) Evans c) Keir d) Faraday	**A**
47)	The effective atomic number of Fe^{3+} in $K_3[Fe(CN)_6]$ is ..... a) 34 **b) 35** c) 32 d) 37	**B**

48)	EDTA is used for ..... a) food preservation b) water softening c) masking **d) all of these**	**D**
49)	Classification of chelating agents is made based on..... a) oxygen atoms b) nitrogen atoms **c) number of donor atoms** d) number of electrons	**C**
50)	By considering spin only the magnetic moment calculated for the Co^{2+} ion is ..... B.M. a) 4.9 **b) 3.87** c) 1.73 d) 2.84	**B**
51)	Salt bridge is a device used to maintain _____ in both half cells. a) Electrical stability **b) Electrical neutrality** c) Thermal stability d) None of the above	**B**
52)	In electrochemical cell, anode is _____ **a) Negative** b) Positive c) Neutral d) None of the above	**A**
53)	In electrolytic cell electrons moves from _____ a) Ion to ion b) ion to cathode **c) Anode to cathode through external circuit**	**C**

	d) Cathode to anode through external circuit	
54)	Natural radioactivity is..... a) Artificial transmutation **b) Spontaneous emission of radiation** c) Decay without any emission **d)** All of the above	**B**
55)	Reaction of hard acid and hard base gives..... a) Covalent compounds **b) Ionic compounds** c) Metallic compounds d) None of the above	**B**
56)	The drugs which are used to lower down the body temperature in condition of fever but not below normal body temperature are _____. a) Anaesthetics b) Antidiabetics **c) Antipyretics** d) Antihistamine agent	**C**
57)	What is nuclear fusion? a) Splitting of nucleus **b) Combination of nuclei** c) Production of lighter daughter nuclei d) Both a) and c)	**B**

58)	Paludrin (Proguanil) is a _____ drug. a) Antifungal **b) Antimalarial** c) Antineoplastics d) Antibacterial	**B**
59)	Which of the following is an antitubercular drug? a) Paludrin b) Cypermethrin c) **Ethambutol** d) None of the above	**C**
60)	Phenobarbital is a _____ drug. a) Antimalarial **b) Central Nervous System (CNS)** c) Antitubercular d) Antidiabetics	**B**
61)	Highest point of magnetization is called? a. Magnetic saturation b. De-Magnetization c. Coercivity d. Remenance	**A**

62)	Magnetic field is denoted by ? a. P b. H c. M d. Hc	B
63)	Magnetic saturation is denoted by? a. H b. Ms c. Hc d. P	A
64)	Magnetic Flux is denoted by? a. H b. B c. M d. Ms	B
65)	Which type of ZnO particle's appear to be transparent in colour? a. Large sized ZnO b. Nano sized ZnO c. Both d. None	B
66)	What is the charge of an electron? a. Negative b. Positive c. Neutral d. None	A
67)	When Chemical energy is converted into photons it's called? a. Chemiluminescence	A

	b. Bioluminescence c. Electroluminescence d. Photovoltaic effect d. none	
68)	Which of the following are considered to be optoelectronic device? a. Solar cells b. GMR c. TMR d. Spin valve	**A**
69)	Which of the following invention has won the Nobel prize in Physics in 2014? a. LED b. Solar cells c. GMR d. TMR	**A**
70)	Soft magnets have? a. Narrow hysteresis b. Broad hysteresis c. both	**A**

	d. None	
71)	If the band gap is 1.7 eV, then LED emittes ..... colored light. a) Blue b) Red c) Green d) Yellow	b
72)	The sword of Tipu Sultan was made of... a) nano gold b) nano aluminium c) Damascus steel d) Nano silver	**c**
73)	Who prepared and explained nanotubes for the first time? a) Sumio Tijima b) Richard Smalley c) Eric Drexler d) Richard Feynmann	**a**
74)	Zig-zag type of a CNT can be represented as …… a) (1,2) b) (2,2) c) (2,0) d) (0,0)	**c**
75)	For Zig-Zag configuration of CNT which of the following condition is suitable. a) n=O, m=O, $\theta=30°$ b) $n\neq O$, m=O, $\theta=0°$ c) n=O, m=O, $\theta=0°$ d) $n\neq O$, m=O, $\theta=30°$	**b**
76)	In case of Esaki diode the width of the depletion region must be ..... a) 100 nm	**c**

	b) 50 nm c) 10 nm d) 0 nm	
77)	Which of the following is an example of bottom-up approach for the preparation of nanomaterials? a) Sol-gel b) Dip pen nano-lithography c) Lithography d) Pulsed laser deposition	**a**
78)	The diameter of a bucky ball is ____ nm. a) 1,000 b) 100 c) 10 d) 1	**d**
79)	For.....nanomaterial, all the dimensions are at nanoscale, an electron confined in all 3D space. a) 3D b) 0D c) 2D d) 1D	b
80)	Due to quantum confinement the energy difference between energy bands is..... with decreasing particle size. a) increases b) decreases c) nearly constant d) do not change	**a**
81)	A piezoelectric generator uses	**d**

	a) principle of the converse piezoelectric effect b) an electronic oscillator c) the idea of electronic vibration **d) all the above**	
82)	Ultrasonics are ..... **a) sound waves with a frequency greater than 20,000 Hz** b) sound waves with a frequency less than 20,000 Hz c) waves traveling with a velocity greater than that of sound waves d) waves traveling with a velocity less than that of sound waves	**a**
83)	The semiconductor has an energy band gap of the order of ..... **a) 1 eV** b) 10 eV c) Zero d) 5 eV	**a**
84)	The most important property of nanomaterials is ..... a) Force **b) Friction** c) Pressure d) Temperature	**b**
85)	Which of these historical works of art contains nanotechnology? a) Lycurgus cup	**d**

	b) Medieval stained-glass windows in churches c) Damascus steel swords **d) All of the above**	
86)	Particles (material) having a size between ..... are called nanoparticles or nanomaterials. a) 1 to 10 nm b) 1 to 1000 nm **c) 1 to 100 nm** d) 1 to 10000 nm	**c**
87)	The hole-electron pair in the lattice is called ..... a) Lone-pair **b) Exciton** c) Positron d) Ion-pair	**b**
88)	The solution of gold nanoparticles shows different colors due to ..... a) Different concentration **b) Different particle size** c) Different molecular condition d) Different energy	**b**

	b) Charge of protein alone c) Mass and hydrophobicity of the protein d) Charge and mass of the protein	
95)	The highest concentration of the calcium is present in_____. a) Cytosol b) Mitochondria c) Lysosomes d) Endoplasmic reticulum	**D**
96)	Titanium dioxide (TiO2) is an important ----- semiconducting **a) n-type** b) p-type c) combined d) Hybrid type	**A**
97)	Photo-catalysis is an advanced -------process that is employed in the field of water and wastewater treatment. **a) Oxidation** b) Neutralizing c) Catalytic d) Neutral	**A**
98)	The Following are anthropogenic Nano-sized chemical particles that are known to accumulate in the food chain **a) Diesel particulate matter** b) Gravels c) Pollen grains d) Tar	**A**
99)	Nanoparticles may enter into the plants via --------cells a) Lignin cells b) Vascular cells c) Kitin cells **d) Stomata cells**	**D**
100)	In water treatment Mesoporous silica is good to the adsorption of ------ a) Oil **b) Toxic anions** c) Plastic fragments d) None of the above	**B**

89)	In scanning electron microscopy (SEM) electron beam is focused by ..... a) Optical lenses b) Electronic lenses **c) Magnetic lenses** d) Electric lenses	**c**
90)	Zero-valent iron nanoparticles widely use as remediation applications in ..... pollution a) Air pollution b) Marine pollution **c) Groundwater pollution** d) Noise pollution	**c**
91)	Restriction endonucleases have the ability of cutting _____ a) DNA at random sites b) DNA at specific sites c) Both a and b d) DNA and RNA at random sites	**B**
92)	The extra chromosomal, self-replicating, double stranded, closed, circular DNA molecules are called _____ a) Plasmids b) Phages c) Viruses d) Chloroplasts	**A**
93)	Self-assembled closed colloidal amphipathic structures composed of lipid bilayers are called as _____. a) Micelles. b) Liposomes c) Polymers. d) Dendrimers	**B**
94)	In 2-D gel electrophoresis is dependent on a) Mass of protein alone	**D**