Rajasthan University Of Health Sciences Jaipur
राजस्थान स्वास्थ्य विज्ञान विश्वविद्यालय जयपुर

BPT Entrance Examination 2019

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1	Prior to experiments with cathode tubes, the smallest particles that made up matter were believed to be
A	atoms
B	corpuscles
C	electrons
D	particles of rarefied air
Answer	A

2	In Millikan’s oil drop experiment, what was the consequence of making the electrical force (q E) equal to the gravitational force (m g)?
A	The oil drops were suspended, motionless in the chamber.
B	The oil drops fell downward due to the force of gravity.
C	The oil drops fell downward due to the electrical force.
D	The oil drops were propelled upward by the electrical force.
Answer	A

3	The correct electronic configuration of Sodium is:
A	2,8,1
B	8,2,1
C	2,1,8
D	2,8,2
Answer	A

4	The atomic number of an atom is the number of _____ in the atom's nucleus.
A	Electrons
B	Neutrons
C	Protons
D	Valence electrons
Answer	C

5	Elements in the same column of the Periodic table have common in?
A	The same atomic weight
B	The same number of electrons in the outermost shell
C	The same total number of electrons
D	The same number of electron shells
Answer	B

6	The sp^3d^2 hybridization of central atom of a molecule would lead to
A	square planar geometry
B	Tetrahedral geometry
C	Trigonal bipyramidal geometry
D	Octahedral geometry
Answer	D

7	Temperature below which, the gas does not obey ideal gas laws is called
A	Boyle's temperature
B	inversion temperature
C	reduced temperature
D	critical temperature
Answer	A

8	An endothermic reaction is one, which occurs
A	With evolution of heat
B	With absorption of heat
C	In forward direction
D	No change of heat
Answer	B

9	The factor E+PV is known as
A	Heat content
B	Enthalpy
C	Work done
D	Entropy
Answer	B

10	In which of the following process, a maximum increase in entropy is observed?

A	dissolution of salt in water
B	condensation of water
C	sublimation of naphthalene
D	melting of ice
Answer	C

11	An acid HA ionises as $HA \rightleftharpoons H^+ + A^-$ The pH of 1.0 M solution is 5. Its dissociation constant would be
A	1×10^{-5}
B	1×10^{-10}
C	5
D	5×10^{-8}
Answer	B

12	Ions which are attracted towards the anode are known as
A	Anion
B	Cation
C	Radical
D	Positron
Answer	A

13	Decease of oxidation Number is known as
A	Oxidation
B	Reduction
C	Neutralization
D	Disproportionation
Answer	B

14	Hydrogen has 3 isotopes. Which of the following is NOT one of them?
A	Tritium
B	Proton
C	Deuterium
D	Protium
Answer	B

15	One of the following is not called alkaline earth metal.
A	barium
B	radium.
C	Beryllium
D	Strontium
Answer	C

16	When Cl_2 gas reacts with hot and concentrated sodium hydroxide solution, the oxidation number of chlorine changes from
A	Zero to – 1 and zero to +3
B	Zero to + 1 and zero to –3
C	Zero to + 1 and zero to –5
D	Zero to – 1 and zero to +5
Answer	D

17	In which of the following compounds, nitrogen exhibits highest oxidation state?
A	N_3H
B	NH_2OH
C	N_2H_4
D	NH_3
Answer	A

18	An isomer of ethanol is
A	Ethanol
B	Methanol
C	Diethyl ether
D	Dimethyl ether
Answer	D

19	Which of the following can’t be used in Freidal Craft’s reactions?
A	$FeCl_3$
B	$FeBr_3$
C	$AlCl_3$

D	NaCl
Answer	D

20	Write the IUPAC name of CH_3CH_2COOH
A	Ethyl formic acid
B	Ethyl carboxylic acid
C	Ethane methanoic acid
D	Propanoic acid
Answer	D

21	The rate of this reaction can be expressed in terms of time derivatives of concentration $N_2(g)$, $H_2(g)$ or $NH_3(g)$. Identify the correct relationship amongst the rate expression:$N_2(g) + 3H_2(g) \rightarrow 2NH_3(g)$
A	$\text{Rate} = -\frac{d[N_2]}{dt} = -\frac{1}{3}\frac{d[H_2]}{dt} = -\frac{1}{2}\frac{d[NH_3]}{dt}$
B	$\text{Rate} = -\frac{d[N_2]}{dt} = -3\frac{d[H_2]}{dt} = 2\frac{d[NH_3]}{dt}$
C	$\text{Rate} = \frac{d[N_2]}{dt} = -\frac{1}{3}\frac{d[H_2]}{dt} = \frac{1}{2}\frac{d[NH_3]}{dt}$
D	$\text{Rate} = -\frac{d[N_2]}{dt} = -\frac{d[H_2]}{dt} = \frac{d[NH_3]}{dt}$
Answer	A

22	The specific rate constant of a first order reaction depends on the
A	Concentration of the reactant
B	Concentration of the product
C	Time
D	Temperature
Answer	D

23	The unit of rate constant for the first order reaction is
A	Sec^{-1}
B	$Mol.\ ltr.^{-1}$

C	$Mol.^{-1}$ $ltr.sec^{-1}$
D	$Ltr.^{-1}$
Answer	A

24	Which of the following statement is incorrect?
A	Taj Mahal is affected by hydrocarbons.
B	Buildings are adversely affected by acid rain.
C	Due to acid rain, microorganisms are affected
D	Large amount of acid rain decreases soil fertility.
Answer	A

25	Compounds with identical crystal structure and analogous chemical formula are called
A	Isomers
B	Isotones
C	Allotropes
D	Isomorphous
Answer	D

26	Sodium chloride, NaCl usually crystallizes in a face centred cubic lattice. How many ions are in contact with any single Na^+ ion?
A	8
B	6
C	4
D	1
Answer	B

27	Faraday’s laws of electrolysis are related to the
A	Atomic number of the cation
B	Atomic number of the anion
C	Equivalent weight of the electrolyte
D	Speed of the cation
Answer	C

28	$2H^+ + 2e^- + \frac{1}{2} O_2 \rightarrow H_2O$ (1); $E^\circ = +1.23$ V $Fe^{2+} + 2e^- \rightarrow Fe(s)$, $E^\circ = -0.44$ V The half-cell reactions for rusting of iron are given above, ΔG° (in kJ) for the reaction is
A	–76
B	–322
C	–122
D	–176
Answer	B

29	We have three aqueous solution of NaCl labelled as A, B and C with concentrations of 0.1M, 0.01M and 0.001M respectively. The value of van't Hoff factor for these solutions will be in the order
A	iA<iB<iC
B	iA>iB>iC
C	iA=iB=iC
D	iA<iB>iC
Answer	C

30	Colligative properties depends on
A	Nature of the solute particles
B	Number of solute particle
C	Physical properties of solute particle
D	Natureof solvent particle
Answer	B

31	In Freundlich adsorption isotherm, the value of 1/n is
A	1 in case of physical adsorption
B	1 in case of chemisorption
C	Between 0 and 1 in all cases
D	Between 2 and 4 in all cases
Answer	C

32	Which one of the following does not involve coagulation?
A	Peptization
B	Formation of delta regions

C	Treatment of drinking water by potash alum
D	Clotting of blood by the use of ferric chloride
Answer	A

33	Copper is extracted by _____ method
A	self-reduction
B	carbon reduction
C	electrolytic
D	froth floatation
Answer	D

34	Within group 15, the trend in values of $\Delta_a H^o$(at 298 K) is:
A	N > P > As > Sb
B	N < P < As < Sb
C	Bi > Sb > As > P
D	N > P < As < Sb
Answer	A

35	Bond enthalpy terms in group 16 follow which one of the following trends?
A	S–S > O–O
B	Se–Se > S–S
C	S=S > O=O
D	S–F < O–F
Answer	A

36	Which statement is correct regarding xenon fluorides (XeF_2, XeF_4 and XeF_6)
A	are all gases at 298 K
B	are all thermodynamically unstable with respect to Xe and F_2
C	all react with water, but not at the same rate
D	all react with SiO_2 at 298 K
Answer	C

37	Matching up correct formula and magnetic property; which pair is correct?

A	$[Zn(OH_2)_6]^{2+}$; paramagnetic
B	$[Co(NH_3)_6]^{3+}$; diamagnetic
C	$[CoF_6]^{3-}$; diamagnetic
D	$[V(OH_2)_6]^{2+}$; diamagnetic
Answer	B

38	$[Cr(CN)_6]^{3-}$ is expected to be:
A	paramagnetic with $\mu_{eff} \approx 3.87\ \mu_B$
B	diamagnetic
C	paramagnetic with $\mu_{eff} < 3.87\ \mu_B$
D	paramagnetic with $\mu_{eff} > 3.87\ \mu_B$
Answer	A

39	Which metal complex ion is expected to be subject to a Jahn-Teller distortion?
A	$[Cr(OH_2)_6]^{3+}$
B	$[Cr(NH_3)_6]^{2+}$
C	$[Cr(CN)_6]^{3-}$
D	$[Cr(bpy)_3]^{2+}$
Answer	B

40	Which one of the following has a square planar geometry? (Atomic numbers: Co = 27, Ni = 28, Fe = 26, Pt = 78)
A	$[CoCl_4]^{2-}$
B	$[FeCl_4]^{2-}$
C	$[NiCl_4]^{2-}$
D	$[PtCl_4]^{2-}$
Answer	D

41	If ‘n’ represents total number of asymmetric carbon atoms in a compound, the possible number of optical isomers of the compound is
A	2n
B	n^2
C	2^n
D	2n + 2
Answer	C

42	Chlorination of ethane is carried out in presence of
A	anhydrous $AlBr_3$
B	mercuric chloride
C	ultraviolet light
D	zinc chloride
Answer	C

43	Anisole can be prepared by the action of methyl iodide on sodium phenate. The reaction is called
A	Fittig’s reaction
B	Williamson’s reaction
C	Wurtz’s reaction
D	Etard’s reaction
Answer	B

44	Among the alkenes which one produces tertiary butyl alcohol on acid hydration
A	$(CH_3)_2C = CH_2$
B	$CH_3 – CH = CH – CH_3$
C	$CH_3 – CH_2 – CH = CH_2$
D	$CH_3 – CH = CH_2$
Answer	A

45	The correct order of decreasing acid strength of trichloroacetic acid (A), trifluoroacetic acid (B), acetic acid (C) and formic acid (D) is
A	A > B > C > D

B	A > C > B > D
C	B > A > D > C
D	B > D > C > A
Answer	C

46	One mole of a symmetrical alkane on ozonolysis gives two moles of an aldehyde having molecular mass of 44u. The alkene is:
A	Ethene
B	Propene
C	1-butene
D	2-butene
Answer	D

47	One strand of DNA has the following sequence of nucleotide 3’ ATTCGCTAT 5’ so the other strand of DNA has
A	5’ TAAGCGATA 3’
B	3’ TAAGCGATA 5’
C	5’ GACGCGATA 3’
D	3’ GACGCGATA 5’
Answer	A

48	Chitin is a
A	Polysaccharide
B	Nitrogenous polysaccharide
C	Lipoprotein
D	Protein
Answer	A

49	Of the following, which one is classified as polyester polymer?
A	Nylon-66
B	Terylene
C	Backelite
D	Melamine
Answer	B

50	Which polymers occur naturally?
A	Starch and Nylon
B	Starch and Cellulose

C	Proteins and Nylon
D	Proteins and PVC
Answer	B

51	The dimensional formula of magnetic flux is
A	$ML^1T^{-1}A^{-1}$
B	$ML^1T^{-2}A^{-1}$
C	$ML^2T^{-1}A^{-1}$
D	$ML^2T^{-2}A^{-1}$
Answer	D

52	How systematic errors are eliminated?
A	Frequent measurement
B	Replacement of instrument
C	Finding mean of reading
D	Finding variance of reading
Answer	B

53	A person can throw a ball up to a maximum height of 20 m. The maximum horizontal distance that he can throw the same ball will be
A	$20\sqrt{2}$ m
B	$40\sqrt{2}$ m
C	40 m
D	20 m
Answer	C

54	A particle moves on a circle with angular momentum L. If the frequency of rotation is doubled and kinetic energy is halved, the angular momentum becomes
A	**L**/4
B	$\mathbf{L}/2$
C	4**L**

D	**2L**
Answer	A

55	A satellite is orbiting just above the surface of aplanet of average density d with a period T. If G is the universal constant of gravitation, The quantity T^2d is equal to
A	$1/G$
B	$3\pi /G$
C	$4\pi^2/ G$
D	$4\pi^2G$
Answer	B

56	The moment of Inertia of a uniform semicircular disc of mass M and radius R about a line perpendicular to the plane of the disc through the centre is
A	$¼(MR^2)$
B	(MR^2)
C	$2/5(MR^2)$
D	$1/2(MR^2)$
Answer	D

57	A rocket of lift of mass $3.5x10^4$ kg is launched upwards with an initial acceleration of $10m/s^2$. Then the initial thrust to rocket will be
A	3.5×10^5 N
B	7.0×10^5 N
C	3.5×10^4 N
D	3.5×10^6 N
Answer	A

58	The period of oscillation of a simple pendulum is given by $T=2\ \pi\sqrt{(l/g)}$ where *l*=100cm and is know to have 1mm accuracy. The period is about 2s. The time of 100oscillations is measured by a stopwatch of least count 0.1s. The percentage error in g is

A	0.1%
B	1%
C	0.2%
D	0.8%
Answer	C

59	A metallic wire of length ‘L ‘and area of cross section ‘A’ behaves like a spring. If Y is the Young’s modulus of the rigidity, the spring constant ‘k’ is given by
A	YL/A
B	YA/L
C	YA/(2L)
D	2YA/L
Answer	B

60	Curie temperature is the temperature above which
A	A ferromagnetic material becomes paramagnetic
B	A paramagnetic material becomes diamagnetic
C	A ferromagnetic material becomes diamagnetic
D	A paramagnetic material becomes ferromagnetic
Answer	A

61	540 gm of ice at 0^o C is mixed with 540 gm of water at 80^o C. The resultant temperature of the mixture would be
A	0^o C
B	30^o C
C	80^o C
D	40^o C
Answer	A

62	When a certain amount of a heat is given to a gas under isothermal conditions, it will result in
A	a rise in temperature
B	external work being done
C	an increase in internal energy of the gas
D	both external work and rise in temperature

Answer	B

63	A reversible heat engine converts $1/6^{th}$ heat, which it absorbs from source into useful work. When the temperature of the sink is reduced by 62^{o} C, its efficiency is doubled. Then the temperature of the source is
A	262 K
B	172 K
C	272 K
D	372 K
Answer	D

64	Two spheres A and B of same material have radius 1 m and 4 m, and temperatures 4000 K and 2000 K respectively. Then the energy radiated by sphere A is
A	Greater than that of sphere B
B	Less than that of sphere B
C	Equal to that of sphere B
D	Two times that of sphere B
Answer	C

65	In the steady state, the temperature of an object
A	does not change with time but is different in different points on the object
B	increases with time
C	decreases with time
D	follows zeroth law of thermodynamics
Answer	A

66	Thermocouple thermometer works on the principle of
A	Peltier effect
B	Zeeman effect
C	Seebeck effect
D	Photoelectric effect
Answer	C

67	The mean free path of an inert gas increases with
A	decrease in temperature
B	increase in temperature
C	Remains constant

D	increase in pressure
Answer	B

68	The bob of simple pendulum is a spherical hollow ball filled with water. A plugged hole near the bottom of the oscillating bob gets suddenly unplugged. The time period of oscillation during draining
A	First increase and then decreases to the original value
B	First decrease and then increases to the original value
C	Remain unchanged
D	Continuously increases towards the saturation value
Answer	A

69	The ratio of speed of an object to the speed of sound is called
A	Reynolds number
B	Avogadro Number
C	Mach number
D	Fibonacci number
Answer	C

70	The time period of a mass suspended from a spring is T. If the spring is cut into four equal parts and the same mass is suspended from one of them, the new time period will be
A	T
B	T/4
C	T/2
D	2T
Answer	C

71	In an adiabatic process, there is no
A	work done
B	change in temperature
C	change in internal energy
D	exchange of heat
Answer	D

72	If surface tension of the water is 0.075 N/m, what will be the diameter of a water droplet, if the pressure inside is 0.1 N/cm^2 greater than the outside pressure?
A	3 mm
B	6 mm

C	0.3 mm
D	0.6 mm
Answer	A

73	What is the moment of inertia of a rectangular section (b= width and d=height) about an horizontal axis through base?
A	$bd^3/3$
B	$bd^2/12$
C	$b^2\ d^3/6$
D	$bd^3/12$
Answer	A

74	Which statement is right for conservative force vector F = Ai + Bj + Ck?
A	In rectangular components representation of any vector we have vector F = Ai + Bj + Ck
B	In rectangular components representation of any vector we have vector F = Ax + By + Cz
C	In rectangular components representation of any vector we have vector F = Fx + Fy + Fz
D	In rectangular components representation of any vector we have vector F = Fi + Fj + Fk
Answer	C

75	The mass of a rocket is 1000 kg, which is to be launched from the surface of earth ($g=10m/s^2$ and radius of earth 6400km$^{)}$). The required energy to launch rocket in free space is
A	$6.4x10^{11}$ J
B	$6.4x10^{10}$ J
C	$6.4x10^{9}$ J
D	$6.4x10^{8}$ J
Answer	D

76	A series L-C-R circuit has a resonant frequency of 2 MHz and a Q-factor of 100. Its bandwidth is
A	20 kHz

B	2kHz
C	4kHz
D	40kHz
Answer	A

77	When a capacitor is added in series in an L-C-R circuit, the impedance of the circuit will
A	decrease
B	increase
C	remain constant
D	depend on the frequency of a.c. mains
Answer	D

78	If an electrically charged particle passes through a magnetic field in a direction perpendicular to it then the
A	Direction of particle remains unchanged
B	Speed of the particle remains unchanged
C	Velocity remains unchanged
D	Acceleration remains unchanged
Answer	B

79	The energy of a proton accelerated through a potential difference of 1 volt is
A	0eV
B	2eV
C	1eV
D	3eV
Answer	C

80	The electric dipole in a uniform electric field is subjected to
A	Torque but no force
B	Force but no torque
C	Neither torque nor force
D	Both force and torque
Answer	A

81	Kirchhoff' law that sum of all electric currents at a junction is zero is based on conservation of
A	energy
B	momentum
C	mass
D	charge
Answer	D

82	A length of metallic wire carrying a constant current is a first bent to form a circular loop of one turn and then bent to form a double loop of small radius. The ratio of magnetic field in the second case to that in the first case would be
A	1/4
B	1/2
C	1
D	4
Answer	D

83	The series of spectral lines in the spectrum of hydrogen atom that lies partly in the ultra violate and partly in visible region is called
A	Balmer series
B	Lyman series
C	Paschen series
D	Brackett series
Answer	A

84	Laser cooling of atoms is produced due to
A	Absorption of photons by atoms
B	Scattering of photons by atoms
C	Transfer of momentum from photons to atoms
D	Transfer of energy from photons to atoms
Answer	C

85	For which of the following material the magnetic susceptibility is nearly independent of temperature
A	Ferrite
B	diamagnetic
C	paramagnetic
D	ferromagnetic
Answer	B

86	The X-ray beam coming from an X-ray tube will be
A	monochromatic
B	Having all wavelength smaller than a certain wavelength
C	Having all wavelength larger than a certain wavelength
D	Having all wavelength between certain minimum and maximum wavelengths
Answer	C

87	The magnification of the image formed by a concave mirror of focal length 'f' is 'm'. If the image is real, the distance of the object from the mirror should be
A	mf
B	(m+1)f
C	f(m-1)/m
D	f(m+1)/m
Answer	D

88	The velocity of light emitted by a source as measured by a stationary observer is C. If the observer moves towards the source with a velocity V then the velocity of light measured by him would be
A	C+V
B	C
C	C-V
D	$\frac{C}{\sqrt{1-v^2/C^2}}$
Answer	B

89	In a Newton's ring experiment, the diameter of the nth dark ring changes from 1.2 cm to 1cm when the air space between the lens and place is replaced by a transparent liquid. The refractive index of liquid is
A	1.44
B	1.33
C	1.55
D	2.33
Answer	A

90	When one leg of Michelson' interferometer is lengthened by a distance, say x, 150 dark fringes sweep through the field of view. If the wavelength of light used is 480 nm, the value of x is
A	12000 nm
B	24000 nm
C	36000 nm
D	48000 nm
Answer	C

91	When a triode is used as an amplifier, the phase difference between the input signal and the output voltage is
A	$\pi/4$
B	π
C	$\pi/2$
D	2π
Answer	B

92	The radioactive of an element decreases to half of its original activity I_o in a period of 9 years. After a further period of nine years its activity will be
A	$I_o/2$
B	$I_o/3$
C	$I_o/4$
D	$I_o/9$
Answer	C

93	In a semiconductor like silicon, the unit cell is
A	Simple cubic
B	Body-centered cubic
C	hexagonal
D	Face-centered Diamond cubic
Answer	D

94	In Boolean algebra $\overline{\bar{A}.\bar{B}}$ is equal to
A	$\bar{A}.\bar{B}$

B	$\bar{A}+\bar{B}$
C	A. B
D	A+B
Answer	D

95	A reaction ${}_{48}Cd^{107} \rightarrow {}_{47}Cd^{107}$ may occur
A	Either by electron capture or positron emission
B	Only by electron capture
C	Only by proton emission
D	Only by electron emission
Answer	A

96	In a Ramsden's eyepiece, the focal length if eye lens is f. The distance from the eye lens at which the image due to objective is formed, is
A	f/4
B	f/2
C	2f/3
D	11/12f
Answer	D

97	A photosensitive material would emit electrons, if excited by photons beyond a threshold. To overcome the threshold, one would increase
A	Voltage applied to the light source
B	Intensity of light
C	Wavelength of light
D	Frequency of light
Answer	D

98	It is desired to photograph the image of an object placed at a distance 2 m from the plane of mirror. The camera, which is at distance of 5.5 m from the mirror should be focused for a distance of
A	3 m
B	6 m

C	4.5m
D	7.5 m
Answer	D

99	A sound absorber attenuates the sound level by 20dB. The intensity decreases by a factor of
A	10
B	10^2
C	10^3
D	10^4
Answer	B

100	A 20 cm long capillary tube is merged in water. The water rises up to 8 cm. If the entire arrangement is put in a freely falling elevator, the length of water column in the capillary tube will be
A	20 cm
B	12 cm
C	16 cm
D	8 cm
Answer	A