PU-CET (BHMS) – 2014
Paper – II: Chemistry

Important: *Please consult your Admit Card/Roll No. slip before filling your Roll Number on the Test Booklet and Answer Sheet.*

Roll No.   *In Figure*   *In Words*

O.M.R. Answer Sheet Serial No.

Signature of the Candidate _____

Time: 70 minutes   **Number of Questions: 60**   **Maximum Marks :120**

INSTRUCTIONS

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14. **Telecommunication equipment such as pager, cellular phone, wireless, scanner, etc., is not permitted inside the examination hall. Use of calculators is not allowed.**

1. Hydrogen gas is not liberated when the following metal is added to dil. HCl.

   (A) Mg   (B) Sn   (C) Ag   (D) Zn

2. A catalyst is a substance, which

   (A) Increases the equilibrium concentration of the product
   (B) Increases the equilibrium constant of the reaction
   (C) Supplies temperature to the reaction
   (D) Alters the path of reaction

3. How many moles of NH_3 gas are produced when 56.0 grams of N_2 gas react?
   $N_2 + 3H_2 \longrightarrow 2NH_3$
   (A) 4   (B) 6   (C) 2   (D) 112

4. Which of the following characteristics is not correct for physical adsorption?

   (A) Adsorption on solid is reversible.
   (B) Adsorption is spontaneous.
   (C) Adsorption increases with increase in temperature.
   (D) Both enthalpy and entropy of adsorption are negative.

5. Which of the following has the highest mass?
   (A) 1 g-atom of C   (B) 3.011×10^{23} atoms of oxygen
   (C) 1/2 mole of CH4   (D) 10 mL of water

6. In which of the following does sulfur have an oxidation number of +7?
   (A) HSO_3^- (B) SO_3 (C) H_2SO_4 (D) $H_2S_2O_8$

7. The rate of a chemical reaction doubles for every 10°C rise of temperature. If the temperature is raised by 50°C, the rate of the reaction increases by about

   (A) 64   (B) 10   (C) 24   (D) 32

8. F - centres are –
   (A) The electrons trapped in anionic vacancies
   (B) The electrons trapped in cation vacancies
   (C) Non equivalent sites of stoichiometric compounds
   (D) All of the above.

9. In a compound, atoms of element Y from ccp lattice and those of element X occupy 2/3rd of tetrahedral voids. The formula of the compound will be

   (A) X_4Y_3 (B) X_2Y_3 (C) X_2Y (D) X_3Y_4

10. Hydroxyl ion concentration in 1 M HCl solution?

    (A) 1×10^{-14} mol dm^{-3} (B) 1×10^{-1} mol dm^{-3}
    (C) 1×10^{-13} mol dm^{-3} (D) 1×10^{-1} mol dm^{-3}

11. How many grams of NaCl are needed to prepare 0.500 L of 4.00 M NaCl solution?

    (A) 1 grams NaCl   (B)   4.00 grams NaCl
    (C) 117 grams NaCl   (D)   58.5 grams NaCl

12. *A crystal having* unit cell dimensions a = b ≠ c , α = β = γ = 90° is

  (A) Cubic   (B) Tetragonal
  (C) Monoclinic   (D) Orthorhombic

13. In which of the following entropy decreases

  (A) Melting of ice   (B) Vaporisation of camphor
  (C) Freezing of water   (D) Sublimation of iodine

14. The specific heat of a gas in isothermal process is

  (A) Zero   (B) Negative   (C) Infinite   (D) Remains constant

15. What happens when a catalyst is added to a system at equilibrium?

  (A) The reaction follows an alternative pathway of lower activation energy.
  (B) The heat of reaction decreases.
  (C) The potential energy of the reactants decreases.
  (D) The potential energy of the products decreases.

16. What is the change in internal energy if 500 J of heat are added to system and 125 J of work is done on the system

  (A) +625 J   (B) -625J   (C) +375J   (D) -375J

17. Under which circumstances would a reaction be non-spontaneous at all temperatures?

  (A) $\Delta H°$ negative and $\Delta S°$ positive
  (B) $\Delta H°$ negative and $\Delta S°$ negative
  (C) $\Delta H°$ positive and $\Delta S°$ negative
  (D) $\Delta H°$ positive and $\Delta S°$ positive

18. The one which decreases with dilution is

  (A) conductance   (B) specific conductance
  (C) equivalent conductance (D) molar conductance

19. An isothermal process is governed by

  (A) Boyles law   (B) Charles Law
  (C) Gay Lussac law   (D) Avogadro Law

20. Work done in a free expansion process is

  (A) 0   (B) Minimum   (C) Maximum   (D) positive

21. Which of the following electronic configuration is not possible according to Hund's Rule?

  (A) $1s^2 2s^2$ (B) $1s^2 2s^1$
  (C) $1s^2 2s^2 2p_x^1 2p_y^1 2p_z^1$ (D) $1s^2 2s^2 2p_x^2$

22. Which of the following has largest size?

  (A) Al   (B) Al^+ (C) Al^{2+} (D) Al^{3+}

23. Which of the following statements about diamond and graphite is true?

   (A) They have same crystal structure
   (B) They have same degree of hardness
   (C) They have same electrical conductivity
   (D) They have same chemical properties.

24. Bakelite is a product of the reaction between?

   (A) Formaldehyde and NaOH   (B) Aniline and Urea
   (C) Phenol and Methanal   (D) Phenol and Chloroform

25. Which of the following has coordination bond?

   (A) N_2 (B) $CaCl_2$ (C) O_3 (D) H_2O

26. For ideal gas the compressibility factor is

   (A) one   (B) zero   (C) infinite   (D) very small

27. For a reaction, $\Delta G = 0$, the reaction is

   (A) spontaneous   (B) in equilibrium   (C) endothermic   (D) exothermic

28. Which of the following is not an extensive property?

   (A) internal energy   (B) density
   (C) Gibb's free energy   (D) entropy

29. The half life period of a first order chemical reaction is 6.93 minutes. The time required for the completion of 99% of the chemical reaction will be ($\log 2 = 0.301$) ?

   (A) 230.3 minutes   (B) 23.03 minutes
   (C) 46.06 minutes   (D) 460.6 minutes

30. Which of the following can be shown to be both a Bronsted acid and a Bronsted base?

   (A) O^{-2} (B) HSO_4^{-1} (C) PO_4^{-3} (D) CN^{-1}

31. Propene reacts with HBr in presence of organic peroxide to form:

   (A) 1-Bromopropane   (B) 2-Bromopropane
   (C) 3-Bromopropane   (D) 2-Bromopropene

32. The compound formed as a result of oxidation of ethyl benzene by $KMnO_4$ is

   (A) Acetophenone   (B) Benzophenone
   (C) Benzoic acid   (D) Benzyl alcohol

33. Alkanes can be obtained from carboxylic acids by

   (A) toluen's reagent   (B) Kolbe's electrolysis
   (C) Decarboxylation   (D) Clemmensen's reduction

34. Ozone layer protects us from which of the following harmful radiation

   (A) ultra-violet   (B) cosmic-rays
   (C) infra-red   (D) radio-wave

35. At 0 K, the cell potential is

(A) 0   (B) 1   (C) ln 2   (D) E^0

36. The structure of XeF_4 is

(A) Square planar   (B) Square pyramidal
(C) Tetrahedral   (D) Octahedral

37. One mole of which of the following has the highest entropy?

(A) Diamond   (B) liquid nitrogen
(C) mercury   (D) hydrogen gas

38. A bee sting is acidic. Which household substance will neutralize a bee sting?

(A) damp bicarbonate of soda pH 8   (B) damp common salt pH 7
(C) lemon juice pH 5   (D) vinegar pH 4

39. Which of the following is not an allotropic form of carbon

(A) diamond   (B) graphite   (C) fullerene   (D) hydrocarbon

40. Baking soda is

(A) Sodium carbonate   (B) Sodium bicarbonate
(C) Copper sulphate   (D) Sodium hydroxide

41. How many grams of H_3PO_4 are in 175 mL of a 3.5 M solution of H_3PO_4?

(A) 0.61   (B) 60   (C) 20   (D) 4.9

42. What is the frequency of light (s^{-1}) that has a wavelength of 3.12×10^{-13} cm ?

(A) 3.69   (B) 2.44×10^{16} (C) 9.62×10^{12} (D) 4.10×10^{-17}

43. At what speed (m/s) must a 10.0 mg object be moving to have a de Broglie wavelength of 3.3×10^{-41} m ?

(A) 4.1   (B) 1.9×10^{-11} (C) 2.0×10^{12} (D) 3.3×10^{-42}

44. Which of the following is not a valid set of four quantum numbers? (n, l, ml, ms)

(A) 2, 0, 0, +1/2   (B) 2, 1, 0, -1/2
(C) 3, 1, -1, -1/2   (D) 1, 1, 0, +1/2

45. Of the choices below, which gives the order for first ionization energies?

(A) Cl > S > Al > Ar > Si   (B) Ar > Cl > S > Si > Al
(C) Al > Si > S > Cl > Ar   (D) Cl > S > Al > Si > Ar

46. Of the following elements, _____ has the most negative electron gain enthalpy.

(A) S   (B) Cl   (C) Br   (D) I

47. Of the following species, _____ will have bond angles of 120 °.

    (A) PH_3 (B) ClF_3 (C) NCl_3 (D) BCl_3

48. Which two bonds are most similar in polarity?

    (A) $O-F$ and $Cl-F$ (B) $B-F$ and $Cl-F$
    (C) $Al-Cl$ and $I-Br$ (D) $I-Br$ and $Si-Cl$

49. In metallic hydrides, the oxidation number of hydrogen is considered to be _____.

    (A)   -2   (B)   -1   (C)   0   (D)   +1

50. When carbon monoxide is used to reduce an ore as in a blast furnace, it is converted to _____.

    (A) graphite   (B) carbon dioxide   (C) methane   (D) carbonate

51. The undesirable material that is separated from an ore during the concentration process is called _____.

    (A) gangue   (B) leachate   (C) slag   (D) flocculent

52. Linkage isomerism can only occur _____.

    (A) in cis-isomers of octahedral complexes
    (B) with coordination number 6
    (C) with tetrahedral complexes
    (D) with ligands that have more than one possible donor atom

53. Based on electron configuration, which is most likely colorless?

    (A) $[Cu(NH_3)_4]^{2+}$ (B) $[Cd(NH_3)_4]^{2+}$
    (C) $[Ni(NH_3)_6]^{2+}$ (D) $[Cr(NH_3)_5Cl]^{2+}$

54. Thermally least stable carbonate is

    (A) Li_2CO_3 (B) Na_2CO_3 (C) K_2CO_3 (D) Cs_2CO_3

55. What happens when Al is added to aqueous solution of KOH?

    (A) O_2 is liberated   (B) H_2 is liberated
    (C) H_2O is formed   (D)   No reaction takes place

56. Zeolites are

    (A) Aluminosilicate
    (B) Calcium aluminosilicate
    (C) Hydrated sodium aluminosilicate
    (D) A mixture of sodium, aluminium and silicon oxides

57. Discrete SiO_4^{4-} tetrahedral are present in

    (A)   Cyclic silicates   (B)   Orthosilicates
    (C)   Pyrosilicates   (D)   Sheet silicates

58. P_4O_6 dissolves in cold water giving H_3PO_3 while in hot water it gives

    (A) PH_3 (B) H_3PO_4
    (C) PH_3 and H_3PO_4 (D)   None of these

59. Which nobel gas is most reactive

    (A)   He   (B)   Ne   (C)   Xe   (D)   Kr

60. Which of these elements are all radioactive

    (A)   Inert gas   (B)   Transition
    (C)   Lanthanoids   (D)   Actinoids

x-x-x

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Paper – III: Biology

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1. Internal structures of plants are best preserved in

    (A) Compressions   (B) Impressions

    (C) Petrifactions   (D) Incrustations

2. Antherozoids of *Dryopteris* are

    (A) Coiled and biflagellate   (B) Coiled and multiflagellate

    (C) Sickle shaped and biflagellate   (D) Sickle shaped and multiflagellate

3. Development of sporophyte from the gametophytic tissue without involving fusion of gametes is known as

    (A) Apospory   (B) Heterospory

    (C) Apogamy   (D) Parthenogenesis

4. Which one is dicot albuminous seed?

    (A) Onion   (B) Pea

    (C) Groundnut   (D) Castor oil

5. Coir of Cocunut is obtained from

    (A) Pericarp   (B) Mesocarp

    (C) Endocarp   (D) Endosperm

6. Which is the correct combination for type of corolla aestivation?

    (A) Valvate – *Lathyrus* sp

    (B) Twisted – *Calotropis procera*

    (C) Imbricate –Psidium sp

    (D) Vexillary – *Pisum sativum*

7. Triplet of nitrogen bases of anticodon are present on

    (A) DNA   (B) mRNA   (C) tRNA   (D) rRNA

8. Transpiration is the least in

    (A) High wind velocity   (B) Good soil moisture

    (C) Dry environment   (D) High atmospheric humidity

9. Phytochrome is involved in

    (A) Phototropism   (B) Geotropism

    (C) Photorespiration   (D) Photoperiodism

10. Excised leaves/fruits remain green/fresh for a longer period if dipped in

    (A) Gibberellins   (B) Cytokinins

    (C) Auxins   (D) Ethylene

11. Chlorophyll 'c' is present in members of class

    (A) Cyanophyceae   (B) Chlorophyceae
    (C) Phaeophyceae   (D) Rhodophyceae

12. Water vapour exits and carbondioxide enters a leaf through

    (A) Stroma   (B) Stomata
    (C) Porphyrin rings   (D) Grana

13. Maximum problem of photorespiration is found in

    (A) C3 plants   (B) C4 plants
    (C) CAM plants   (D) Heterotrophs

14. How many turns of Calvin cycle are required to produce one molecule of 3-phosphoglyceraldehyde?

    (A) One   (B) Two   (C) Three   (D) Six

15. The primary form of sugar transported from photosynthetic site to rest of the plant is

    (A) Glucose   (B) Sucrose   (C) Fructose   (D) Maltose

16. Primary growth involves the activity of

    (A) Apical meristem   (B) Lateral meristem
    (C) Vascular cambium   (D) Phellogen

17. The only living element in xylem tissue is

    (A) Wood fibres   (B) Tracheids
    (C) Wood parenchyma   (D) Vessels

18. Name of Alec Jeffery is associated with

    (A) DNA sequencing   (B) DNA fingerprinting
    (C) RNA sequencing   (D) Site directed mutagenesis

19. Head of T4 viruses is normally

    (A) Hexagonal   (B) Polygonal
    (C) Filamentous   (D) Tetragonal

20. A cyanobacterium (blue green alga) is typically present in association with roots of

    (A)Cycas   (B) Azolla   (C) Hydrilla   (D) Marsilea

21. Ascomycetes are characterized by the presence of

    (A) Soredium   (B) Pycnidium
    (C) Basidium   (D) Ascus

22. In *Funaria*, reductional division occurs in

    (A) Antheridium   (B) Archegonium
    (C) Capsule   (D) Zygote

23. The first transgenic plant produced is

    (A)   Tobacco   (B)   Wheat   (C)   Maize   (D)   Rice

24. A part of nucleic acid used to find a gene by hybridization is

    (A)   Vector   (B)   Clone   (C)   Probe   (D)   Cybrid

25. Law of purity of gametes is another name for

    (A)   Hardy Weinberg's law   (B)   Law of dominance
    (C)   Principle of segregation   (D)   Principle of independent assortment

26. Banana multiplies by means of

    (A)   Seeds   (B)   Runner   (C)   Offsets   (D)   Rhizome

27. In Angiosperms triple fusion produces

    (A)   Secondary nucleus   (B)   Primary endospermic nucleus
    (C)   Zygotic nucleus   (D)   Polar nucleus

28. Entry of pollen tube through micropylar end of the ovule is called

    (A)   Porogamy   (B)   Chalazogamy
    (C)   Mesogamy   (D)   Syngamy

29. Transfer of pollen from one flower to another flower of the same plant is called

    (A)   Autogamy   (B)   Xenogamy
    (C)   Cleistogamy   (D)   Geitonogamy

30. According to Darwin theory, the long necked Giraffe evolved because

    (A)   Nature selected only long necked ones
    (B)   Humans preferred only long necked ones
    (C)   Short necked Giraffe suddenly became long necked
    (D)   By stretching of neck over many generations

31. Cell theory was put forward by

    (A)   Schleiden and Schwann   (B)   Sutton and Boveri
    (C)   Watson and Crick   (D)   Darwin and Wallace

32. Prokaryotic genetic system has

    (A)   Neither DNA nor histones   (B)   Both DNA and histones
    (C)   DNA but no histones   (D)   Either DNA or histones

33. Which purine is found in RNA?

    (A)   Thymine   (B)   Cytosine   (C)   Uracil   (D)   Guanine

34. Fluid mosaic model of cell membrane was put forward by

    (A)   Danielli and Davson   (B)   Singer and Nicolson
    (C)   Garner and Allard   (D)   Watson and Crick

35. Which of the following structure is present in mitochondria?

    (A) Oxysomes   (B) Quantosomes
    (C) Polysomes   (D) Dictyosomes

36. The term heterochromatin was coined by

    (A) Hammerling   (B) Warburg
    (C) Heitz   (D) Morgan

37. Nucleolus takes part in synthesis of

    (A) rRNA   (B) tRNA   (C) mRNA   (D) DNA

38. Nissl granules are formed from

    (A) SER   (B) RER   (C) DNA   (D) Golgi Bod

39. Quarantan malaria is due to

    (A) Plasmodium falciparum   (B) P. vivax
    (C) P. ovale   (D) P. malariae

40. Male cockroach differs from female because of presence of

    (A) Long antennae   (B) Anal styles
    (C) Anal cerci   (D) Amphids

41. The force operating in an ecosystem which opposes unchecked growth of populat

    (A) Fecundity   (B) Mortality
    (C) Biotic control   (D) Environmental resistance

42. The driving force for an ecosystem is

    (A) Biomass   (B) Solar energy
    (C) Carbohydrates in producers   (D) Producers

43. Path of energy in an ecosystem is

    (A) Herbivores→Producers→Carnivores→Decomposers
    (B) Herbivores→Carnivores →Producers →Decomposers
    (C) Producers → Carnivores → Herbivores→Decomposers
    (D) Producers → Herbivores→ Carnivores →Decomposers

44. Spraying of DDT produces pollution of

    (A) Air and soil   (B) Air, water and soil
    (C) Air and water   (D) Air

45. Acid rain is due to increase in atmospheric concentration of

    (A) Ozone and dust   (B) CO_2 and CO
    (C) SO_3 and CO   (D) SO_2 and NO_2

46. Biosphere reserve project was started in India during

(A)   1984   (B)   1985   (C)   1986   (D)   1989

47. 'Red Data Book' provides data on

(A) Threatened species   (B)   Red pigmented plants
(C) Biota of red sea   (D)   Effect of red light on photosynthesis

48. Tendon connects

(A) Bone to bone   (B)   Bone to muscle
(C) Nerve to muscle   (D)   Muscle to muscle

49. Which of the following is not a granulocyte?

(A) Lymphocyte   (B)   Basophil
(C) Neutrophil   (D)   Eosinophil

50. Which of the following glands is both exocrine and endocrine?

(A) Liver   (B)   Spleen   (C)   Pancreas   (D)   Adrenal

51. Respiratory centre is situated in

(A) Cerebellum   (B)   Medulla oblongata
(C) Hypothalamus   (D)   Cerebrum

52. Universal recipient blood group is

(A) A   (B)   B   (C)   AB   (D)   O

53. Kidney stone is produced due to

(A) Deposition of sand particles   (B)   Crystallisation of oxalates
(C) Precipitation of proteins   (D)   Blockage of fats

54. Water reabsorption in kidneys is controlled by

(A) ADH   (B)   Aldosterone (C) GH   (D)   Oxytocin

55. During muscle contraction

(A) Diameter of fibre increases   (B)   Size of I-bands decreases
(C) Size of A-bands remains the same (D)   Size of H-zone becomes smaller

56. Joint between humerus and radio-ulna is

(A) Ball and socket   (B)   Pivot
(C) Gliding   (D)   Hinge

57. Which of the following cranial nerves in man is both sensory and motor?

    (A) Optic   (B) Olfactory   (C) Trigeminal   (D) Auditory

58. During impulse transmission, nerve permeability increases for

    (A) Na^+ (B) Cl'   (C) K^+ (D) Ca^{2+}

59. Decreased production of STH in early life causes

    (A) Cretinism   (B) Dwarfism

    (C) Acromegaly   (D) Gigantism

60. Diadetes insipidus is caused by hyposecretion of

    (A) Oxytocin   (B) Thymosin

    (C) Insulin   (D) Vasopressin

x-x-x

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Paper – I: Physics

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9. For rough work only the blank sheet at the end of the Question Booklet be used.
10. The Answer Sheet is designed for computer evaluation. Therefore, if you do not follow the instructions given on the Answer Sheet, it may make evaluation by the computer difficult. **Any resultant loss to the candidate on the above account, i.e. not following the instructions completely, shall be of the candidate only.**
11. After the test, hand over the Question Booklet and the Answer Sheet to the Assistant Superintendent on duty.
12. In no case the Answer Sheet, the Question Booklet, or its part or any material copied/ noted from this Booklet is to be taken out of the examination hall. Any candidate found doing so would be expelled from the examination.
13. A candidate who creates disturbance of any kind or changes his/her seat or is found in possession of any paper possibly of any assistance or found giving or receiving assistance or found using any other unfair means during the examination will be expelled from the examination by the Centre Superintendent/Observer whose decision shall be final.
14. Telecommunication equipment such as pager, cellular phone, wireless, scanner, etc., is not permitted inside the examination hall. Use of calculators is not allowed.

1. A nanosecond is:
   (A) 10^9 s.
   (B) 10^{-9} s.
   (C) 10^{-10} s.
   (D) 10^{-11} s.

2. Suppose A = BC, where A has the dimensions L/M and C has the dimensions L/T. Then B has dimensions:
   (A) T/M.
   (B) L^2/TM.
   (C) TM/L^2
   (D) L^2T/M.

3. If $\vec{A} = 6\hat{\imath} - 8\hat{\jmath}$ then $4\vec{A}$ has magnitude:
   (A) 10.
   (B) 20.
   (C) 30.
   (D) 40.

4. A car, initially at rest, travels 20m in 4s along a straight line with constant acceleration. The acceleration of the car (in m/s²) is:
   (A) 0.4
   (B) 1.3
   (C) 2.5
   (D) 4.9

5. An object is thrown vertically upward. While it is rising:
   (A) its velocity and acceleration are both upward.
   (B) its velocity is upward and its acceleration is downward.
   (C) its velocity and acceleration are both downward.
   (D) its velocity is downward and its acceleration is upward.

6. In principle, a force is measured by measuring the _____, when the force is applied to it.
   (A) velocity of the standard kilogram.
   (B) speed of the standard kilogram.
   (C) velocity of an object.
   (D) acceleration of the standard kilogram.

7. A 1000 kg airplane moves in straight flight at constant speed. The force of air friction is 1800 N. The net force on the plane is:
   (A) zero.
   (B) 11800 N.
   (C) 1800 N.
   (D) 9800 N.

8. An object moves in a circle at constant speed. The work done by the centripetal force is zero because:
   (A) the displacement for each revolution is zero.
   (B) the average force for each revolution is zero.
   (C) there is no friction.
   (D) the centripetal force is perpendicular to the velocity.

9. A kilowatt hour is a unit of:
   (A) power.
   (B) energy/time.
   (C) work.
   (D) power/time.

10. The woundup spring of a clock possesses:
    (A) kinetic but no potential energy.
    (B) potential but no kinetic energy.
    (C) both potential and kinetic energy.
    (D) neither potential nor kinetic energy.

11. If two different masses have the same kinetic energy, their momenta are:
    (A) proportional to their masses.
    (B) proportional to square of their masses.
    (C) proportional to square roots of their masses.
    (D) inversely proportional to their masses.

12. The moment of inertia of a wheel about its axle does not depend upon its:
    (A) diameter.   (B) mass.
    (C) distribution of mass.   (D) speed of rotation.

13. A torque applied to a rigid object always tends to produce:
    (A) linear acceleration.   (B) rotational equilibrium.
    (C) rotational inertia.   (D) angular acceleration.

14. A certain wire stretches 1 cm when a force F is applied to it. The same force is applied to a wire of the same material but with twice the diameter and twice the length. The second wire stretches:
    (A) 0.25 cm.   (B) 0.5 cm.
    (C) 1 cm.   (D) 2 cm.

15. An astronaut in an orbiting spacecraft feels "weightless" because she:
    (A) is beyond the range of gravity.
    (B) is pulled outwards by centrifugal force.
    (C) has no acceleration.
    (D) has the same acceleration as the spacecraft.

16. The speed of a comet in an elliptical orbit about the Sun:
    (A) decreases while it is receding from the Sun.
    (B) is constant.
    (C) is greatest when farthest from the Sun.
    (D) varies sinusoidally with time.

17. Mercury is a convenient liquid to use in a barometer because:
    (A) it looks silvery.
    (B) it is a metal.
    (C) it expands little with temperature.
    (D) it has a high density.

18. The hydraulic automobile jack illustrates:
    (A) Archimede's principle.   (B) Pascal's principle.
    (C) Hooke's law.   (D) Newton's third law.

19. In simple harmonic motion, the magnitude of the acceleration is greatest when the:
    (A) displacement is zero
    (B) displacement is maximum.
    (C) velocity is maximum.
    (D) force is zero.

20. For a given medium, the frequency of a wave is:
    (A) independent of wavelength.
    (B) proportional to wavelength.
    (C) inversely proportional to wavelength.
    (D) proportional to the amplitude.

21. A source emits a sound wave of frequency f. If it were possible for a man to travel tpward the source at the speed of sound, he would observe the emitted sound to have a frequency of:
    (A) zero.   (B) $f/2$.
    (C) $2f/3$.   (D) $2f$.

22. A Kelvin thermometer and a Fahrenheit thermometer, both give the same reading for a certain sample. The corresponding Celsius temperature is:
    (A) 574^0 C.   (B) 232^0 C.
    (C) 301^0 C.   (D) 614^0 C.

23. According to the first law of thermodynamics, applied to a gas, the increase in the internal energy during any process:
    (A) equals the heat input minus the work done on the gas.
    (B) equals the heat input plus the work done on the gas.
    (C) equals the work done on the gas minus the heat input.
    (D) is independent of the heat input.

24. The rate of heat flow through a slab does NOT depend upon the:
    (A) temperature difference between opposite faces of the slab.
    (B) thermal conductivity of the slab.
    (C) slab thickness.
    (D) specific heat of the slab.

25. The "Principle of Equipartition of Energy" states that the internal energy of a gas is shared equally:
    (A) among the molecules.
    (B) between kinetic and potential energy.
    (C) among the relevant degrees of freedom.
    (D) between temperature and pressure.

26. A heat engine in each cycle absorbs heat from a reservoir and does an equivalent amount of work, with no other changes. This engine violates:
    (A) the zeroth law of thermodynamics.
    (B) the first law of thermodynamics.
    (C) the second law of thermodynamics.
    (D) the third law of thermodynamics.

27. The heat capacity at constant volume of an ideal gas depends on:
    (A) the temperature.
    (B) the pressure.
    (C) the volume.
    (D) the number of molecules.

28. A 200 cm open organ pipe is in resonance with a sound wave of wavelength 200 cm. The pipe is operating in its:
    (A) fundamental frequency.
    (B) first overtone.
    (C) second overtone.
    (D) third overtone.

29. The rise in pitch of an approaching siren is an apparent increase in its:
    (A) speed.   (B) amplitude.
    (C) frequency.   (D) wavelength.

30. The internal energy of an ideal gas depends on:
    (A) the temperature only.
    (B) the pressure only.
    (C) the volume only.
    (D) temperature, pressure and volume.

31. An electrical insulator is a material:
    (A) containing no electrons.
    (B) through which electrons do not flow easily.
    (C) that has more electrons than protons on its surface.
    (D) cannot be a pure chemical element.

32. An isolated point charge produces an electric field with magnitude E at a point 2m away. A point at which the field magnitude is E/4 is:
    (A) 1 m away.   (B) 0.5 m away.
    (C) 2 m away.   (D) 4 m away.

33. The electric field due to a uniform distribution of charge on a spherical shell is zero:
    (A) everywhere.
    (B) nowhere.
    (C) only inside the shell.
    (D) only at the centre of the shell.

34. A hollow metal sphere is charged to a potential V. The potential at its center is:
    (A) 0.   (B) $-V$.
    (C) V.   (D) 2V.

35. If both the plate area and the plate separation of a parallel-plate capacitor are doubled, the capacitance is:
(A) halved.
(B) doubled.
(C) tripled.
(D) unchanged.

36. A cylindrical copper rod has resistance R. It is reformed to twice its original length with no change of volume. Its new resistance is:
(A) R
(B) 2R
(C) 4R
(D) R/2

37. You wish to double the rate of energy dissipation in a heating device. To do this you could:
(A) double the potential difference keeping the resistance the same.
(B) double the current keeping the resistance the same.
(C) double the resistance keeping the potential difference the same.
(D) double the resistance keeping the current the same.

38. A 3 ohm and a 1.5 ohm resistor are wired in parallel and the combination is wired in series to a 4 ohm resistor and a 10 V emf device. The potential difference across the 3 ohm resistor is:
(A) 2.0 V
(B) 6.0 V
(C) 8.0 V
(D) 10 V

39. A magnetic field exerts a force on a charged particle:
(A) always.
(B) never.
(C) if the particle is moving across the field lines.
(D) if the particle is moving parallel to the field lines.

40. Solenoid 2 has twice the radius and six times the number of turns per unit length as solenoid 1. The ratio of the magnetic field in the interior of 2 to that in the interior of 1 is:
(A) 6.
(B) 4.
(C) 2.
(D) 1.

41. You push a permanent magnet with its north pole away from you toward a loop of conducting wire in front of you. Before the north pole enters the loop the current in the loop is:
(A) zero.
(B) counterclockwise.
(C) clockwise.
(D) to your left.

42. A flat coil of wire, having 5 turns, has an inductance L. The inductance of a similar coil having 20 turns is:
(A) 4L.
(B) 8L.
(C) 16L.
(D) L/4.

43. If both the resistance and the inductance in an LR series circuit are doubled the new inductive time constant will be:
    (A) twice the old.
    (B) four times the old.
    (C) half the old.
    (D) unchanged.

44. According to Gauss' law for magnetism, magnetic field lines:
    (A) form closed loops.
    (B) start at south poles and end at north poles.
    (C) start at north poles and end at south poles.
    (D) start at both north and south poles and end at infinity.

45. When a permanent magnet is strongly heated,
    (A) nothing happens.
    (B) it loses its magnetism.
    (C) it becomes an induced magnet.
    (D) its magnetism increases.

46. We desire to make an LC circuit that oscillates at 100 Hz using an inductance of 2.5H. We also need a capacitance of:
    (A) 1 F.   (B) 1 mF.   (C) 1 µF.   (D) 1 pF.

47. In a purely capacitive circuit the current:
    (A) lags the voltage by one-half of a cycle.
    (B) lags the voltage by one-fourth of a cycle.
    (C) leads the voltage by one-half of a cycle.
    (D) leads the voltage by one-fourth of a cycle.

48. A sinusoidal voltage V (t) has an rms value of 100V. Its maximum value is:
    (A) 141 V.   (B) 100 V.
    (C) 707 V.   (D) 70.7 V.

49. Maxwell's equations predict that the speed of light in free space is
    (A) an increasing function of frequency.
    (B) a decreasing function of frequency.
    (C) independent of frequency.
    (D) a function of the distance from the source.

50. The electric field in unpolarized light:
    (A) has no direction at any time.
    (B) rotates rapidly.
    (C) is always parallel to the direction of propagation.
    (D) changes direction randomly and often.

51. When light passes from air to glass, it:
    (A) bends toward the normal without changing speed.
    (B) bends toward the normal and slows down.
    (C) bends toward the normal and speeds up.
    (D) bends away from the normal and speeds up.

52. A point source is to be used with a concave mirror to produce a beam of parallel light. The source should be placed:
    (A) as close to the mirror as possible.
    (B) at the center of curvature.
    (C) midway between the center of curvature and the focal point.
    (D) midway between the center of curvature and the mirror.

53. Which instrument uses a single converging lens with the object placed just inside the focal point?
    (A) Camera   (B) Compound microscope
    (C) Magnifying glass   (D) Telescope

54. Two light waves are coherent:
    (A) their frequencies are the same.
    (B) their phase difference is the same.
    (C) their amplitudes are the same.
    (D) their wavelengths are the same.

55. The rainbow seen after a rain shower is caused by:
    (A) refraction.   (B) interference.
    (C) diffraction.   (D) polarization.

56. Which of the following electromagnetic radiations has photons with the greatest energy?
    (A) blue light.   (B) yellow light.
    (C) x-rays.   (D) radio waves.

57. Evidence for the wave nature of matter is:
    (A) Young's double slit experiment.
    (B) Lenz's law.
    (C) Thompson's measurement of e/m.
    (D) electron diffraction experiments of Davisson and Germer.

58. The quantum number n is most closely associated with what property of the electron in a hydrogen atom?
    (A) Energy
    (B) Orbital angular momentum
    (C) Spin angular momentum
    (D) Magnetic moment

59. An acceptor replacement atom in silicon might have _____ electrons in its outer shell.
    (A) 4   (B) 5   (C) 3   (D) 6

60. A beta particle is:
    (A) a helium nucleus.   (B)   an electron or a positron.
    (C) any negative particle.   (D)   a hydrogen atom.

x-x-x

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ANSWERS / KEY
Subject: CHEMISTRY

1	2	3	4	5	6	7	8	9	10
C	D	A	C	A	D	D	A	A	A

11	12	13	14	15	16	17	18	19	20
C	B	C	C	A	A	C	B	A	A

21	22	23	24	25	26	27	28	29	30
D	A	D	C	C	A	B	B	C	B

31	32	33	34	35	36	37	38	39	40
A	C	B	A	D	A	D	A	D	B

41	42	43	44	45	46	47	48	49	50
B	C	C	D	B	B	D	A	B	B

51	52	53	54	55	56	57	58	59	60
A	D	B	A	B	C	B	C	C	D

Note: An 'X' in the key indicates that either the question is ambiguous or it has printing mistake. All candidates will be given credit for this question.

Panjab University, Chandigarh
BHMS-2014
ANSWERS / KEY

Subject: PHYSICS

1	2	3	4	5	6	7	8	9	10
B	A	D	C	B	D	A	D	C	B

11	12	13	14	15	16	17	18	19	20
C	D	D	B	D	A	D	B	B	C

21	22	23	24	25	26	27	28	29	30
D	C	B	D	C	C	D	B	C	A

31	32	33	34	35	36	37	38	39	40
B	D	C	C	D	C	D	A	C	A

41	42	43	44	45	46	47	48	49	50
B	C	D	A	B	C	D	A	C	D

51	52	53	54	55	56	57	58	59	60
B	D	C	B	A	C	D	A	C	B

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Panjab University, Chandigarh
BHMS-2014
ANSWERS / KEY

Subject: BIOLOGY

1	2	3	4	5	6	7	8	9	10
C	B	C	D	B	D	C	D	D	B

11	12	13	14	15	16	17	18	19	20
C	B	A	C	B	A	C	B	B	A

21	22	23	24	25	26	27	28	29	30
D	C	A	C	C	D	B	A	D	A

31	32	33	34	35	36	37	38	39	40
A	C	D	B	A	C	A	B	D	B

41	42	43	44	45	46	47	48	49	50
D	B	D	B	D	C	A	B	A	C

51	52	53	54	55	56	57	58	59	60
B	C	B	A	X	D	C	A	B	D

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