ALL INDIA INSTITUTE OF SPEECH AND HEARING
MANASAGANGOTHRI, MYSORE 570 006

ENTRANCE EXAMINATION 2014

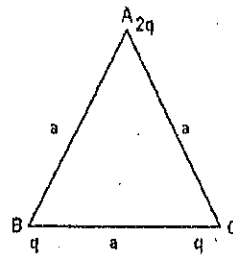Entrance Examination for Admission to B.Sc (Speech and Hearing)

Time: 50 minutes   Max. Marks 50

PHYSICS

1.   Identify the scalar quantity among the following
      a)   Electric dipole moment   c)   Electric potential
      b)   Electric field   d)   Torque

2.   What happens to the flux through a Gaussian surface, enclosing a charge, when its radius is reduced to half?
      a)   Doubled   c)   Halved
      b)   Remains the same   d)   Quadrupled

3.   In the given configuration of charges as shown in the figure, what would be the resultant magnitude of the electrostatic force on the charge at corner A due to the other two charges?


a) $\dfrac{1}{4\pi\varepsilon_0}\dfrac{q^2}{a^2}$

c) $\dfrac{1}{4\pi\varepsilon_0}\dfrac{2\sqrt{3}q^2}{a^2}$

b) $\dfrac{1}{4\pi\varepsilon_0}\dfrac{\sqrt{3}q^2}{2a^2}$

d)   Zero

4.   Kirchoff's second law is a consequence of
      a)   Conservation of energy   c)   Conservation of charge
      b)   Conservation of linear momentum   d)   Conservation of angular momentum

5.   A carbon resistor of colour coding red, red, brown is connected to a power supply of 220 V. The current through the resistor is
      a)   1 A   c)   2 A
      b)   3 A   d)   0.5 A

6.   What happens to the velocity of light when it passes from air to glass?
      a)   Increases   c)   Decreases
      b)   No change   d)   First decreases and then increases

7.   A convex lens of refractive index (μ_G) 1.5 is immersed in a solution of refractive index (μ_S) 1.64. The lens behaves as
      a)   Diverging lens   c)   Converging lens
      b)   Plano convex lens   d)   Plano concave lens

8. Two concave lenses of same focal length f are kept in contact. The resultant focal length of the combination will be,

   a) $\dfrac{-f}{2}$ c) $\dfrac{f}{2}$

   b) $-2f$ d) $2f$

9. An interference pattern is produced on a screen by using yellow beam of light. What would happen to the fringe width if the yellow light is replaced by a blue light?

   a)   No change   c)   Decreases

   b)   Bands disappear   d)   Increases

10. Select the correct statement when a beam of white light passes through a prism,

   a)   The violet colour has maximum angle of deviation

   b)   The violet colour has least angle of deviation

   c)   The red colour has maximum angle of deviation

   d)   None of these

11. The graph of stopping potential vs. frequency for two metals M_A and M_B is given below. Which of the metals have more work function?

   a) M_A c) M_B

   b)   Both M_A and M_B have the same work function   d)   None of these

12. The ratio of the de Broglie wavelengths of two bodies of masses m_1 and m_2 moving with same velocity is,

   a) $\dfrac{m_1}{m_2}$ c) $\dfrac{m_2}{m_1}$

   b) $\dfrac{m_1^2}{m_2^2}$ d) $\dfrac{\sqrt{m_1}}{\sqrt{m_2}}$
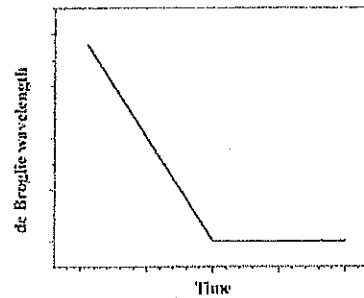
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13. The graph of momentum vs. time of an object is shown below. Select the correct graph showing the corresponding variation of its de Broglie wavelength with time.
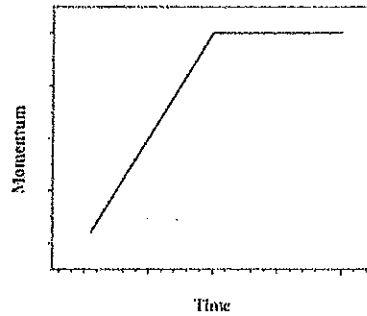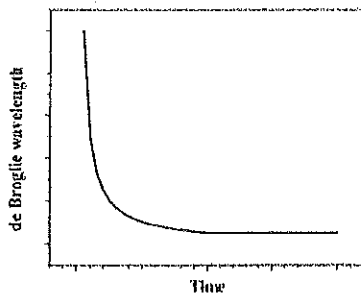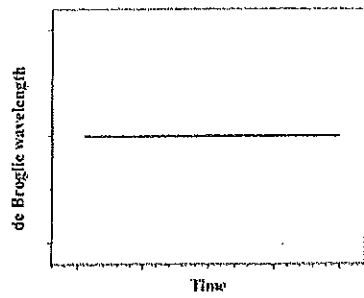
a)
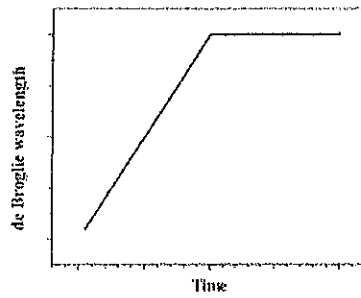
c)

b)

d)

14. All components of electromagnetic spectrum in vacuum have same

    a) Energy   c) Velocity

    b) Wave   d) Frequency

15. In an electromagnetic field the amplitude of magnetic field is 3×10^{-10} T. If the frequency of wave is 10^{12} Hz, then the amplitude associated with electric field will be

    a) 9×10^{-2} V/m   c) 3×10^{-2} V/m

    b) 3×10^{-10} V/m   d) 9 V/m

16. Energy of electron in the first excited state of the Hydrogen atom is -3.4 eV. What will be its potential energy?

    a) 6.8 eV   c) -3.4 eV

    b) 3.4 eV   d) -6.8 eV

17. What will be the angular momentum in the fourth orbit if L is the angular momentum of the electron in the second orbit of the Hydrogen atom?

    a) (2/3)L   c) L/2

    b) 2L   d) (3/2)L

18. The time taken by a radioactive sample for disintegrating from 12 g to 6 g is 3.5 years. If we start with 20 g of the same sample, how much of it would remain after 10.5 years?

   a) 10 g

   b) 2.5 g

   c) 5 g

   d) 0 g

19. What is the frequency of full wave rectifier, if the frequency of A. C. mains is 60 Hz?

   a) 120 Hz

   b) 60 Hz

   c) 0 Hz

   d) 240 Hz

20. Electrical conductivity of an intrinsic semiconductor at 0K is

   a) Maximum

   b) Zero

   c) Minimum

   d) None of these

21. In the given P-N junction circuit which of the following materials to be doped at regions X and Y, in order make it reverse biased?
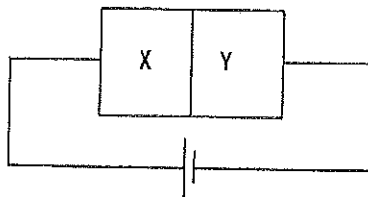
   a) Al at X and As at Y

   b) Al at X and B at Y

   c) As at X and Al at Y

   d) P at X and As at Y

22. The current gain of an amplifier in the common emitter configuration is 50. What is its current gain in common base configuration?

   a) 0.95

   b) 0.05

   c) 0.98

   d) 0.5

23. 1T= .gauss

   a) 10^4

   b) 10^2

   c) 10^{-4}

   d) 10^{-2}

24. Select the correct statement about a particle moving inside a cyclotron.

   a) The time taken by the particle for one complete revolution is independent of the charge.

   b) The time taken by the particle for one complete revolution is independent of the magnitude of the magnetic field.

   c) The time taken by the particle for one complete revolution is independent of the radius of the dee.

   d) The time taken by the particle for one complete revolution is independent of the mass.

25. The emf induced by the relative motion between a magnet and a conducting coil is independent of

   a) The strength of the magnetic field

   b) The resistance of the coil

   c) The area of cross section of the coil

   d) The number of turns of the coil

26. Three inductors each of inductance L_1, L_2, and L_3 are connected in series. The effective inductance will be

   a) $L_1+L_2+L_3$

   b) Zero

   c) $\dfrac{1}{L_1}+\dfrac{1}{L_2}+\dfrac{1}{L_3}$

   d) $\dfrac{1}{L_1^2}+\dfrac{1}{L_2^2}+\dfrac{1}{L_3^2}$

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27. A transformer has 1250 number of turns in the primary coil and 625 turns in the secondary coil. If the voltage in the secondary coil is 220 V, what would be the voltage in the primary coil?
   a) 440 V
   c) 110 V
   b) 55 V
   d) 0 V

28. A spring carrying a current is used in a spring balance. The weight of the objects measured using this current carrying spring balance will be,
   a) Less than the actual weight
   c) More than the actual weight
   b) Equal to the actual weight
   d) None of the above

29. Which parameter of the signal gets modified in an AM wave?
   a) Frequency
   c) Phase
   b) Speed
   d) Amplitude

30. Which of the following electromagnetic waves are useful for telecommunication?
   a) Microwave
   c) Ultraviolet
   b) Infrared
   d) Electrical wave

31. Velocity of sound in oxygen at NTP is v. The velocity of sound in Hydrogen at NTP will be,
   a) $4v$
   c) $2v$
   b) $2\sqrt{2}v$
   d) None of these

32. In order to double the time period of a simple pendulum what change is to be made for its length?.
   a) Doubled
   c) Quadrupled
   b) Tripled
   d) Halved

33. The degree of freedom of a system are equal to the number of,
   a) Molecules in it
   c) It's possible independent modes of rotation
   b) The actual mode of vibration at a particular instant
   d) Atoms in it

34. Gas exerts pressure on the walls of the container because,
   a) Gas has weight
   c) Gas molecules collide with each other
   b) Gas molecules have momentum
   d) Gas molecules collide with the walls of the container

35. If S is the stress and Y is the Young's modulus of the material of a wire, the energy stored in the wire per unit volume is,
   a) $2Y/S$
   c) $S/(2Y)$
   b) $2S^2Y$
   d) $S^2/(2Y)$

36. A solid sphere falls with terminal velocity v in CO_2 gas. If it is allowed to fall in vacuum,
   a) Terminal velocity= v
   c) Terminal velocity< v
   b) Terminal velocity> v
   d) Sphere never attains terminal velocity

37. The temperature of the Sun cannot be found out by using
   a) Wein's displacement law
   c) Stefan's Boltzmann law
   b) Kepler's law of motion
   d) Planck's law

38. Equal volume of water at 100C is contained in two beakers X and Y. To the beaker X, 10 g of ice at 00C is added and allowed to melt completely. To the beaker Y, 10 g of water at 00C is added and allowed to mix completely. The final temperature of the mixtures in beakers X (T1) and beaker Y (T2) are related to
   a) $T_1=T_2$
   c) $T_1>T_2$
   b) $T_1<T_2$
   d) None of these

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39. Select the statement which is **NOT** correct about the escape velocity of an object from a planet.
   a) It is independent of the angle of projection   c) It is independent of the mass of the body
   b) It is independent of the volume of the body   d) It is independent of the acceleration due to gravity

40. The ratio of the acceleration due to gravity at the surface of earth to a point which is at a depth of 1/10th of the radius of earth is
   a) 4/5   c) 9/10
   b) 5/4   d) 10/9

41. The dimensions of Power are,
   a) $[ML^2T^2]$ c) $[MLT^2]$
   b) $[ML^2T^{-2}]$ d) $[ML^2T^{-3}]$

42. The mass and volume are measured to be 0.0048 kg and 0.04m^3 respectively. The correct way of expressing the density is,
   a) 0.12 kg/m^3 c) 0.1 kg/m^3
   b) 0.120 kg/m^3 d) 0.1200 kg/m^3

43. The range of a projectile projected with an initial velocity u is found to be u^2/g. What would be the angle of projection?
   a) 45^0 c) 60^0
   b) 30^0 d) 76^0

44. Two trains A and B are moving in parallel tracks, in opposite directions, with the speed of 120 km/h and 80 km/h respectively. What would be the relative velocity of train A with respect to the train B?
   a) 200 km/h   c) 50 km/h
   b) 40 km/h   d) 100 km/h

45. A man of weight 98 N is moving down in a lift which is accelerating at the rate of 9.8 m/s^2. What would be the apparent weight of the man?
   a) 196 N   c) 98 N
   b) 0 N   d) 49 N

46. A body of weight 15N resides over a rough surface of coefficient of friction 0.5. The maximum static friction existing between the contact surfaces will be,
   a) 12.5 N   c) 15.5 N
   b) 7.5 N   d) 14.5 N

47. A body moves from a point with position vector $\vec{S_1} = 4\hat{i} + 4\hat{j} + 3\hat{k}$ to another point with position vector $\vec{S_2} = 2\hat{i} + \hat{j} + 3\hat{k}$ under the action of a constant force of $\vec{F} = 2\hat{i} + 4\hat{j} + 3\hat{k}$. The work done in this case will be,
   a) 8 J   c) 10 J
   b) 0 J   d) 16 J

48. Two objects of masses m and 4m have equal momentum. The ratio of the magnitude of their kinetic energies will be,
   a) 1:4   c) 1:16
   b) 4:1   d) 1:2

49. What is the moment of inertia of a solid sphere of radius R and mass M about its diameter is,
   a) (2/5) MR^2 c) ½ MR^2
   b) (3/2) MR^2 d) (5/3) MR^2

50. Two bodies have their moments of inertia I and 4I respectively about their axes of rotation. If their kinetic energies of rotation are equal, their angular momenta will be in the ratio,
   a) 1:2   c) 2:1
   b) 4:1   d) 1:4

A

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CHEMISTRY

1. A chemical equation is balanced according to the law of
   a) Multiple Proportions
   b) Constant Proportions
   c) Reciprocal Proportions
   d) Conservation of mass

2. How many orbitals are possible in 3rd main energy level ?
   a) 4
   b) 3
   c) 9
   d) 14

3. The spectral lines of Lyman series lie in
   a) IR region
   b) Far IR region
   c) UV region
   d) Visible region

4. The element chromium belongs to
   a) Alkali metals
   b) Alkaline earth metals
   c) Transition metals
   d) Lanthanides

5. Ammonia has abnormally high boiling point because
   a) It has distorted shape
   b) Due to the alkaline nature
   c) Hydrogen bonding
   d) sp^3 Hybridisation

6. C-C bond distance is largest in
   a) $C_2 H_2$
   b) $C_2 H_4$
   c) $C_6 H_6$
   d) $C_2 H_4 Br_2$

7. A gas deviates most from ideal behavior when it is subjected to
   a) Low temperature and high pressure
   b) High temperature and low pressure
   c) High temperature and high pressure
   d) Low temperature and low pressure

8. Which of the following is not related to the first law of thermodynamics?
   a) Heat
   b) Work
   c) Internal energy
   d) Entropy

9. Free energy change of a reversible reaction at equilibrium is
   a) Infinite
   b) Zero
   c) Positive
   d) Negative

10. The conjugate base of HCO_3^- is
    a) $H_2 CO_3$
    b) CO_2
    c) $H_2 O$
    d) CO_3^{2-}

11. The p^H of a 10^{-10}M NaOH solution is nearest to
    a) 10
    b) 7
    c) 4
    d) -10

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12. The oxidation number of sodium in sodium amalgam is
    a) +1
    c) -1
    b) 0
    d) -10

13. The reagent commonly used to determine hardness of water titrimetrically is
    a) Oxalic acid
    c) Sodium citrate
    b) Disodium salt of EDTA
    d) Sodium thiosulphate

14. Water softening by Clarke's process uses
    a) Calcium bicarbonate
    c) Sodium aluminates
    b) Sodium bicarbonate
    d) Calcium hydroxide

15. A solution of sodium in liquid ammonia is strongly reducing due to the presence of
    a) Sodium atoms
    c) Sodium amide
    b) Sodium hydride
    d) Solvated electrons

16. Which of the alkaline earth metal does not impart colour in the Bunsen flame?
    a) Mg
    c) Ca
    b) Ba
    d) Sr

17. Orthoboric acid is
    a) Lewis acid
    c) Arrhenius acid
    b) Bronsted acid
    d) Tribasic acid

18. Which of the following has 3-center-2-electron bonds?
    a) $B_2 O_3$
    c) $B_2 H_6$
    b) $H_3 BO_3$
    d) $Na_2 B_4 O_7 10H_2 O$

19. Which of the following is not a nucleophile?
    a) NH_3
    c) CN^-
    b) OH^-
    d) $AlCl_3$

20. The compound that does not give a blue colour in Lassaigne's test is
    a) Aniline
    c) Hydrazine
    b) Glycine
    d) Urea

21. The number of σ and π bonds in but-1-en-3-yne are
    a) 5 σ and 5 π
    c) 8 σ and 2 π
    b) 7 σ and 3 π
    d) 6 σ and 4 π

22. A mixture of ethyl iodide and n-propyl iodide is subjected to wurtz reaction. The resultant hydrocarbon, which will not be formed is
    a) Butane
    c) Pentane
    b) Propane
    d) Hexane

23. Benzene reacts with acetyl chloride or acetic anhydride in the presence of anhydrous $AlCl_3$ to give
    a) $C_6 H_5 Cl$
    c) $C_6 H_5 CH_3$
    b) $C_6 H_5 COCl$
    d) $C_6 H_5 COCH_3$

24. One mole of an alkene, $C_4 H_8$ on ozonolysis forms one mole of propanone and one mole of methanal. The IUPAC name of the alkene is
    a) But-1-ene
    c) 2-methylpropene
    b) But-2-ene
    d) 2-methylbut-2-ene

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25. Which of the following is not regarded as a pollutant?
a) NO_2 c) O_3
b) CO_2 d) Hydrocarbons

26. The contribution of a particle at the edge for the unit cell is
a) $\frac{1}{2}$ c) $\frac{1}{6}$
b) $\frac{1}{8}$ d) $\frac{1}{4}$

27. A pair of liquids shows a small contraction in volume on mixing. This mixture shows.
a) Ideal behavior c) Positive deviation from Raoults law
b) ΔH(mixing)>0 d) Negative deviation from Raoults law

28. Which of the following solutions will have the highest boiling point?
a) 0.1 M $FeCl_3$ c) 0.1 M NaCl
b) 0.1 M $BaCl_2$ d) 0.1 M NH_2CONH_2

29. The units of cell constant are
a) cm^2 v c) $ohm^{-1}cm^2$
b) cm^{-1} d) cm

30. For a irreversible process
a) ΔG < 0 and E cell >0 c) ΔG = 0 and E cell = 0
b) ΔG > 0 and E cell <0 d) Temperature always increases

31. Consider a reaction, A → B+C. If the initial concentration of A was reduced from 2M to 1M in 1 hour and from 1M to 0.25 M in 2 hours the order of the reaction is
a) 1 c) 2
b) 0 d) 3

32. A plot of log (a − x) against time't' is a straight line with positive slope. This indicates that the reaction is of
a) Zero order c) Second order
b) First order d) Third order

33. Which of following is required in lowest concentration for coagulating a sol having positively charged colloidal particle?
a) KCl c) K_3 [Fe(CN)$_6$]
b) K_2SO_4 d) K_4 [Fe(CN)$_6$]

34. The fact the colloidal particles carry charge can be shown by
a) Electrophoresis c) Adsorption
b) Dialysis d) Tyndall effect

35. Which one of the following is a carbonate ore ?
a) Pyrolusite c) Diaspore
b) Malachite d) Cassiterite

36. The element of group 14 which has the highest tendency to show +2 oxidation state is
a) Carbon c) Germanium
b) Lead d) Silicon

37. Graphite and diamond differ in properties except
a) Hardness c) Electrical conductivity
b) Crystal structure d) Relative atomic weight

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38. The highest oxidation state achieved by a transition metal is given by
    a) ns electrons
    b) (n-1) d electrons
    c) (n+1) d electrons
    d) ns+(n-1) d electrons

39. Cu^+ ion exists rarely in aqueous solution due to
    a) Oxidation
    b) Reduction
    c) Disproportionation
    d) Hydration

40. The number of chlorine atom acting as ligand in the complex $[Co(H_2O)Cl(en)_2]Cl_2$ is
    a) 1
    b) 2
    c) 3
    d) 4

41. The order of reactivity of alklyl halides towards elimination reaction is
    a) $1^o>2^o>3^o$
    b) $2^o>1^o>3^o$
    c) $3^o>2^o>1^o$
    d) $3^o>1^o>2^o$

42. Which of following is the major product when 2-chloro-2 methyl butane reacts with alcoholic KOH?
    a) 2-methyl butan-1-ol
    b) 2-methyl but-1-ene
    c) 2-methyl but-2-ene
    d) 2-methyl but-2-

43. Alcohols are isomeric with
    a) acids
    b) ethers
    c) esters
    d) aldehydes

44. The alcohol manufactured from water gas is
    a) butanol
    b) ethanol
    c) methanol
    d) isobutanol

45. Which of the following will not give iodoform test?
    a) ethanal
    b) ethanol
    c) Pentan-2-one
    d) Pentan-3-one

46. Which of the following forms a ketone on oxidation?
    a) 2-hydroxy propane
    b) Tert butyl alcohol
    c) Glycerol
    d) 2-methyl 2-hydroxy propane

47. Gabriel Pthalimide synthesis is used for the preparation of
    a) 1^0 aromatic amines
    b) 1^0 aliphatic amines
    c) 2^0 amines
    d) 3^0 amines

48. Which of the following is not a reducing sugar?
    a) sucrose
    b) glucose
    c) lactose
    d) maltose

49. Buna-s is a copolymer of
    a) Vinyl chloride and vinyl alcohol
    b) Butadiene and acrylo nitrile
    c) Butadiene and styrene
    d) Butadiene and ethylene

50. Tranquilizers are substances used for the treatment of
    a) Cancer
    b) AIDS
    c) Mental diseases
    d) Blood infection

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MATHEMATICS

1. In a survey of 60 people it was found that 45 own cycle, 50 own scooter. How many own only scooter but not cycle if all the 60 people own at least one vehicle.
    - a) 15
    - b) 10
    - c) 35
    - d) Data incomplete

2. $(A \cup B)^c$ is not equal to
    - a) $U - (A \cup B)$
    - b) $((B - A) \cup (A \cap B) \cup (A - B))^c$
    - c) $A^c \cap B^c$
    - d) $(U - (A \cap B))^c$

3. A has 3 elements $(0,1), (-1,1)$ are elements in A X A then A is
    - a) $\{-1,0,2\}$
    - b) $\{1,0\}$
    - c) $\{-1,0,1\}$
    - d) $\{-1,0,\{1\}\}$

4. Range of $f(x) = -|x^2 + 2x + 1|$
    - a) Positive real numbers greater than 1
    - b) Negative real numbers
    - c) Negative real numbers greater than -1
    - d) Positive real numbers

5. Which of the following relation is true
    - a) $\sin 1 < \sin 2 < \sin 3$
    - b) $\sin 3 < \sin 2 < \sin 1$
    - c) $\sin 3 < \sin 1 < \sin 2$
    - d) $\sin 2 < \sin 3 < \sin 1$

6. $(\cos x + \cos y)^2 + (\sin x - \sin y)^2$ is equal to
    - a) $4\cos^2\left(\dfrac{x+y}{2}\right)$
    - b) $4\cos^2\left(\dfrac{x-y}{2}\right)$
    - c) $4\sin^2\left(\dfrac{x+y}{2}\right)$
    - d) $4\sin^2\left(\dfrac{x-y}{2}\right)$

7. A leap year is selected at random, then the probability that it will contain 53 Mondays is
    - a) $\dfrac{1}{7}$
    - b) $\dfrac{2}{7}$
    - c) $\dfrac{3}{7}$
    - d) $\dfrac{4}{7}$

8. Probability that A speaks truth is $\dfrac{4}{5}$. A coin is tossed. A reports that a head appears. The probability that actually there was head is
    - a) $\dfrac{4}{5}$
    - b) $\dfrac{1}{2}$
    - c) $\dfrac{1}{5}$
    - d) $\dfrac{2}{5}$

9. The distance of the plane $2x - 3y + 4z - 6 = 0$ from the origin is

   a) 7

   b) $\dfrac{4}{\sqrt{3}}$

   c) $\dfrac{6}{\sqrt{29}}$

   d) $\dfrac{4}{\sqrt{29}}$

10. If the lines $\dfrac{x-1}{-3} = \dfrac{y-2}{2k} = \dfrac{z-3}{2}$ and $\dfrac{x-1}{3k} = \dfrac{y-1}{1} = \dfrac{z-6}{-5}$ are perpendicular, then value of k is

   a) −1

   b) $\dfrac{-10}{7}$

   c) 2

   d) $\dfrac{3}{5}$

11. If $|\vec{a}| = 11$, $|\vec{b}| = 23$, $|\vec{a} + \vec{b}| = 30$, then $|\vec{a} - \vec{b}|$ is

   a) 10

   b) 20

   c) 15

   d) 25

12. The value of $[\hat{i} - \hat{j}, \hat{j} - \hat{k}, \hat{k} - \hat{i}]$ is equal to

   a) $2(\hat{i} + \hat{j} + \hat{k})$

   b) 0

   c) 1

   d) −1

13. The integrating factor of $(1 + x^2)\dfrac{dy}{dx} + 2xy = \dfrac{1}{1 + x^2}$ is

   a) $\log(1 + x^2)$

   b) $(1 + x^2)$

   c) $\dfrac{1}{1 + x^2}$

   d) $e^{(1+x^2)}$

14. The degree of differential equation $\left(\dfrac{d^3y}{dx^3}\right)^2 + \left(\dfrac{dy}{dx}\right)^3 + \sin\left(\dfrac{dy}{dx}\right) + 1 = 0$ is

   a) 2

   b) 3

   c) 1

   d) Not defined

15. The value of $\int_0^{\pi/4} \log(1 + \tan x)dx$ is

   a) $\dfrac{\pi}{8}$

   b) $\dfrac{\pi}{8}\log 2$

   c) $\log 2$

   d) $2\log 2$

16. Area bounded by the y axis, $y=\cos x$ and $y=\sin x$ when $0 \le x \le \dfrac{\pi}{2}$ is

a) $2\left(\sqrt{2}-1\right)$

b) $\left(\sqrt{2}-1\right)$

c) $\sqrt{2}+1$

d) $\sqrt{2}$

17. $\int \dfrac{x\,dx}{(x-1)(x-2)}$ equals

a) $\log\left|\dfrac{(x-1)^2}{x-2}\right|+c$

b) $\log\left|\dfrac{(x-2)^2}{x-1}\right|+c$

c) $\log\left|\dfrac{x-1}{x-2}\right|^2+c$

d) $\log|(x-1)(x-2)|+c$

18. The normal to the curve $x^2 = 4y$ passing through $(1,2)$ is

a) $2x+y = 4$

b) $x-y = 3$

c) $x+y = 1$

d) $x-y = 1$

19. A cylindrical tank of radius 10m is being filled with wheat at the rate of 314 m³/h. Then depth of the wheat is increasing at the rate of

a) $1\text{m}^3/\text{h}$

b) $0.1\text{m}^3/\text{h}$

c) $1.1\text{m}^3/\text{h}$

d) $0.5\ \text{m}^3/\text{h}$

20. The rate of change of the area of a circle with respect to its radius r at r=6 cms is

a) 10π

b) 12π

c) 8π

d) 11π

21. For what value of k is the function continuous at $x=2$ $f(x) = \begin{cases} 2x+1 & if \quad x<2 \\ k & if \quad x=2 \\ 3x-1 & if \quad x>2 \end{cases}$

a) 2

b) 5

c) 3

d) 1

22. If $\sqrt{x}+\sqrt{y}=1$ then $\dfrac{dy}{dx}$ at $\left(\dfrac{1}{4},\dfrac{1}{4}\right)$ is equal to

a) 1

b) $\dfrac{1}{2}$

c) -1

d) $\dfrac{1}{4}$

23. If a, b, c are in A.P. then the determinant $\begin{vmatrix} 2y+4 & 5y+7 & 8y+a \\ 3y+5 & 6y+8 & 9y+b \\ 4y+6 & 7y+9 & 10y+c \end{vmatrix}$ is

a) 0

b) 1

c) x

d) $2x$

24. Let B be a square matrix of order 3x3, then |kB| is equal to

a) $k|B|$

c) $k^3|B|$

b) $k^2|B|$

d) $3k|B|$

25. If $A^2 - A + I = 0$, then inverse of A is

a) $\dfrac{1}{A}$

c) $I - A$

b) $A + I$

d) $A - I$

26. The number of all possible matrices of order 3x3 with each entry 1 or 2 is

a) 27

c) 81

b) 18

d) 512

27. If $\sin\left(\sin^{-1}\dfrac{1}{7} + \cos^{-1}x\right) = 1$, then the value of x is

a) $\dfrac{\pi}{2}$

c) 7

b) $\dfrac{1}{7}$

d) 0

28. Simplest form of $\tan^{-1}\left(\dfrac{\cos x}{1 - \sin x}\right)$ is

a) $\dfrac{\pi}{4} + \dfrac{x}{2}$

c) x

b) $\pi - \dfrac{x}{2}$

d) 1

29. If f: R→R be given by $f(x) = \left(3 - x^3\right)^{1/3}$, then $f \bullet f(x)$ is

a) $\dfrac{1}{x^3}$

c) x

b) x^3

d) $\left(3 - x^3\right)$

30. Let A = {1,2,3}, the number of equivalence relation containing (1,2) is

a) 1

c) 3

b) 2

d) 4

31. Let R be the relation in the set N given by R={(a, b): a = b - 2, b>6}. Choose the correct answer

a) (2,4)∈R

c) (6,8)∈R

b) (3,8)∈R

d) (8,7)∈R

32. $\displaystyle\sum_{n=1}^{100} i^n$ is

a) 50

c) 0

b) -50

d) 100

33. $\tan 80° \tan 75° \tan 15° \tan 10°$ is

a) -1

c) 1

b) 0

d) Not defined

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34. For what value of x, $\dfrac{3+2i\sin x}{1-2i\sin x}$ is purely real

   a) $(2n+1)\dfrac{\pi}{2}, n \in z$

   c) $n\pi, n \in z$

   b) $(2n-1)\dfrac{\pi}{2}, n \in z$

   d) $2n\dfrac{\pi}{3}, n \in z$

35. If $\dfrac{3x+4}{3} \le \dfrac{x-1}{3} - 1$, then x belongs to

   a) $(-\infty, -4)$

   c) $(-\infty, 4)$

   b) $(-\infty, -4]$

   d) $(-\infty, 4]$

36. If the words which can be formed using the letters of the word RANK with or without meaning arranged as in a dictionary, position of the word RANK will be

   a) 19

   c) 21

   b) 20

   d) 22

37. How many diagonals can be drawn to a 21 sided polygon

   a) 180

   c) 176

   b) 210

   d) 189

38. If 17th and 18th terms of $(2+a)^{50}$ are equal, then value of a is

   a) 1

   c) $\dfrac{1}{2}$

   b) 2

   d) Any real number

39. Middle term of $\left(\dfrac{x}{3} + 9y\right)^8$ is

   a) $5670x^5y^3$

   c) $5670x^6y^2$

   b) $5670x^3y^5$

   d) $5670x^4y^4$

40. 10th term of a geometric series $10, 1, \dfrac{1}{10}, \ldots$

   a) $\dfrac{1}{10^7}$

   c) $\dfrac{1}{10^9}$

   b) $\dfrac{1}{10^8}$

   d) $\dfrac{1}{10^{10}}$

41. If arithmetic mean and geometric mean of two numbers are equal to 8, then the numbers are

   a) 10, 6

   c) 8, 8

   b) 16, 4

   d) 4, 4

42. Slope of the equation of a line perpendicular to $3x - 4y + 10 = 0$ is

   a) $\dfrac{3}{4}$

   c) $\dfrac{-3}{4}$

   b) $\dfrac{4}{3}$

   d) $\dfrac{-4}{3}$

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43. A ray of light passing through the point (1,2) reflects on x-axis at A and the reflected ray passes through (5,3), then coordinates of A will be

   a) $\left(\dfrac{13}{5},0\right)$

   c) $\left(\dfrac{-13}{5},0\right)$

   b) $\left(0,\dfrac{13}{5}\right)$

   d) $\left(0,\dfrac{-13}{5}\right)$

44. Sum of eccentricities of two conics is 4, then the conics can be

   a) Ellipse and parabola

   c) Two Ellipse

   b) Two Parabola

   d) Two hyperbola

45. $y = 2\sin x$ intersect $y = 5x^2+2x+3$ at

   a) One point

   c) Two points

   b) No points

   d) Infinitely many points

46. Origin is the centroid of the triangle with vertices P (2a, 2, 6) Q (–4, 3b, –10) R (8, 16, 2c), then values of a , b and c are

   a) 1, 2, 3

   c) –2, –6, 2

   b) 0, 0, 0

   d) 2, 6, –2

47. Equation of set of point which is at equal distance from (3, 4, –5) and (–2, 1, 4) is

   a) $10x + 6y - 18z - 29 = 0$

   c) $10x + 6y + 18z + 29 = 0$

   b) $10x - 6y - 18z - 29 = 0$

   d) $10x - 6y + 18z + 29 = 0$

48. $\underset{x \to 0}{Limit}\dfrac{1-\cos 2x}{x^2}$

   a) 1

   c) 0

   b) –1

   d) 2

49. Derivative of $\dfrac{x}{\sin^n x}$ with respect to x

   a) $\dfrac{1}{n\sin^{n-1} x \cos x}$

   c) $\dfrac{\sin x - nx\cos x}{\sin^{n+1} x}$

   b) $\dfrac{1}{n\sin^n x \cos x}$

   d) $\dfrac{1-n\cos^n x}{\left(\sin^n x\right)^2}$

50. Which of the following can be a valid assignment of probabilities for outcomes of sample space, S = $\{\omega_1, \omega_2, \omega_3, \omega_4, \omega_5\}$

   a) 0.1, 0.01, 0.5, 0.89, 0.5

   c) $\dfrac{1}{10},\dfrac{1}{10},\dfrac{1}{10},\dfrac{1}{10},\dfrac{1}{10}$

   b) $\dfrac{1}{5},\dfrac{1}{5},\dfrac{2}{5},\dfrac{1}{5},0$

   d) 0.1, 0.8, 0.1, –0.1, 0.1

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ALL INDIA INSTITUTE OF SPEECH AND HEARING
MANASAGANGOTHRI, MYSORE 570 006

ENTRANCE EXAMINATION 2014
Entrance Examination for Admission to B.Sc (Speech and Hearing)

Time: 50 minutes   Max. Marks 50

BIOLOGY

1. Slipper Animalcule is the name of
   - a) *Paramecium*
   - b) *Plasmodium*
   - c) *Chlamydomones*
   - d) *Vorticella*

2. Jelly fish belongs to
   - a) A coelenterate
   - b) bony fish
   - c) Cartilaginous fish
   - d) Mullusca

3. According to Whittakar classification the following algae is placed in Monera
   - a) green algae
   - b) red algae
   - c) brown algae
   - d) blue-green algae

4. Sexual dimorphism is found in
   - a) *Ascaris*
   - b) *Pheretima*
   - c) *Amoeba*
   - d) All the above

5. Which one of the following is common to both prokaryote and eukaryotes
   - a) Mitotic apparatus
   - b) Histones
   - c) Mitochondria
   - d) Genetic code

6. In angiosperm leaves are attached at
   - a) Nodes
   - b) Internodes
   - c) Epidermis
   - d) Endodermis

7. Vascular bundles in which protoxylem is present towards periphery is called
   - a) closed
   - b) open
   - c) endarch
   - d) exarch

8. Tyloses are
   - a) Tracheal plugs
   - b) Secretory cells
   - c) Laticifers
   - d) Compound sieve cells

9. In camel and Llama RBC are
   - a) Flat ,Oval and nucleated
   - b) Flat ,Oval and non nucleated
   - c) Biconvex , oval and non-nucleated
   - d) Biconvex , oval and nucleated

10. Anal style is present in
    - a) Female cockroach
    - b) Male cockroach
    - c) Male frog
    - d) Female frog

11. Which arrangement is true of biomembrane
    - a) L-P-P-L
    - b) P-L-L-P
    - c) P-L-P-L
    - d) P-P-L-L

12. New cells develop from
    a) Bacterial fermentation
    b) Regeneration of old cells
    c) Pre-existing cells
    d) Abiotic materials

13. Plasmodesmata are
    a) Small vesicles present in cytoplasm
    b) a type of plastids
    c) Ingredients of nuclear pores
    d) Protoplasmic bridges between adjacent cells

14. Cillia and Flagella are composed of
    a) Microtubules
    b) Microfilaments
    c) Microfibrils
    d) Microvilli

15. Centromere takes part in
    a) Transcription
    b) Crossing over
    c) Poleward movement of chromosomes
    d) Cytoplasmic cleavage

16. A riboside consists of
    a) Ribose + Base
    b) Ribose + Phosphate
    c) Base + Phosphate
    d) Ribose + Phosphate + Base

17. A cell shrinks on being kept in a solution. The solution is
    a) Isotonic
    b) Hypotonic
    c) Hypertonic
    d) None

18. Carrier protein is required for
    a) Active transport
    b) Passive transport
    c) Water absorption
    d) Water evaporation

19. For fixing one molecule of CO_2 in Calvin cycle, are required
    a) $3ATP + 1NADPH_2$
    b) $3ATP + 2 NADPH_2$
    c) $2ATP + 3 NADPH_2$
    d) $3ATP + 3NADPH_2$

20. Photorespiration begins with the formation of
    a) Glycine
    b) Glycerate
    c) Phosphoglycolate
    d) Phosphoglycerate

21. Which one is absent in erythrocytes ?
    a) Kreb cycle
    b) Enzymes
    c) Biomembrane
    d) Hyaloplarm

22. Alcoholic fermentation is carried out by
    a) *Saccharomyces*
    b) *Lactobacillus*
    c) *Clostridium*
    d) *Aspergillus*

23. Ethylene gas
    a) Is saturated hydrocarbon
    b) Shows down ripening of apples
    c) Retards ripening of tomatoes
    d) Speeds up maturation of fruits

24. Which is specific gastric hormone?
    a) Secretin
    b) Serotonin
    c) Amphetamine
    d) None of these

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25. Exchange of gases in alveoli occurs through
   a) Active transport
   c) Simple diffusion
   b) Osmosis
   d) Passive transport

26. Heart beat is initiated by
   a) AV node
   c) Bundle of his
   b) SA node
   d) Purkinje fibres

27. The cells named podocytes occur in
   a) Inner wall of Bowman's capsule
   c) Large intestine
   b) Outer wall of Bowman's capsule
   d) Neck region of nephrons

28. Which one belongs to pectoral girdle?
   a) Glenoid cavity
   c) Ileum
   b) Sternum
   d) Acetabulum

29. Milky waters of tenders coconut is
   a) Liquid gametes
   c) Liquid embryo
   b) Liquid nucellus
   d) Liquid endosperm

30. Sertoli cells are regulated by pituitary hormone known as
   a) LH
   c) GH
   b) FSH
   d) Prolactin

31. Which one of the following groups includes all sexually transmitted diseases?
   a) AIDs, Syphilis, Cholera
   c) Gonorrhoea, hepatitis –B, clamydiasis
   b) HIV, Malaria, trichomoniasis
   d) Hepatitis –B, haemophila, AIDS

32. Which among the following has 23 chromosomes?
   a) Spermatogonia
   c) Secondary oocyte
   b) Zygote
   d) Oogonia

33. Study of pollen grain is called
   a) Ethmology
   c) Paleobotany
   b) Palynology
   d) Co-taxonomy

34. Down's syndrome occurs as a result of
   a) Trisomy
   c) Autopolyploidy
   b) Tetrasomy
   d) Allopolyploidy

35. Phenotypic ratio in plant snapdragon in F_2 is
   a) 1:1
   c) 3:1
   b) 2:1
   d) 1:2:1

36. Crick, one of the discover of the DNA double helical structure, was the man of
   a) Physics
   c) Zoology
   b) Chemistry
   d) Botany

37. Darwin's finches provide an excellent evidence in favour of evolution. The evidences come from the field of
   a) Embryology
   c) Biogeography
   b) Palaeontology
   d) Anatomy

38. Which type of selection is observed in Industrial melanism of moth, *Biston bitularia*
   a) Stabilising
   b) Directional
   c) Disruptive
   d) Artificial

39. The stimulant present in tea, coca and cola drinks is
   a) Cocaine
   b) Tannin
   c) Astringent
   d) Caffeine

40. Selection of homozygous plant is
   a) Mass selection
   b) Pure line selection
   c) Mixed selection
   d) None of the above

41. Cell organelle showing polymorphism is
   a) Lysosomes
   b) Golgi apparatus
   c) Endoplasmic reticulum
   d) All the above

42. *Monascus purpursus* is a yeast used commercially in the productive of
   a) Ethanol
   b) Streptokinase for removing clots from the blood vessels
   c) Citric acid
   d) Blood cholesterol lowering statins

43. Probiotics are
   a) Cancer inducing microbes
   b) New kind of food allergens
   c) Live microbial food supplement
   d) Safe antibiotics

44. Function of restriction enzyme is to
   a) Cute the DNA at specific site
   b) Join the cut ends
   c) Cut DNA at the ends
   d) Cut RNA at specific sites

45. Agarose extracted from sea weed which is used in
   a) Spectrophotometry
   b) Tissue culture
   c) PCR
   d) Gel electrophoresis

46. Golden rice is a promising transgenic crop. When released for cultivation, it will help in
   a) Producing a petrol-like fuel from rice
   b) Alleviation of vitamin - A
   c) Pest resistance
   d) Herbicide tolerance

47. Which one of the following areas in India, is a hotspot of biodiversity
   a) Eastern ghats
   b) Gangetic plain
   c) Sunderbans
   d) Western ghats

48. What is common to *Lantana, Eichhornia* and African catfish?
   a) All are endangered species of India
   b) All are key stone species
   c) All are mammals found in India
   d) All the species are neither threatened nor indigenous species of India

49. Minamata disease was caused due to the consumption of
   a) Sea food containing lot of cadmium
   b) Fish contaminated with mercury
   c) Oysters with lots of pesticide
   d) Sea food contaminated with selenium

50. The final stable community in ecological succession is
   a) Pioneers
   b) Sere
   c) Climax
   d) Carnivores

ALL INDIA INSTITUTE OF SPEECH & HEARING, MYSORE -6
B.Sc. (Sp&Hg) Entrance Exam 2014
Answer Keys

Sl. No.	Physics	Chemistry	Mathematics	Biology
1.	C	D	A	A
2.	B	C	D	A
3.	C	C	C	D
4.	A	C	B	A
5.	A	C	C	D
6.	C	D	A	A
7.	A	A	B	D
8.	A	D	A	A
9.	C	B	C	B
10.	A	D	B	B
11.	A	C	B	B
12.	C	B	B	C
13.	B	B	B	D
14.	C	D	D	A
15.	A	D	B	C
16.	D	A	B	A
17.	B	A	B	C
18.	B	C	A	A
19.	A	D	A	B
20.	B	C	B	C
21.	C	B	B	A
22.	C	B	C	A
23.	A	D	A	D
24.	C	C	C	A
25.	B	B	C	C
26.	A	B	D	B
27.	A	D	B	A
28.	A	A	A	A
29.	D	B	C	D
30.	A	C	B	B
31.	A	A	C	C
32.	C	B	C	C
33.	C	D	C	B
34.	D	A	C	A
35.	D	B	B	D
36.	D	B	B	B
37.	B	D	D	C
38.	B	D	A	B
39.	D	A	D	D
40.	D	A	B	B
41.	D	C	C	A
42.	C	C	D	D
43.	A	B	A	C
44.	A	C	D	A
45.	B	D	B	D
46.	B	A	C	B
47.	D	B	A	D
48.	B	A	D	D
49.	A	C	C	B
50.	A	C	B	C