ALL INDIA INSTITUTE OF SPEECH AND HEARING: MYSORE – 570 006

ENTRANCE EXAMINATION – 2010

BASLP

Time: 50 minutes **Max. Marks 50**

MATHEMATICS

1. In a survey of 40 students 26 take tea, 18 take coffee and 8 take neither of two. How many take both tea and coffee.
   a) 14 c) 12
   b) 6 d) 8

2. Number of binary operations on the set {a, b} are
   a) 10 c) 20
   b) 8 d) 16

3. Find the range of $f(x) = \frac{1}{\sqrt{9-x^2}}$
   a) $[1/3, \infty)$ c) $[1/9, \infty)$
   b) $(1/3, \infty)$ d) $(-\infty, 1/3]$

4. Let f: R-{-4/3}→R be a function defined as $f(x) = \frac{4x}{3x+4}$. The inverse of x is the map g: Range f→R-{-4/3} given by
   a) $g(y) = \frac{3y}{3-4y}$ c) $g(y) = \frac{4y}{3-4y}$
   b) $g(y) = \frac{4y}{4-3y}$ d) $g(y) = \frac{3y}{4-3y}$

5. If $f(x)=8x^3$ and $g(x)=x^{1/3}$ then $f_0g(x)$ is
   a) 4x c) $8x^3$
   b) 8x d) $x^{1/3}$

6. If $A = \begin{bmatrix} \cos\alpha & -\sin\alpha \\ \sin\alpha & \cos\alpha \end{bmatrix}$ then $A + A^I = I$, if the value of α is
   a) $\pi/6$ c) π
   b) $\pi/3$ d) $3\pi/2$

7. The inverse of $\begin{bmatrix} \cos 5\theta & \sin 5\theta \\ -\sin 5\theta & \cos 5\theta \end{bmatrix}$ is

a) $\begin{bmatrix} -\cos 5\theta & \sin 5\theta \\ \sin 5\theta & \cos 5\theta \end{bmatrix}$

b) $\begin{bmatrix} \cos 5\theta & -\sin 5\theta \\ \sin 5\theta & \cos 5\theta \end{bmatrix}$

c) $\begin{bmatrix} \cos 5\theta & \sin 5\theta \\ -\sin 5\theta & \cos 5\theta \end{bmatrix}$

d) $\begin{bmatrix} -\cos 5\theta & -\sin 5\theta \\ \sin 5\theta & \cos 5\theta \end{bmatrix}$

8. A is a square matrix of order 3 and $|A| = 2$ then $|5A|$ is equal to
   a) 250
   b) 125
   c) 10
   d) 40

9. The value of the determinant $\begin{vmatrix} 1+x & 1 & 1 \\ 1 & 1+x & 1 \\ 1 & 1 & 1+x \end{vmatrix}$ is equal to
   a) $x^2(x+3)$
   b) $3x^2$
   c) 0
   d) x^3

10. If $\begin{bmatrix} x & -5 & -1 \end{bmatrix} \begin{bmatrix} 1 & 0 & 2 \\ 0 & 2 & 1 \\ 2 & 0 & 3 \end{bmatrix} \begin{bmatrix} x \\ 4 \\ 1 \end{bmatrix} = 0$, then the value of x is
   a) 48
   b) $4\sqrt{3}$
   c) $-4\sqrt{3}$
   d) $\pm 4\sqrt{3}$

11. $\lim_{x \to 0} \dfrac{\sin 3x + 7x}{4x + \sin 2x}$ is equal to
   a) 5/6
   b) 5/3
   c) 10/3
   d) ½

12. $\lim_{x \to 0} \dfrac{3^x - 1}{\sqrt{x+1} - 1}$ is equal to
   a) $\text{Log}_e 3$
   b) 0
   c) 1
   d) $\text{Log}_e 9$

13. The value of $\lim_{x \to \pi/2} \dfrac{\tan 2x}{x - \pi/2}$ is equal to
   a) -2
   b) 1
   c) 2
   d) 0

14. For what value of k is the function defined by $f(x)=\begin{cases}\frac{k\cos x}{\pi-2x}, & \text{if } x \neq \pi/2 \\ 3, & \text{if } x = \pi/2\end{cases}$ is continuous at $x=\pi/2$?

a) 6 c) 3
b) -6 d) 12

15. If the coefficient of x^2 in the expansion $(1+x)^m$ is 6 then the positive value of m is equal to

a) -4 c) 3
b) 4 d) -3

16. If $\left(\frac{1+i}{1-i}\right)^m = 1$, then the least integral value of m is

a) 2 c) 4
b) 8 d) 16

17. The polar form of the complex number $z = -1 - i$ is

a) $\sqrt{2}(\cos -3\pi/4 + i\sin -3\pi/4)$ c) $\sqrt{2}(\cos \pi/4 + i\sin \pi/4)$
b) $\sqrt{2}(\cos -3\pi/4 + i\sin -3\pi/4)$ d) $\sqrt{2}(\cos -\pi/4 + i\sin -\pi/4)$

18. The distance between the parallel lines $3x-4y+7=0$ and $3x-4y+5=0$ is

a) 1/5 c) 12/5
b) -2/5 d) 2/5

19. The solution of the inequality $\frac{3(x-2)}{5} \leq \frac{5(2-x)}{3}$ is

a) $(-\infty, 2)$ c) $[2, \infty)$
b) $(-\infty, 2]$ d) $(2, \infty)$

20. The normal at the point (1, 1) on the curve $2y+x^2 = 2$ is

a) $x + y = 0$ c) $x + y + 1 = 0$
b) $x - y = 0$ d) $x + y - 1 = 0$

21. If $y = \sec^{-1}\left(\frac{1}{2x^2-1}\right)$, $0<x<1/\sqrt{2}$, then dy/dx is

a) $-\frac{2}{\sqrt{1-x^2}}$ c) $\frac{2}{\sqrt{1-x^2}}$

b) $\frac{2}{\sqrt{x^2-1}}$ d) $\frac{-2}{\sqrt{x^2-1}}$

22. If $x = a\cos\theta$, $y = a\sin\theta$, then dy/dx is

a) $\cot\theta$ c) $-\cot\theta$
b) $\tan\theta$ d) $-\tan\theta$

23. The solution for the differential equation $x\,dy/dx + y = 3x^2$ is

a) $xy = x^2/3 + c$ c) $x^2y = x^3 + c$

b) $xy = x^3/3 + c$ d) $xy = x^3 + c$

24. Derivative of $(\log x)^{\log x}$, $x > 1$ is

a) $(\log x)^{\log x}\left[\frac{1}{\log x} + \frac{\log(\log x)}{x}\right]$ c) $(\log x)^{\log x}\left[\frac{1}{x} + \frac{\log(\log x)}{\log x}\right]$

b) $(\log x)^{\log x}\left[\frac{1}{x} + \frac{\log(\log x)}{x}\right]$ d) $(\log x)^{\log x}\left[\frac{1}{\log x} + \frac{\log(\log x)}{x}\right]$

25. If $ax^2+by^2+2gx+2fy+c = 0$ then dy/dx is

a) $\frac{ax+g}{by+f}$ c) $\frac{-(by+f)}{ax+g}$

b) $\frac{-(ax+g)}{by+f}$ d) $\frac{-(ax+f)}{(by+g)}$

26. $\int_{-1}^{1} \sin^{11}x\,dx$ is equal to

a) 0 c) -1

b) 1 d) None of these

27. The vector $\alpha\,\hat{i} + 2\hat{j} + 3\hat{k}$ and $-\hat{i} + 5\hat{j} + \alpha\hat{k}$ are perpendicular then α is equal to

a) 1 c) -5

b) 0 d) 5

28. $\int (\sin^{-1}\sqrt{x} + \cos^{-1}\sqrt{x})dx$ is equal to

a) $\frac{\pi}{4}x + c$ c) $\pi x + c$

b) $\frac{\pi}{2}x + c$ d) $\frac{\pi}{3}x + c$

29. The equation of the plane passing through (2, 3, 4) and parallel to $x+2y+4z=5$ is

a) $x+4y+2z=24$ c) $4x+2y+2z=24$

b) $x+2y+4z=34$ d) $x+2y+4z=24$

30. ${}^{n}C_r + {}^{n}C_{r-1}$ is equal to

a) ${}^{n}C_{r+1}$ c) ${}^{n+1}C_{r-1}$

b) ${}^{n+1}C_r$ d) ${}^{n}C_{r-1}$

31. $\int \frac{2\cos x-3\sin x}{6\cos x+4\sin x}\,dx$ is equal to

a) $1/2\log(3\cos x+2\sin x)+c$ c) $1/2\log(6\cos x+4\sin x)+c$
b) $1/2\log(2\cos x-3\sin x)+c$ d) $2\log(3\cos x+2\sin x)+c$

32. If E and F are events such that P(E) = 1/4, P(F) = 1/2, and P(E and F) = 1/8, then P(not E and not F) is equal to

a) 5/8 c) 3/8
b) 1 d) ¼

33. The condition for an equilateral hyperbola is

a) a = -b c) a = b
b) a = 2b d) None of these

34. If cosx = - 1/3, x is in quadrant III, then cos x/2 is

a) -1/6 c) $1/\sqrt{3}$
b) 1/6 d) $-1/\sqrt{3}$

35. $\int_1^e \log x\,dx$ is equal to

a) 0 c) 1
b) e d) e-1

36. The value of $\tan(\sin^{-1}3/5 + \cot^{-1}3/2)$ is

a) 17/6 c) 6/17
b) - 17/6 d) 1/6

37. If $x(\hat{i}+\hat{j}+\hat{k})$ is a unit vector then the values of x is

a) $\pm 1/\sqrt{2}$ c) $\pm 1/\sqrt{3}$
b) 1/3 d) $\pm\sqrt{3}$

38. A line makes equal angles with axes, direction cosines of line are

a) 1, 1, 1 c) $1/\sqrt{3}, 1/\sqrt{3}, 1/\sqrt{3}$
b) 1/3, 1/3, 1/3 d) $1/\sqrt{3}, -1/\sqrt{3}, 1/\sqrt{3}$

39. If $\vec{a}+\vec{b}+\vec{c}=\vec{0}$ then

a) $\vec{a}\times\vec{b}=\vec{b}\times\vec{c}=\vec{c}\times\vec{a}$ c) $\vec{a}, \vec{b}, \vec{c}$ are non-coplanar
b) $\vec{a}+\vec{b}=\vec{b}+\vec{c}=\vec{c}+\vec{a}$ d) None of these

40. If $|\vec{a}|=5$, $|\vec{b}|=13$ and $|\vec{a}\times\vec{b}|=25$, then $\vec{a}\cdot\vec{b}$ is equal to

a) 12 c) 13
b) 5 d) 60

41. The angle between the planes 2x-3y+4z=1 and –x+y=4 is

a) $\cos^{-1}(5/\sqrt{58})$ c) $\cos^{-1}(-5/\sqrt{29})$
b) $\cos^{-1}(-5/\sqrt{58})$ d) $\cos^{-1}(-2/\sqrt{58})$

42. The equation of the parabola which is symmetric about the y axis and passes through point (2, -3) is
    a) $3x^2 = 4y$
    b) $3x^2 = -4y$
    c) $2y^2 = 9x$
    d) $2y^2 = -9x$

43. If AM and GM of two positive numbers a and b are 10 and 8 respectively, then the numbers are
    a) 4, 16
    b) 4, 8
    c) 3, 27
    d) 2, 8

44. The principal solution of the equation $\sin x = \sqrt{3}/2$ is
    a) $\pi/6, 5\pi/6$
    b) $5\pi/6, 11\pi/6$
    c) $\pi/3, 2\pi/3$
    d) $2\pi/3, 5\pi/3$

45. The variance of 20 observations is 5. If each observation is multiplied by 2 then the new variance of the resulting observations is
    a) 10
    b) 5
    c) 40
    d) 20

46. If -2/7, x, -7/2 are in GP, then the value of x is
    a) ±1
    b) ±2
    c) ±4
    d) None of these

47. The solution of the differential equation $(1+\cos x)dy = (1-\cos x)\,dx$ is
    a) $\frac{1}{2}\tan x/2 - x + c$
    b) $2\tan x/2 - x + c$
    c) $2\tan x/2 + x + c$
    d) $1/3\tan^3 x/2 + c$

48. The co-ordinates of the foci of the ellipse $x^2/25 + y^2/100 = 1$ is
    a) $(0, \pm\sqrt{75})$
    b) $(\pm\sqrt{75}, 0)$
    c) $(0, \pm\sqrt{45})$
    d) $(0, \pm 5)$

49. If the sum of n terms of an AP is $(pn + qn^2)$, where p and q are constants, then the common difference is
    a) 2p
    b) 0
    c) 2q
    d) Q

50. A dice is thrown twice and the sum of the numbers appearing is observed to be 7. The conditional probability that the number 2 has appeared at least once is
    a) 1/2
    b) 2/3
    c) ¼
    d) 1/3

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ENTRANCE EXAMINATION – 2010

BASLP

Time: 50 minutes **BIOLOGY** Max. Marks 50

1. In earth worm, the spermathecal aperture is present on the ventro lateral sides on the segments
   a) 5th to 9th
   b) 6th to 10th
   c) 7^{th} to 11^{th}
   d) On the 14^{th} segment only

2. In a plant cell, the neighbouring cells are held together by
   a) A kind of glue
   b) Primary cell wall
   c) Secondary cell wall
   d) Middle lamella

3. A nucleotide has
   a) A monosaccharide, a heterocyclic compound and phosphate.
   b) A polysaccharide, an amino acid and a phosphate group.
   c) A polysaccharide, a heterocyclic compound and a phosphate.
   d) A monosaccharide, an amino acid and a phosphate group.

4. When a cell is placed in a hypotonic solution, there is movement of water from
   a) The cell to the outside.
   b) Outside into the cell.
   c) The cell to the outside and from outside into the cell.
   d) There is no movement of water in any direction.

5. A mineral element which is a constituent of Amino acids vitamins and co enzymes is
   a) Phosphorous
   b) Nitrogen
   c) Sulphur
   d) Potassium

6. A microbe Frankia produces nitrogen-fixing nodules on the roots
   a) Leguminous plants
   b) Non-leguminous plants
   c) Cereals
   d) Gymnosperms

7. When the pigments of a green leaf were subjected to paper chromatography, in the chromotogram
   a) Chlorophyll-a will appear as yellow
   b) Chlorophyll-a will appear as a green or light green
   c) Chlorophyll-a will appear as orange
   d) Chlorophyll-a will appear as bright or blue green

8. The Bundle sheath cells in C_4 plants have
   a) Large number of chloroplasts, thick walls and no intercellular spaces.
   b) Less number of chloroplasts, thin walls and lot of intercellular spaces.
   c) Large number of chloroplasts, thin walls and lots of intercellular spaces.
   d) Less number of chloroplasts, thick walls and no intercellular spaces.

9. In Animal cells, pyruvic acid is reduced to Lactic acid in the following conditions
   a) Presence of oxygen, presence of lactic acid dehydrogenase and absence of NADH.H$^+$
   b) In the absence of oxygen, presences of lactic acid dehydrogenase and presence of NADH.H$^+$
   c) In the presence of oxygen, absence of lactic acid dehydrogenase and presence of NADH.H$^+$
   d) In the absence of oxygen, presence of alcohol dehydrogenase and absence of NADH.H$^+$

10. The formation of inter fascicular cambium and cork cambium from fully differentiated parenchyma cells is known as
   a) Differentiation
   b) Dedifferentiation
   c) Redifferentiation
   d) All of the above

11. Auxin was first isolated from the tips of coleoptiles of oat seedlings by
   a) Charles Darwin
   b) F.W. Went
   c) F. Skoog
   d) Miller

12. Natural system of classification based on natural affinities among the organisms which includes similarities in morphology and anatomy, embryology and photochemistry was given by
   a) Carl Linnaeus
   b) R.A. Whittaker
   c) Bentham and Hooker
   d) Tippo

13. A cell having two nuclei during sexual reproduction known as dikaryon stage is seen in
   a) Brown algae
   b) Fungi
   c) Bryophytes
   d) Pteridophytes

14. The members of Rhodophyceae commonly known as red algae have
   a) Chlorophyll-a and b as pigments and starch as the stored food.
   b) Chlorophyll-a and d and phycoerythrin as pigments and floridean starch as the stored food.
   c) Chlorophyll-a, c fucoxanther and floridean starch as stored food.
   d) Chlorophyll-a, b, c and phycoerythrin as pigments and starch as stored food.

15. The property of emitting light by a living organism called Bioluminescence is well seen in
   a) Members of phylum Annelida
   b) Members of phylum platy helminthes
   c) Members of phylum Ctenophora.
   d) Members of phylum Arthropoda.

16. If a flower, gynoecium is above and another floral parts are present below it, such flower is said to be
   a) Epigynous flower
   b) Hypogynous flower
   c) Perigynous flower
   d) Polygynous flower

17. The floral formula $\%\,\mathrm{K}_{(5)}\mathrm{C}_{1+2+(2)}\mathrm{A}_{(9)+1}\,\underline{\mathrm{G}}_{1}$ is of a flower which belongs to family
   a) Liliaceae
   b) Solanaceae
   c) Poaceae
   d) Fabaceae

18. Axile placentation is seen in
    a) Mustard and lemon
    b) Datura and primrose
    c) China rose and tomato
    d) Sunflower and marigold

19. A large number of vascular bundles, which are conjoint, open and endarch arranged in a ring, is found in
    a) Monocot stem
    b) Monocot root
    c) Dicot stem
    d) Dicot root

20. During cell division, the amount of DNA present in the doubles during
    a) Interphase
    b) G1 phase
    c) S-phase
    d) G2 phase

21. A typical angiosperm embryo sac at maturity has
    a) 8 nuclei and 8 cells
    b) 8 nuclei and 6 cells
    c) 8 nuclei and 7 cells
    d) 8 nuclei and 1 cell

22. The persistent nucellus in the seeds is known as
    a) Endosperm
    b) Pericarp
    c) Mesocarp
    d) Perisperm

23. In human males the cells which synthesise and secrete testicular hormones are
    a) Male germ cells.
    b) Cells of Sertoli.
    c) Cells of Leydig.
    d) All of them,

24. Rapid secretion of Luteinising hormone during the middle of menstrual cycle of human female help in
    a) Development of graffian follicle.
    b) Rupture of graffian follicle.
    c) Degeneraton of graffian follicle.
    d) Secretion by graffian follicle.

25. The Alkali resistant nucleic acid is
    a) Deoxyribose nucleic acid .
    b) Messenger ribose nucleic acid.
    c) Transfer ribose nucleic acid.
    d) Ribose nucleic acid.

26. The copper releasing Intra uterine devices prevent pregnancy by
    a) Stopping the formation of ovum.
    b) Suppressing the motility and fertilizing capacity of the sperm.
    c) Prevent implantation of the zygote.
    d) Prevent the development of endometrium.

27. In a villus, some of the glycerol and fatty acids of the digested food are combined to form fats coated with proteins, and then transported as chylomicrons to
    a) Blood capillaries.
    b) Lacteals.
    c) Lumen of the small intestine.
    d) Lumen of the large intestine.

28. Which one of the following helps in increasing the size of thorax during inspiration?
    a) Relaxation of intercostal muscles.
    b) Contraction of intercostal muscles.
    c) Relaxation of the muscles of the diaphragm.
    d) Contraction of muscles of diaphragm.

29. The typical lub-dub sounds heard in the heart beat of a healthy person are due to
    a) Closing of semilunar valves
    b) Closing of bicuspid and tricuspid valves
    c) Closing of the tricuspid and bicuspid valves followed by the closing of the semilunar valves.
    d) Blood flow through dorsal aorta and pulmonary artery.

30. Which of the following parts of the nephron is least permeable to water?
    a) Proximal tubule.
    b) Collecting ducts.
    c) Descending limb of Henle's loop
    d) Ascending limb of Henle's loop.

31. The cranial nerve in man which sends parasympathetic stimulation to the visceral organs like heart, stomach and liver is
    a) Vagus nerve
    b) Trigeminal nerve
    c) Abducens nerve
    d) Glossopharyngeal nerve

32. When a person suffers from a fall in blood pressure, it is useful to administer the hormone
    a) Thyroxine
    b) Adrenaline
    c) Insulin
    d) Parthormone

33. A heterogenous purple flower is crossed with a recessive white flower. The progeny produced is in the following ratio.
    a) 75% purple and 25% white
    b) 50% purple and 50% white
    c) All purple
    d) All white

34. In sickle cell anaemia, death occurs in the affected individual when the lethal genes are present in
    a) Homozygous dominant condition.
    b) Homozygous recessive condition.
    c) Co dominant condition.
    d) Heterozygous condition.

35. The replication of DNA is semi conservative. This was demonstrated experimentally by
    a) Watson and Crick
    b) Nirenberg and Mathaei
    c) Meselson and Stahl
    d) Crick and H.G. Khorana

36. During protein synthesis, the termination of polypeptide takes place in the presence of the following codons on m-RNA.
    a) UUG, UAG and UCG
    b) UAA, UAG and UGA
    c) UUG, UGC and UCA
    d) UCG, GCG and ACC

37. Adaptive similarities in different animals living in the same habitat is called
    a) Retrogressive evolution.
    b) Parallel evolution.
    c) Adaptive radiation
    d) Convergent evolution.

38. A restriction enzyme breaks the bonds between the
    a) Base pairs of DNA molecule.
    b) Sugar and phosphate of DNA molecules.
    c) Base pairs of a DNA and RNA hybrid molecule.
    d) Exons and introns of a DNA molecule.

39. The population of peppered moths (Biston betularia) of England changed from 1% dark and 99% grey individuals to 99% dark and 1% light individuals between 1848 and 1898. The natural selective agent bringing this change was
    a) Human beings
    b) Lichens on the bark of the tree.
    c) Smoke emitted by the industries.
    d) Predator birds.

40. The receptors of pressure present in the deep layers of the skin are
    a) Krause's end bulb.
    b) Meissner's corpuscles.
    c) Pacinian corpuscles.
    d) Corpuscles of Raffini.

41. Gene flow is
    a) Transfer of genes between the population which differ genetically from one another but can interbreed.
    b) Exchange of genes between male and female.
    c) Transfer of genes from nucleus to chromosome.
    d) Transfer of gene from sperm to egg.

42. The organization, which has published the "Red Data book", is
    a) Conservation in international trade in endangered species of wild flora and fauna
    b) National wild life action plan
    c) National environmental engineering research institute.
    d) International union for conservation of nature and natural resources.

43. How many nucleotides are needed to code for a protein with 450 amino acids?
    a) At least 150
    b) At least 300
    c) At least 900
    d) At least 1350

44. A hybrid variety of wheat is produced which is resistant to
    a) White rust
    b) Leaf and stripe rust
    c) Black rot
    d) Bacterial blight.

45. Swiss cheese has large holes due to the production of a large amount of CO2 by a bacterium called
    a) Acetobacter aceti
    b) Propioni bacterium sharmanii
    c) Clostridium butylicum
    d) Lactobacillus acidophilus

46. The fragments of DNA are separated by
    a) Gel chromatography
    b) Gel-electrophoresis
    c) Gelling
    d) Elution

47. In a simple ecosystem of paddy crops which traps 10,000 calories, mice eat paddy and skunks eat mice which are in turn eaten by wolves. How many calories would a wolf receive in the end?
    a) 100
    b) 10
    c) 1
    d) 0.1

48. Pick out a group consisting of only submerged plants
    a) Pistia, Eichhornia and Nymphaea
    b) Wolffia, Lemna and Pistia.
    c) Hydrilla, Aeschynomene and potamogeton
    d) Hydrilla, Elodea and Vallisneria.

49. Who among the following is known as "Father of Human Genetics"?
    a) H.J. Muller
    b) A. Levan
    c) Archibald garrod
    d) Johann Mendel

50. Sun loving plants are called
    a) Photophytes.
    b) Heliophytes.
    c) Sciophytes.
    d) Xerophytes.

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BASLP

Time: 50 minutes **Max. Marks 50**

PHYSICS

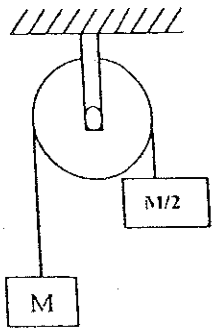
1. Which of the following have the dimensions of time? L, C and R represent inductance, capacitance and resistance respectively?
   a) R/C
   b) $\sqrt{LC}$
   c) R/L
   d) C/L

2. The distance traveled by a body is directly proportional to the square of the time taken. Its acceleration
   a) Increases
   b) Decreases
   c) Becomes zero
   d) Remains constant

3. A student goes from his house to school with speed v_1 and returns back to his house with the speed v_2. Then the average speed of the student is
   a) $\frac{v_1+v_2}{2}$
   b) $\sqrt{v_1 v_2}$
   c) $\frac{2v_1v_2}{v_1+v_2}$
   d) v_1v_2

4. A monkey is descending from the branch of a tree with constant acceleration. If the breaking strength is 75% of the weight of the monkey, the minimum acceleration with which the monkey can slide down without breaking the branch is
   a) g
   b) g/2
   c) 3g/4
   d) g/4

5. Two masses M and M/2 are joined together by means of light inextensible string passed over a frictionless pulley as shown in figure. When mass M released, the mass M/2 will ascend with an acceleration of



   a) g/3
   b) 3g/2
   c) G
   d) g/2

6. Two springs A and B are identical but A is harder than B ($K_A > K_B$). On which spring more work will be done if they are stretched through the same distance.
   a) A
   b) B
   c) Equal work done in A and B
   d) Either A or B

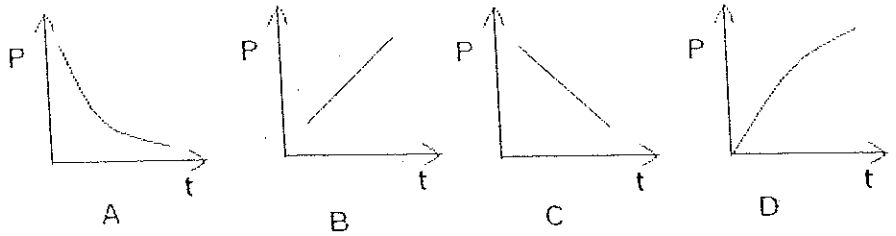
7. 300J of work done in sliding a 2.5Kg block up an inclined plane of height 10m. Taking $g=10m/s^2$, work done against friction is
   a) 300J
   b) 250J
   c) 150J
   d) 50J

8. If a sphere is rolling, the ratio of rotational energy to the total kinetic energy is given by
   a) 5:3
   b) 2:5
   c) 10:7
   d) 2:7

9. A geostationary satellite is orbiting the earth at a height of 16R above the earth surface of the earth; R being the radius of the earth. The time period of another satellite at a height 4R from the surface is
   a) 1 hour
   b) 3 hours
   c) 5 hours
   d) 7 hours

10. A steel wire of diameter 2mm has a breaking strength of $4x10^5N$. The breaking strength of similar steel wire of diameter 1mm is
    a) 10^6N
    b) 10^4N
    c) 10^5N
    d) $2x10^5N$

11. When a soap bubble formed at the end of a tube is blown very slowly, the graph between excess of pressure inside the bubble with time is shown in the figure



    a) A
    b) B
    c) C
    d) D

12. The hydrogen gas, $C_p-C_v=a$ and for oxygen gas $C_p-C_v=b$. The relation between a and b is
    a) a =2b
    b) b =2a
    c) a =b
    d) b =4a

13. Which of the following process is reversible?
    a) Diffusion
    b) Change of state
    c) Radiation
    d) Heat conduction

14. The equation of a simple harmonic motion is $y=0.2 \cos(200t + 0.3)$ where y is cm and t in second. The frequency of the motion is
    a) 0.2 Hertz
    b) 200 Hertz
    c) $200/2\pi$ Hertz
    d) 0.3×10^3 Hertz

15. Two sound waves of slightly different frequencies propagating in the same direction produces beats due to
    a) Interference
    b) Diffraction
    c) Reflection
    d) Polarization

16. A body covered a distances of 1 metre along a semicircular path. The ratio of distance to displacement is
    a) π
    b) Zero
    c) $\pi/2$
    d) 1:1

17. A car runs at a constant speed on a circular track of radius 100m; taking 62.8 seconds for every circular lap. The average velocity is
    a) 1.68 m/s
    b) 10 m/s
    c) 20 m/s
    d) Zero

18. Velocity of sound at pressure P is v. If pressure increased to 2P then velocity of sound is
    a) 2 v
    b) 3 v
    c) $\sqrt{v}$
    d) V

19. A body of mass 30 Kg stands on a weighing machine lying on the floor of a lift. The weight of the body when lift falls freely
    a) 30 Kg wt
    b) 60 Kg wt
    c) 20 Kg wt
    d) Zero

20. A body is describing a vertical circle of radius 'r'. The minimum value of its speed at the top of the vertical circle is
    a) $\sqrt{gr}$
    b) $\sqrt{2gr}$
    c) $\sqrt{3gr}$
    d) $\sqrt{5gr}$

21. If the earth suddenly shrinks to 1/64 of its present volume then the duration of the day is
    a) 0.5 Hr
    b) 1.0 Hr
    c) 1.5 Hr
    d) 2.0 Hr

22. Weight of body at earth's surface is W. At a depth half way to the center of earth it will be
    a) W
    b) W/2
    c) W/4
    d) W/8

23. What makes the hair of shaving brush cling together when taken out of water?
    a) Gravity
    b) Surface tension
    c) Viscosity
    d) Friction

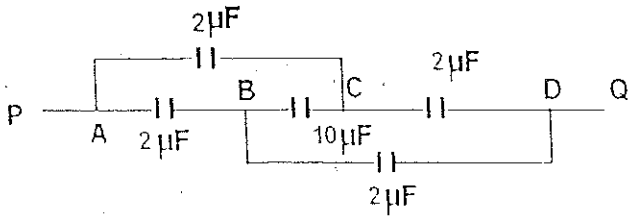
24. The velocity of sound in air is 332 m/s. The frequency of the fundamental note of a closed pipe of 50 cm long is
    a) 66 Hertz
    b) 166 Hertz
    c) 100 Hertz
    d) 332 Hertz

25. What happens to the period of a simple pendulum if its amplitude of the oscillation is doubled?
    a) Increases
    b) Decreases
    c) Remains same
    d) Increases or decreases

26. Capacitance of a spherical conductor is 1μF. The radius of the conductor is
    a) 0.9 m
    b) 9 mm
    c) 9 Km
    d) None of the above

27. A charge 'q' is located at the centre of a cube. The electric flux through all the six faces of the cube is
    a) q/ε_o
    b) $6.q/\varepsilon_o$
    c) $q/6\ \varepsilon_o$
    d) Zero

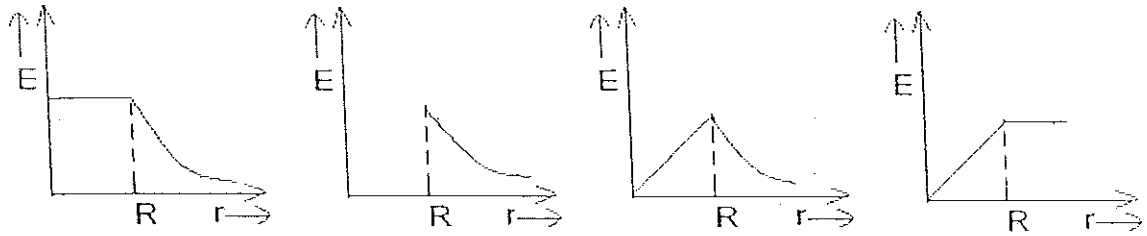
28. What is the effective capacitance between points P and Q?



    a) 2 μF
    b) 4 μF
    c) 8 μF
    d) 10 μF

29. Energy per unit volume for a capacitor having area A and separation 'd' kept at potential difference V is given by
    a) $1/2\varepsilon_o E^2$
    b) $1/2\ \varepsilon_o V^2$
    c) $1/2\varepsilon_o (E/d)^2$
    d) $1/2\varepsilon_o (v/d)$

30. The electric field due to a uniformly charged, hollow sphere of radius R as a function of the distance from its centre is represented graphically by



    a) A
    b) B
    c) c
    d) D

31. A carbon resistor has orange, violet, red and silver coloured strips. Its resistance is
    a) 2,600 ± 10%
    b) 2,600 Ω ± 20%
    c) 3,700 Ω ± 20%
    d) 3,700 Ω ± 10%

32. When a metal is heated, its resistance
    a) Increases
    b) Decreases
    c) Remains constant
    d) May increases or decreases

33 A magnetic needle is kept in a non-uniform magnetic field. It experiences
    a) A torgue but not a force.
    b) Neither torgue nor a force.
    c) A torgue and force.
    d) A force but not a torgue.

34. If a magnetic material, moves from stronger to weaker parts of a magnetic field, then it is known as
    a) Diamagnetic
    b) Paramagnetic
    c) Ferromagnetic
    d) Anti-ferromagnetic

35. A metallic wire 1m in length is moving normally across a field of 0.1 T with a speed of 20 m/s. The emf between the ends of the wire is
    a) 0.1 v
    b) 1.0 v
    c) 0.2 v
    d) 2.0 v

36. The average power in a.c circuit is given by $P=E_v I_v \cos\Phi$. The value of power factor $\cos\Phi$ in series LCR- circuit at resonance is
    a) Zero
    b) 1.0
    c) $1/\sqrt{2}$
    d) 0.707

37. Velocity of light is equal to
    a) $\sqrt{\mu_o\varepsilon_o}$
    b) $\mu_o\varepsilon_o$
    c) $1/\sqrt{\mu_o\varepsilon_o}$
    d) $1/\mu_o\varepsilon_o$

38. The ratio of slit widths in young's double slit experiment is 4:1. The ratio of amplitudes of light waves from them have a ratio
    a) 2:1
    b) 1:2
    c) 4:1
    d) None of these

39. The angle of minimum deviation of a prism depends upon:
    a) Angle of incidence
    b) Angle of emergence
    c) Angle of reflection
    d) None of the above

40. At the polarizing angle, the angle between reflected and refracted ray is
    a) 0^o
    b) 90^o
    c) 120^o
    d) 180^o

41. Which of the following statement is correct?
    a) The stopping potential increases with intensity of incident light.
    b) The photoelectric current increases with increasing frequency.
    c) The photoelectric current is proportional to applied voltage.
    d) The photoelectric current increases with intensity of light.

42. The energy E and momentum p of a photon is given by $E=h\gamma$ and $P=h/\lambda$. The velocity of the photon will be.
    a) E/p
    b) E p
    c) $(E/p)^2$
    d) $(E/p)^{1/2}$

43. The radio isotope of silver has half-life of 20 minutes. The fraction of the original mass would remain after one hour is
    a) ½
    b) ¼
    c) 1/8
    d) 1/16

44. If the reverse bias voltage in a diode is increased, the width of the depletion region
    a) Fluctuates
    b) Decreases
    c) Increases
    d) No change

45. For rectifying alternating current the device used is
    a) Choke
    b) Transformer
    c) Diode
    d) Capacitor

46. Optical fibres rely for their operation on the phenomenon of
    a) Reflection
    b) Refraction
    c) Dispersion
    d) Total internal reflection

47. Energy required to take an electron from the ground state to the first excited state of hydrogen atom is
    a) 13.6 e v
    b) 10.2 e v
    c) -13.6 ev
    d) -10.2 ev

48. In the nuclear process ${}_6C^{11} \rightarrow {}_6B^{11} + e^{+} + X$, X stands for
    a) Neutron
    b) Neutrino
    c) Antineutrino
    d) Photon

49. Resistance of a conductor increases with the rise of temperature, because
    a) Relaxation time decreases
    b) Relaxation time increases
    c) Electron density decreases
    d) Electron density increases

50. A rays of light passes through an equilateral prism such that the angle of incidence is equal to the angle of emergence and the later is equal to $(3/4)^{th}$ the angle of the prism. The angle of deviation is
    a) 45^{o}
    b) 39^{o}
    c) 20^{o}
    d) 30^{o}

ALL INDIA INSTITUTE OF SPEECH AND HEARING: MYSORE – 570 006

ENTRANCE EXAMINATION – 2010

BASLP

TIME: 50 minutes Max. Marks: 50

CHEMISTRY

1. 1 amu = _____ g
   a. 1.6736×10^{-24} g
   b. 1.66056×10^{-24} g
   c. 6.022×10^{-23} g
   d. 1 g

2. What is the molecular formula of the compound, if empirical formula is CH_2Cl and molar mass is 98.96 g ?
   a. CH_2Cl
   b. $C_2H_4Cl_2$
   c. $C_3H_6Cl_3$
   d. C_6H_5Cl

3. The approximate radii of the nuclei of atoms lie in the range of
   a. $10^{-12} - 10^{-13}$
   b. $10^{-13} - 10^{-14}$
   c. $10^{-14} - 10^{-15}$
   d. $10^{-15} - 10^{-16}$

4. Which of the following orbital will have the zero probability of finding the electron in yz plane ?
   a. p_x
   b. p_y
   c. p_z
   d. d_{yz}

5. Considering the elements B, Al, Mg and K, the correct order of their metallic character is
   a. B > Al > Mg > K
   b. Al > Mg > B > K
   c. Mg > Al > K> B
   d. K>Mg>Al>B

6. The size of iso electronic species F^-, Ne and Na^+ is affected by
   a. Nuclear charge
   b. Valence principal quantum number (n)
   c. Electron – electron interactions in the outer orbitals
   d. None of the factors because their size is the same

7. NO is an example for
   a. Perfect octet
   b. Incomplete octet
   c. Odd electron molecule
   d. Expanded octet

8. The shape of $XeOF_4$ molecule is
   a. Square planar
   b. Trigonal bipyramidal
   c. Square pyramidal
   d. Octahedral

9. Type of intermolecular forces present among HCl molecules
   a. London forces
   b. Dipole – dipole forces
   c. Dipole – induced dipole forces
   d. Hydrogen bonding

10. At 1 atm pressure, boiling point is called _____
    And at 1 bar pressure, boiling point is called _____
   a. Normal boiling point, standard boiling point
   b. Standard boiling point, Normal boiling point
   c. Critical point, Triple point
   d. Triple point, Critical point

11. A reaction A + B → C + D + heat is found to have a positive entropy change. The reaction will be
   a. Possible at high temperature
   b. Possible at low temperature
   c. Not possible at any temperature
   d. Possible at any temperature

12. The enthalpies of all elements in their standard states are
   a. Unity
   b. zero
   c. < 0
   d. different for each element

13. If $Q_c < K_c$, then
    (Q_c = Reaction quotient, K_c = Equilibrium constant)
   a. process is at equilibrium
   b. net reaction goes from left to right
   c. net reaction goes from right to left
   d. None of the above

14. Correct sequence of hydrogen halides with respect to increasing acidic strength is

   a. HF < HCl < HBr < HI
   b. HF < HCl < HI< HBr
   c. HI< HBr <HCl < HF
   d. HI< HBr < HF<HCl

15. The products of electrolysis in case of aqueous solution of $AgNO_3$ with silver electrodes at anode and cathode are
   a. Ag, Ag^+
   b. NO_2, Ag
   c. Ag^+ , Ag
   d. Ag, H_2

16. The oxidation states of Cr in $Cr_2O_7^{2-}$ and S in H_2SO_4 are
   a. –6, -6
   b. +6, -6
   c. -6, +6
   d. +6, +6

17. Hydrogen economy means
   a. Measuring economy of a country in terms of hydrogen
   b. Saving hydrogen
   c. Transportation and storage of hydrogen
   d. none of the above

18. $LaH_{2.87}$ is an example for
    a. Saline hydride
    b. Molecular hydride
    c. Metallic hydride
    d. None of the above

19. Which one of the following alkali metal gives hydrated salts ?
    a. Li
    b. Na
    c. K
    d. Cs

20. Correct sequence of decreasing hydration enthalpies of group 2 metal ions
    a. $Ba^{2+} > Sr^{2+} > Ca^{2+} > Mg^{2+} > Be^{2+}$
    b. $Be^{2+} > Mg^{2+} > Ca^{2+} > Sr^{2+} > Ba^{2+}$
    c. $Mg^{2+} > Be^{2+} > Sr^{2+} > Ca^{2+} > Ba^{2+}$
    d. $Ca^{2+} > Sr^{2+} > Be^{2+} > Ba^{2+} > Mg^{2+}$

21. Hybridisation of B in B_2H_6 is
    a. sp
    b. sp^2
    c. sp^3
    d. dsp^2

22. IUPAC name of Neopentane is
    a. 2,2-Dimethylpropane
    b. 1,1-Dimethylpropane
    c. 2,3-Dimethylpropane
    d. 1,2-Dimethylpropane

23. The intermediate CH_2 is
    a. Carbocation
    b. Carbanion
    c. Freeradical
    d. Carbene

24. The isomer that does not belong to conformational isomerism is
    a. Skew
    b. Staggered
    c. anomer
    d. Eclipsed

25. The intermediate formed during nitration of benzene with concentrated H_2SO_4 and concentrated HNO_3 is
    a. NO_2^-
    b. NO_2^+
    c. $NO_2^{\cdot}$
    d. NO_2

26. The unit cell present in ABC ABC ..... Packing of atom is
    a. Hexagonal
    b. Tetragonal
    c. face centred cubic
    d. primitive cubic

27. Which of the following crystal defect decreases the density of the crystal ?
    a.Schottky defect
    b.Frenkel defect
    c. both of them
    d. none of all above

28. Which of the following does not change with temperature ?
    a.molarity
    b.molality
    c.percentage by volume
    d.none of the above

29. The osmotic pressure of 0.1 M NaCl solution at 27^0C ?
    a.4.0 atm
    b.2.46 atm
    c. 4.92 atm
    d. 1.23 atm

30. When a lead storage battery is charged
    a. sulphuric acid is consumed
    b. sulphuric acid is formed
    c. lead sulphate is formed
    d. lead is consumed

31. Given E^0 (Cu^{2+}/Cu) = 0.337 V and E^0 (Sn^{2+}/Sn) = - 0.136 V., which of the following statement is correct ?
    a. Cu^{2+} can be reduced by H_2 gas
    b. Cu can be oxidized by H^+
    c. Sn^{2+} can be reduced by H_2 gas
    d. Cu can reduce Sn^{2+}

32. A catalyst lowers activation energy of the forward reaction by 10 $kJmol^{-1}$. What effect does it have on the activation energy of the backward reaction ?
    a. increase by 10 $kJmol^{-1}$
    b. decrease by 10 $kJmol^{-1}$
    c. remains unaffected
    d. cannot be predicted

33. During the course of a chemical reaction the rate of a reaction
    a. remains constant throughout
    b. increases as the reaction proceeds
    c. decreases as the reaction proceeds
    d. first increases followed by a decrease

34. Which of the following method is used to purify the colloids ?
    a. dialysis
    b. peptisation
    c. mechanical dispersion
    d. oxidation

35. Which of the following colloidal system represents a gel ?
    a. solid in liquid
    b. solid in gas
    c. liquid in gas
    d. liquid in solid

36. Calamine is an ore of
    a. Al
    b. Zn
    c. Cu
    d. Fe

37. What is the role of depressants in frothfloatation method ?
    a. to enhance non wettability of the ore particles
    b. to stabilize the froth
    c. for both a and b
    d. to separate two sulphide ores

38. The reaction $CH_3COCl + H_2 \xrightarrow{(Pd/BaSO_4)} CH_3CHO + HCl$ is known as
    a. Clemmenson's reduction
    b. Wolff – kishner reduction
    c. Rosenmund's reduction
    d. Catalytic reduction

39. The solid Phosphorus pentachloride exists as
    a. PCl_5
    b. PCl_6^-
    c. $PCl_4^+ PCl_6^-$
    d. $PCl_4^+ Cl^-$

40. Orthophosphorous acid is a
    a. monobasic acid
    b. dibasic acid
    c. tribasic acid
    d. tetrabasic acid

41. The strongest Bronsted base is
    a. ClO^-
    b. ClO_2^-
    c. ClO_3^-
    d. ClO_4^-

42. The shape of XeO_3 is
    a. triangular planar
    b. tetrahedral
    c. pyramidal
    d. square planar

43. A chemical test to distinguish methanol and ethanol is
    a. Lucas test
    b. Esterification test
    c. Iodoform test
    d. Sodium metal test

44. The aqueous solution of Ferric chloride is
    a. acidic
    b. alkaline
    c. neutral
    d. acidic or alkaline depending upon temperature

45. The coordination number of Co in $[Co(ox)_3]Cl_3$ is
    a. 3
    b. 6
    c. 2
    d. 4

46. Which of the following detergent has germicidal properties ?
    a. anionic detergent
    b. cationic detergent
    c. nonionic detergent

47. The IUPAC name of $OHC - (CH_2)_4 - CHO$ is
    a. hexane-1,2-dial
    b. butane-1,4-dial
    c. butanedial
    d. hexanedial

48. Which of the following is isoprene ?
    a. $CH_2 = CH - CH = CH_2$
    b. $CH_2 = C(CH_3) - (CH_3)C = CH_2$
    c. $CH_2 = C(CH_3) - HC = CH_2$
    d. $CH_2 = C(Cl) - HC = CH_2$

49. The disease beri beri is caused by the deficiency of vitamin
    a. A
    b. B_1
    c. B_{12}
    d. K

50. Which of the following order is true regarding the basic nature of NH_2 group
    a. $CH_3NH_2 > (CH_3)_2NH > (CH_3)_3N$
    b. $CH_3NH_2 > (CH_3)_2NH < (CH_3)_3N$
    c. $CH_3NH_2 < (CH_3)_2NH > (CH_3)_3N$
    d. $CH_3NH_2 < (CH_3)_2NH < (CH_3)_3N$

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