

GENERAL KNOWLEDGE

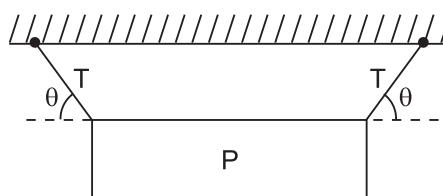
- Ions are produced in the atmosphere as a result of:
 - collision between fast neutrons and nitrogen nuclei present in the atmosphere
 - action of ultraviolet light from the sun on atmospheric oxygen
 - action of solar radiations particularly cosmic rays on carbon dioxide present in the atmosphere
 - lightning discharge in atmosphere
- The 2nd most spoken language in the world is
 - Chinese
 - English
 - Spanish
 - Arabic
- It is easier to roll a stone up a sloping road than to lift it vertical upwards because
 - work done in rolling is more than in lifting
 - work done in lifting the stone is equal to rolling it
 - work done in both is same but the rate of doing work is less in rolling
 - work done in rolling a stone is less than in lifting it
- Zero Kelvin in Kelvin scale is equal to _____ degree celsius scale.
 - 273.5°C
 - 273.5°C
 - 272.5°C
 - 275.3°C
- The absorption of ink by blotting paper involves
 - viscosity of ink
 - capillary action phenomenon
 - diffusion of ink through the blotting
 - siphon action
- The world's highest railway bridge will come up over which river?
 - Narmada
 - Godavari
 - Ganga
 - Chenab
- Siphon will fail to work if
 - the densities of the liquid in the two vessels are equal
 - the level of the liquid in the two vessels are at the same height
 - both its limbs are of unequal length
 - the temperature of the liquids in the two vessels are the same
- Large transformers when used for some time, become very hot and are cooled by circulating oil. The heating of the transformer is due to
 - the heating effect of current alone
 - hysteresis loss alone
 - both the heating effect of current and hysteresis loss
 - intense sunlight at noon
- How many years does it take tin to decompose?
 - 70 – 450 years
 - 3 – 4 years
 - 500 – 800 years
 - around 50 years
- Nuclear sizes are expressed in a unit named as:
 - fermi
 - angstrom
 - newton
 - tesla

SECTION B: PHYSICS & CHEMISTRY

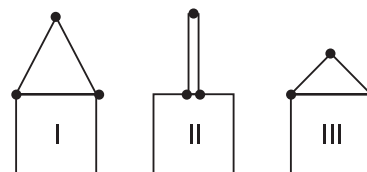
11. Among the following which is least acidic?
- (1) phenol
 - (2) o-cresol
 - (3) p-nitrophenol
 - (4) p-chlorophenol
12. An organic compound A (C_4H_9Cl) on reaction with Na/diethyl ether gives a hydrocarbon which on monochlorination gives only
- (1) iso-butyl chloride
 - (2) secondary butyl chloride
 - (3) t-butyl chloride
 - (4) n-butyl chloride
13. The artificial sweetener containing chlorine that has the appearance and taste as that of sugar and is stable at cooking temperature is
- (1) Aspartame
 - (2) Saccharin
 - (3) Sucralose
 - (4) Alitame
14. The oxidant which is used as an antiseptic is
- (1) $KBrO_3$
 - (2) $KMnO_4$
 - (3) CrO_3
 - (4) KNO_3
15. Which of the following statements for order of reaction is not correct?
- (1) Order can be determined experimentally
 - (2) Order of a reaction is equal to the sum of the power of concentration terms in differential rate law
 - (3) It is not affected with the stoichiometric coefficients of the reactants
 - (4) Order cannot be fractional
16. The dimensional formula for Reynold's number is
- (1) $[M^1L^{-1}T^{-1}]$
 - (2) $[M^0L^1T^{-1}]$
 - (3) $[M^1L^1T^{-1}]$
 - (4) $[M^1L^0T^{-1}]$
17. The period of oscillation of a simple pendulum is $T = 2\pi\sqrt{\frac{L}{g}}$. Measured value of L is 20.0 cm known to 1 mm accuracy and time for 100 oscillations of

the pendulum is found to be 90 s using a wrist watch of 1 s resolution. The accuracy in the determination of g is

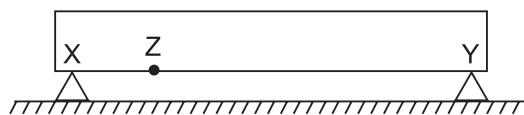
- (1) 2%
 - (2) 3%
 - (3) 1%
 - (4) 5%
18. A picture P of weight W is hung by two strings as shown. The magnitude of the tension force of each string is T. The total upward pull of the strings on the picture is:



- (1) $2W \cos \theta$
 - (2) $T \sin \theta$
 - (3) $T \cos \theta$
 - (4) $2T \sin \theta$
19. A picture can be hung on a wall with string in the three different ways as shown. The magnitude of the tension force of the string is:



- (1) least in I
 - (2) greatest in I
 - (3) greatest in II
 - (4) greatest in III
20. A uniform plank is supported by two equal 120-N forces at X and Y, as shown. The support at X is then moved to Z (half-way to the plank center). The supporting forces at Y and Z are then:



- (1) $F_Y = 240 \text{ N}, F_Z = 120 \text{ N}$
- (2) $F_Y = 200 \text{ N}, F_Z = 40 \text{ N}$
- (3) $F_Y = 40 \text{ N}, F_Z = 200 \text{ N}$
- (4) $F_Y = 80 \text{ N}, F_Z = 160 \text{ N}$

SECTION C: MATHEMATICS

- 21.** In 4th quadrant
- (1) $x < 0, y > 0$
 - (2) $x > 0, y < 0$
 - (3) $x > 0, y > 0$
 - (4) $x < 0, y < 0$
- 22.** If $A = [5, 6, 7]$ and $B = [7, 8, 9]$ then $A \cup B$ is equal to:
- (1) $[7, 8, 9]$
 - (2) $[5, 6, 7]$
 - (3) $[5, 6, 7, 8, 9]$
 - (4) $[5, 6, 7, 8]$
- 23.** A set has n elements then the number of elements in its power set is
- (1) 2^n
 - (2) $2n$
 - (3) $2n - 1$
 - (4) 2^{n-1}
- 24.** Polar form of $1 + i\sqrt{3}$ is
- (1) $2 (\cos 60^\circ + i \sin 60^\circ)$
 - (2) $2 (\cos 60^\circ - i \sin 60^\circ)$
 - (3) $2 (\cos 30^\circ + i \sin 30^\circ)$
 - (4) $\cos 60^\circ + i \sin 60^\circ$
- 25.** If $\sin x = \frac{1}{2}$, then solution in the interval $[0, 2\pi]$ is
- (1) $\left[\frac{\pi}{6}, \frac{5\pi}{6}\right]$
 - (2) $\left[\frac{\pi}{6}, \frac{7\pi}{6}\right]$
 - (3) $\left[\frac{\pi}{3}, \frac{4\pi}{3}\right]$
 - (4) $\left[\frac{\pi}{3}, \frac{2\pi}{3}\right]$
- 26.** A "Triangle" has:
- (1) 2 elements
 - (2) 3 elements
 - (3) 4 elements
 - (4) 6 elements
- 27.** $\frac{1}{2}, \frac{1}{7}, \frac{1}{12}, \dots$ is:
- (1) A.P
 - (2) G.P
 - (3) H.P
 - (4) Harmonic series
- 28.** The minimum distance between a point on the curve $y = e^x$ and a point on the curve $y = \log_e x$ is
- (1) $\frac{1}{\sqrt{2}}$
 - (2) $\sqrt{2}$
 - (3) $\sqrt{3}$
 - (4) $2\sqrt{2}$
- 29.** What is the value of k when $f(x) = kx^3 - 4x^2 - 3x + 5$ is divided by $x + 1$, the remainder is 3?
- (1) 1
 - (2) -1
 - (3) 2
 - (4) -2
- 30.** The radius of a circle in which the sphere $x^2 + y^2 + z^2 + 2x - 2y - 4z = 19$ is cut by the plane $x + 2y + 2z + 7 = 0$ is
- (1) 1
 - (2) 2
 - (3) 3
 - (4) 4
- 31.** The value of $\lim_{n \rightarrow \infty} \frac{1 + 2^4 + 3^4 + \dots + n^4}{n^5}$ is
- (1) zero
 - (2) $\frac{1}{4}$
 - (3) $\frac{1}{5}$
 - (4) $\frac{1}{30}$

32. One card is drawn from a well shuffled pack of 52 cards. If each outcomes is equally likely, what is the probability that the card will be a red card?

- (1) $\frac{2}{3}$ (2) $\frac{1}{3}$
 (3) $\frac{1}{4}$ (4) $\frac{1}{2}$

33. Five marbles are drawn from a bag which contains 6 blue marbles and 7 green marbles. Then, the probability that 3 will be blue and 2 will be green is

- (1) $\frac{213}{429}$
 (2) $\frac{140}{429}$
 (3) $\frac{117}{429}$
 (4) $\frac{162}{429}$

34. Calculate the mean deviation from the median of the following data:

Class	Frequency
10-20	4
20-30	6
30-40	10
40-50	20
50-60	10
60-70	6
70-80	4

- (1) 11.33 (2) 12.33
 (3) 14.28 (4) 128.2

35. Differentiate $\frac{1 + \tan x}{1 - \tan x}$ with respect to x .

- (1) $\frac{2 \tan^2 x}{1 - \sec^2 x}$
 (2) $1 - \operatorname{cosec}^2 x$
 (3) $\frac{1 - \cos^2 x}{2 \tan^2 x}$
 (4) $\frac{2 \sec^2 x}{(1 - \tan x)^2}$

36. In a ΔABC , if $a = 3$, $b = 5$ and $c = 7$, find $\cos A$, $\cos B$ and $\cos C$.

- (1) $4, \frac{1}{9}, -\frac{1}{2}$
 (2) $\frac{13}{14}, \frac{-1}{2}, \frac{11}{13}$
 (3) $\frac{13}{14}, \frac{11}{14}, \frac{-1}{2}$
 (4) $\frac{-1}{2}, \frac{11}{14}, \frac{13}{14}$

37. $\sqrt{3} \operatorname{cosec} 20^\circ - \sec 20^\circ$ is equal to

- (1) -3 (2) 2
 (3) 4 (4) 6

38. Find x and y , if $(x + 3, 5) = (6, 2x + y)$

- (1) $x = 3, y = 1$
 (2) $x = 3, y = -1$
 (3) $x = -3, y = 1$
 (4) $x = 2, y = -5$

39. If $a < b$ then,

- (1) $a < b$
 (2) $\frac{1}{a} < \frac{1}{b}$
 (3) $\frac{1}{a} > \frac{1}{b}$
 (4) $a - b > 0$

40. If adjoint of $A = \begin{bmatrix} -1 & -2 \\ 3 & 4 \end{bmatrix}$, then matrix A is

- (1) $\begin{bmatrix} -1 & -2 \\ 4 & 3 \end{bmatrix}$
 (2) $\begin{bmatrix} 4 & 2 \\ 3 & -1 \end{bmatrix}$
 (3) $\begin{bmatrix} -4 & 3 \\ -2 & 1 \end{bmatrix}$
 (4) $\begin{bmatrix} 4 & 2 \\ -3 & -1 \end{bmatrix}$

SECTION C : BIOLOGY

21. Women who consumed the drug thalidomide for relief from vomiting during early months of pregnancy gave birth to child with
- (1) No spleen
 - (2) Underdeveloped limbs
 - (3) Extra fingers and toes
 - (4) hare lip
22. Which one of the following is a matching pair of a drug and its category?
- (1) Heroin-psychoactive
 - (2) Lysergic acid dimethylamide - narcotic
 - (3) Amphetamine-stimulant
 - (4) Benzodiazepam-pain killer
23. In alcoholic liver gets damaged as it
- (1) Accumulates excess of fats
 - (2) Stores excess of glycogen
 - (3) Secretes more bile
 - (4) Has to detoxify alcohol
24. Interferons are
- (1) Anti viral protein
 - (2) Anti bacterial protein
 - (3) Complex protein
 - (4) Anti clotting protein
25. Botanical gardens and zoological parks have
- (1) Collection of endemic and exotic living species.
 - (2) Collection of exotic living species only.
 - (3) Collection of endemic living species only.
 - (4) Collection of only local plants and animals.
26. G-Protein is
- (1) Tetrameric
 - (2) Bimeric
 - (3) Unimeric
 - (4) Trimeric
27. A conjoint and open vascular bundle will be observed in the transverse section of
- (1) Monocot root
 - (2) Monocot stem
 - (3) Dicot stem
 - (4) Dicot root
28. Archaeopteryx is a missing link between
- (1) Birds and mammals
 - (2) Reptiles and birds
 - (3) Amphibians and reptiles
 - (4) Mammals and insects
29. Which of the following is linked to evolution?
- (1) variations
 - (2) competition
 - (3) extinction
 - (4) reproduction
30. The modern man differs from the apes in
- (1) Protruding eyes
 - (2) Sparse body hair
 - (3) Arms shorter than legs
 - (4) Wearing of cloths
31. Wings of birds and butterflies are
- (1) Homologous organs
 - (2) Vestigial organs
 - (3) Analogous organs
 - (4) Intestine organs
32. Which of the following is not a vestigial part in human?
- (1) Coccyx
 - (2) Third molar of each side in each jaw.
 - (3) Segmental muscles of abdomen
 - (4) Finger nails
33. The basic difference between B and T cell is
- (1) They are found at different places in the lymphoid pool
 - (2) The maturation and storage is different
 - (3) Their origins is different
 - (4) They do not show any difference

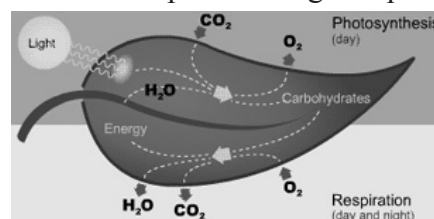
34. A pure line is a
- (1) population of homozygous plants raised from homozygous plants
 - (2) group of individuals which are morphologically similar
 - (3) population of plants and animals which are with pure blood
 - (4) haploid individual
35. The resemblance of individuals to their progenitors is called
- (1) taxonomy
 - (2) genetics
 - (3) evolution
 - (4) heredity
36. Dwarf plants of F₂ population of monohybrid cross
- (1) segregate into 3 tall and 1 dwarf
 - (2) breed true for tallness
 - (3) breed true for dwarfness
 - (4) show incomplete dominance
37. During a cross between yellow round (YYRR) and green wrinkled (yyrr), which of the following statement is true?
- (a) A gamete which receives 'Y' for colour may receive 'R' or 'r' for shape.
 - (b) A gamete which receives 'Y' for colour will receive only 'R' for shape.

- (c) A gamete which receives 'y' for colour may receive 'R' or 'r' for shape.
 - (d) A gamete which receives 'y' for colour will receive only 'r' for shape.
- (1) (a), (b), (c) and (d) are true
 - (2) (a), (b) are true
 - (3) (a) and (c) are true
 - (4) only (d) is true

38. _____ traits lead to evolution.
- (1) Evolutionary
 - (2) Inherited
 - (3) Acquired
 - (4) Heredity

39. The first person to discover vitamins was
- (1) Jenner
 - (2) Calvin
 - (3) Funk
 - (4) Mellanby

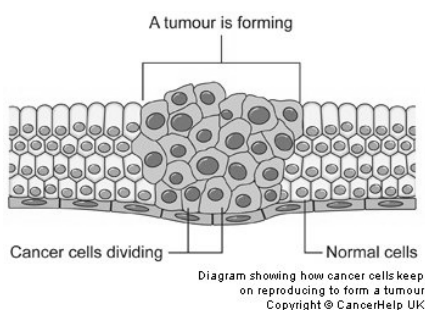
40. The process of respiration in green plants occurs



- (1) only when stomata are open
- (2) only when photosynthesis ceases
- (3) only when photosynthesis is in progress
- (4) At all times

INTERACTIVE SECTION

41. Cancer of β lymphocytes is called
- (1) Sarcoma
 - (2) Melanoma
 - (3) Myeloma
 - (4) Carcinoma
42. The basic difference between a cancer cell and a normal cell is

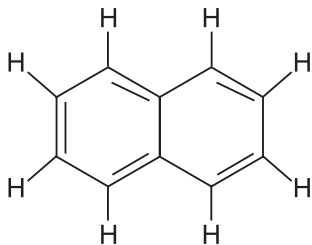


- (1) cancer cells divide continuously but normal cells do not divide
- (2) normal cell is bigger than cancer cells
- (3) normal cells are immortal but cancer cells are mortal
- (4) cancer cells divide do not differentiate like normal cells

43. Which of the following chemical equation is incorrectly balanced?

- (1) $\text{Sb}_2\text{S}_3 + 12\text{HCl} \rightarrow 2\text{H}_3\text{SbCl}_6 + 3\text{H}_2\text{S}$
- (2) $3\text{IBr} + 4\text{NH}_3 \rightarrow \text{NI}_3 + 3\text{NH}_4\text{Br}$
- (3) $2\text{KrF}_2 + 2\text{H}_2\text{O} \rightarrow 2\text{Kr} + 2\text{O}_2 + 4\text{HF}$
- (4) $\text{PCl}_3 + 3\text{H}_2\text{O} \rightarrow \text{H}_3\text{PO}_3 + 3\text{HCl}$

44. Number of π bonds and σ bonds in the following structure is

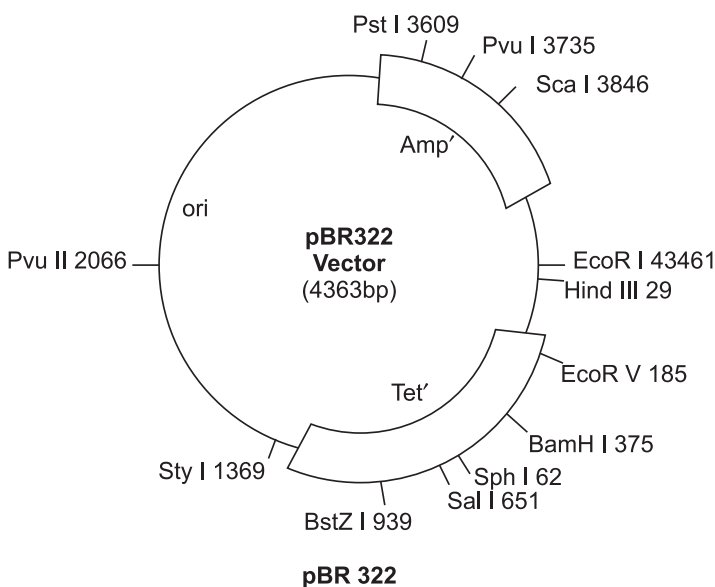


- (1) 6, 19
- (2) 4, 20
- (3) 5, 19
- (4) 5, 20

45. Extra chromosomal, double stranded, circular DNA molecule present in bacteria which is widely used as vector is called

- (1) phagemid
- (2) cosmid
- (3) plasmid
- (4) bacterial vectors

46. In pBR 322, pBR stands for



- (1) plasmid bacterial recombination
- (2) plasmid bacterial replication
- (3) plasmid Bolivar and Rodriguez
- (4) plasmid Baltimore and Rodriguez

47. Phage M13 vectors are widely used for

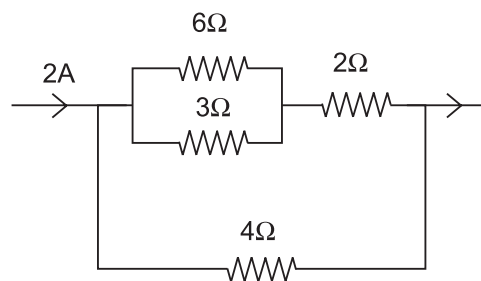
- (1) obtaining single stranded copies of cloned DNA suitable for DNA sequencing

- (2) obtaining double stranded copies of cloned DNA suitable for DNA sequencing
- (3) obtaining fragments of cloned DNA suitable for DNA sequencing
- (4) obtaining double stranded and fragment copies of DNA.

48. The electronic configuration of the outermost shell of the most electronegative element is

- (1) $2s^2 2p^5$
- (2) $3s^2 3p^5$
- (3) $4s^2 4p^5$
- (4) $5s^2 5p^5$

49. In the circuit shown in figure the potential difference across 3Ω is



- (1) 2V
- (2) 4V
- (3) 8V
- (4) 16V

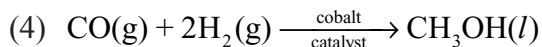
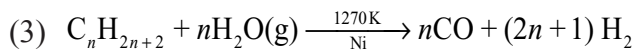
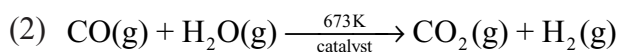
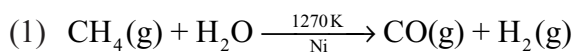
50. A soap bubble (surface tension $30 \times 10^{-3} \text{ N/m}$) has radius 2 cm. The workdone in bobbling the radius is

- (1) zero
- (2) $1.1355 \times 10^{-4} \text{ J}$
- (3) $2.261 \times 10^{-4} \text{ J}$
- (4) $4.532 \times 10^{-4} \text{ J}$

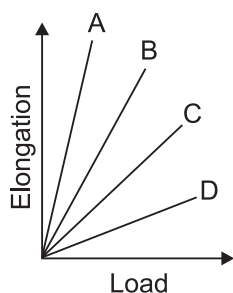
51. Total energy of a particle executing S.H.M. is proportional to

- (1) Square of the amplitude of the motion
- (2) Frequency of oscillation
- (3) Velocity in equilibrium position
- (4) Displacement from equilibrium position

52. Which of the following reactions is an example of use of water gas in the synthesis of other compounds?



53. Which of the following is correct statement from the given graph plotted for four wires of same material and same thickness?



- (1) A has largest length
- (2) D has largest length
- (3) C has largest length
- (4) B has largest length

54. If g is the acceleration due to gravity of the earth's surface, the gain in the potential energy of an object of mass m raised from the surface of the earth to a height equal to the radius R of the earth is

- (1) $\frac{1}{2} mgR$
- (2) $2mgR$
- (3) mgR
- (4) $\frac{1}{4} mgR$

55. Which of the following oxides is acidic in nature?

- (1) B_2O_3
- (2) Al_2O_3
- (3) Ga_2O_3
- (4) In_2O_3

56. The de-Broglie wavelength of an electron accelerated to a potential 400 V is approximately

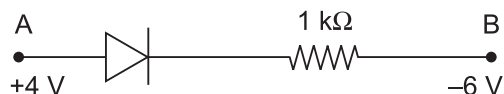
- (1) 0.03 nm
- (2) 0.04 nm
- (3) 0.12 nm
- (4) 0.06 nm

57. Arrange the following electromagnetic radiations per quantum in the order of increasing energy:

- (A) Blue light
- (B) Yellow light
- (C) X-ray
- (D) Radio wave

- (1) (A), (B), (C), (D)
- (2) (C), (A), (B), (D)
- (3) (B), (A), (D), (C)
- (4) (D), (B), (A), (C)

58. Consider the junction diode as ideal. The value of current flowing through AB is



- (1) 10^{-1} A
- (2) 10^{-3} A
- (3) 0 A
- (4) 10^{-2} A

59. Which of the following statement is correct?

- (1) Fullerenes have dangling bonds
- (2) Fullerenes are not cage like molecules
- (3) Graphite is thermodynamically most stable allotrope of carbon
- (4) Graphite is slippery and hard and therefore used as a dry lubricant in machines

60. In semiconductors at a room temperature

- (1) The valence band is completely filled and the conduction band is partially filled
- (2) The valence band is completely filled
- (3) The conduction band is completely empty
- (4) The valence band is partially empty and the conduction band is partially filled



END OF THE EXAM