PHYSICS

1. Photon is quantum of radiation with energy E = hν where ν is frequency and h is planck constant. The dimension of h are same as that of:

   i. Angular momentum

   ii. Linear momentum

   iii. Linear impulse

   iv. Angular impulse

   (1) i, iii (2) ii, iii

   (3) i, iv (4) i, ii, iv

2. The dimensions of gravitational constant G are:

   (1) MLT^{-1} (2) ML^3T^{-2}

   (3) $M^{-1}L^3T^{-2}$ (4) $M^{-1}LT^{-2}$

3. In $F = A\nu + bt + \frac{cx}{D + At}$, where F = force, ν = speed, t = time, x = position, the dimensions of c will be:

   (1) $[M^2L^{-2}T^\circ]$ (2) $[M^1L^{-1}T^\circ]$

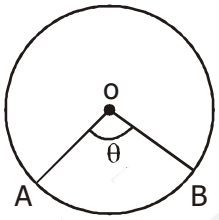
   (3) $[M^2L^0T^{-2}]$ (4) $[M^1L^0T^{-2}]$

4. A physical quantity A is related to four observables a, b, c and d as follows $A = \frac{a^2b^3}{c\sqrt{d}}$. The percentage errors of measurement in a, b, c and d are 1%, 3%, 2% and 2% respectively. What is the percentage error in the quantity A?

   (1) 12% (2) 7%

   (3) 5% (4) 14%

5. A particle is moving an a circular path with a constant speed 'υ'. Its change of velocity as it moves from A to B is:



   (1) $2\upsilon \sin\theta$ (2) $\upsilon \sin\theta/2$

   (3) $\upsilon \cos\theta$ (4) $2\upsilon \sin\theta/2$

6. If momentum of a particle is increased by 100%. Then percentage increase in kinetic energy of the particle is:

   (1) 400% (2) 300%

   (3) 100% (4) 200%

7. A physical quantity A is dependent on four Physical quantities p, q, r & s as given by $A = \frac{\sqrt{pq}}{r^2s^3}$. The error of measurement in p, q, r & s are 1%, 3%, 0.5% and 0.33% respectively, then the maximum percentage error in A is–

   (1) 2% (2) 0%

   (3) 4% (4) 3%

8. If the vectors $\vec{P} = a\hat{i} + a\hat{j} + 3\hat{k}$ and $\vec{Q} = a\hat{i} - 2\hat{j} - \hat{k}$ are perpendicular to each other then the positive value of a is:

   (1) Zero (2) 1

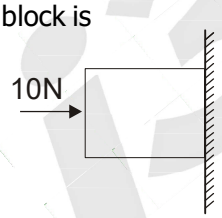
   (3) 2 (4) 4

Rough Work

9. Given that $y = A\sin\left[\left(\frac{2\pi}{\lambda}(ct - x)\right)\right]$, where y and x are measured in metres. Which of the following statments is true?
   (1) The unit of λ is same as that of x and A
   (2) The unit of λ is same as that of x but not of A
   (3) The unit of c is same as that of $\frac{2\pi}{\lambda}$
   (4) The unit of (ct –x) is same as that of $\frac{2\pi}{\lambda}$

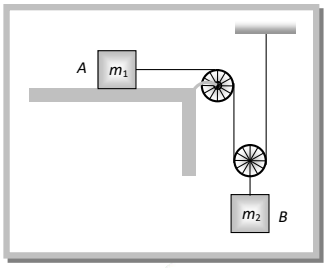
10. The physical quantity having the dimensions $[M^{-1}L^{-3}T^{3}A^{2}]$ is–
   (1) Resistance
   (2) Resistivity
   (3) Electrical conductivity
   (4) Electromotive force

11. A horizontal force of 10 N is necessary to just hold a block stationary against a wall. The coefficient of friction between the block and the wall is 0.2. The weight of the block is



   (1) 2 N (2) 20 N
   (3) 50 N (4) 100 N

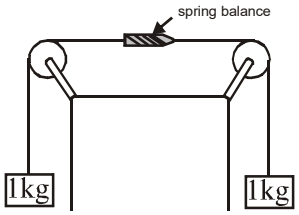
12. The acceleration of block *B* in the figure will be



   (1) $\frac{m_2 g}{(4m_1 + m_2)}$ (2) $\frac{2m_2 g}{(4m_1 + m_2)}$
   (3) $\frac{2m_1 g}{(m_1 + 4m_2)}$ (4) $\frac{2m_1 g}{(m_1 + m_2)}$

13. A man weighing 80 *kg* is standing in a trolley weighing 320 *kg*. The trolley is resting on frictionless horizontal rails. If the man starts walking on the trolley with a speed of 1 *m/s*, then after 4 *sec* his displacement relative to the ground will be
   (1) 5 *m* (2) 4.8 *m*
   (3) 3.2 *m* (4) None of these

14. In the given figure, what is the reading of the spring balance?



   (1) 10N (2) 20N
   (3) 5N (4) Zero

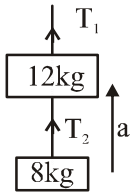
Rough Work

15. A car is moving along a straight road with speed v_0. If the coefficient of friction between tyres and the road is μ. The shortest distance in which the car can be stopped is:

(1) $\frac{v_0^2}{2\mu g}$ (2) $\frac{v_0^2}{\mu g}$

(3) $\left(\frac{v_0}{\mu g}\right)^2$ (4) $\frac{2v_0^2}{\mu g}$

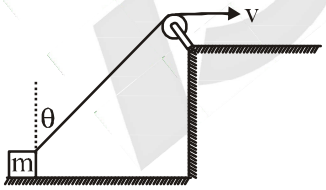
16. A body of mass 8 kg is hanging from another body of mass 12kg. The combination is being pulled by a string with an acceleration of 2.2 ms^{-2}. The tension T_1 and T_2 will be respectively: (use g = 9.8 m/s^{-2})–



(1) 200N, 80N (2) 200N, 90N

(3) 240N, 96N (4) 260N, 96N

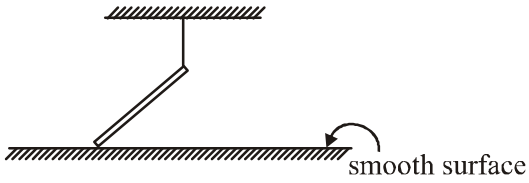
17. A block is dragged on smooth plane with the help of a rope which moves with velocity v. The horizontal velocity of the block is–

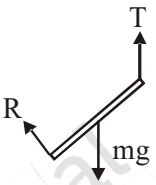


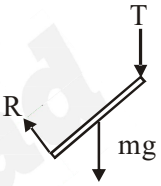
(1) v (2) $\frac{v}{\sin\theta}$

(3) v sin θ (4) $\frac{v}{\cos\theta}$

18. Which figure represents the correct F.B.D. of rod of mass m as shown in figure:



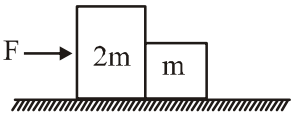
(1) 

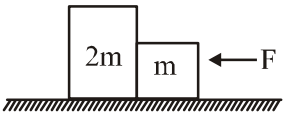
(2) 

(3) 

(4) None of these

19. Two blocks are in contact on a frictionless table. One has mass m and the other 2m. A force F is applied on 2m as shown in the figure. Now the same force F is applied from the right on m. In the two cases respectively, the ratio of force of contact between the two blocks will be–



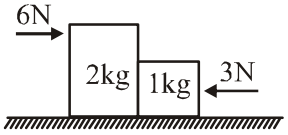


(1) Same (2) 1 : 2

(3) 2 : 1 (4) 1 : 3

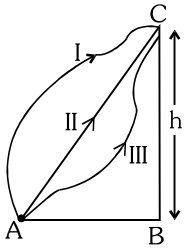
Rough Work

20. Two forces of 6N and 3N are acting on the two blocks of 2kg and 1kg kept on frictionless floor. What is the force exerted on 2kg block by 1kg block–



(1) 1N (2) 2N
(3) 4N (4) 5N

21. As shown in the diagram a particle is to be carried from point A to C via paths (I), (II) and (III) in gravitational field, then which of the following statements is correct :–



(1) Work done is same for all the paths
(2) Work done is minimum for path (II)
(3) Work done is maximum for path (I)
(4) None of the above;

22. A sphere of mass m moving with a constant velocity collides with another stationary sphere of same mass. The ratio of velocities of two spheres after collision will be, if the co-efficient of restitution is e-

(1) $\frac{1-e}{1+e}$ (2) $\frac{e-1}{e+1}$

(3) $\frac{1+e}{1-e}$ (4) $\frac{e+1}{e-1}$

23. If the momentum of a body is incresed n times, its kinetic energy increases.

(1) n times (2) 2n times
(3) $\sqrt{n}$ times (4) n^2 times

24. A force $\vec{F} = (3x^2+2x-7)$ N acts on a 2 kg body as a result of which the body gets displaced from x=0 to x=5m. The work done by the force will be –

(1) 35 Joule (2) 70 Joule
(3) 115 Joule (4) 270 Joule

25. A body is dropped from a height h. When loss in its potential energy is U then its velocity is v. The mass of the body is –

(1) $\frac{U^2}{2v}$ (2) $\frac{2v}{U}$

(3) $\frac{2v}{U^2}$ (4) $\frac{2U}{v^2}$

26. The relation between time and displacement of a particle moving under the influence of a force F is $t = \sqrt{x} + 3$ where x is in meter and t in second. The displacement of the particle when its velocity is zero will be –

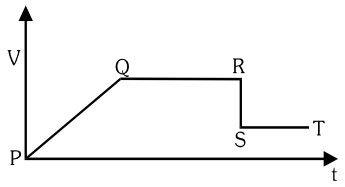
(1) 1m (2) 0 m
(3) 3 m (4) 2m

27. A particle moves in a potential region given by $U = 8x^2 - 4x + 400$ J. Its state of equilibrium will be –

(1) x = 25 m (2) x = 0·25 m
(3) x = 0·025 m (4) x = 2·5 m

Rough Work

28. V–t graph is obtained as shown in the figure. The work done by the force is represented by the path–



(1) PQ (2) QR

(3) RS (4) ST

29. A force $F = Kx^2$ acts on a particle at an angle of 60° with the x–axis. the work done in displacing the particle from x_1 to x_2 will be –

(1) $\frac{kx^2}{2}$ (2) $\frac{k}{2}\left(x_2^2 - x_1^2\right)$

(3) $\frac{k}{6}\left(x_2^3 - x_1^3\right)$ (4) $\frac{k}{3}\left(x_2^3 - x_1^3\right)$

30. A ball after falling from a height of 10m strikes the roof of a lift which is descending down with a velocity of 1 m/s. The recoil velocity of the ball will be (e = 1) –

(1) 8 m/s (2) 11 m/s

(3) 12 m/s (4) 15 m/s

Chemistry

31. In H–atom, electron transits from 6th orbit to 2nd orbit in multi step. Then total spectral lines (without Balmer series) will be :–

(1) 6 (2) 10

(3) 4 (4) 0

32. Which transition emits photon of maximum frequency

(1) 2nd spectral line of Balmer series

(2) 2nd spectral line of Paschen series

(3) 5th spectral line of Humphery series

(4) Ist spectral line of Lymen series

33. Which one of the following species will give a series of spectral lines similar to that of Mg^{2+} :-

(1) Al^{3+} (2) Na

(3) Mg^{+} (4) F

34. An atom has x energy level, then total number of lines in its spectrum are:-

(1) 1 + 2 + 3 .....(x + 1)

(2) 1 + 2 + 3 ..... (x^2)

(3) 1 + 2 + 3 ..... (x - 1)

(4) (x + 1) (x + 2) (x + 4)

35. The ratio of minimum wavelengths of Lyman & Balmer series will be :–

(1) 1.25 (2) 0.25

(3) 5 (4) 10

Rough Work

36. The transition of electron in H–atom that will emit maximum energy is :–

(1) $n_3 \rightarrow n_2$ (2) $n_4 \rightarrow n_3$

(3) $n_5 \rightarrow n_4$ (4) All have same energy

37. Given that in the H– atom the transition energy for n = 1 to n = 2, Rydberg states is 10.2eV. The energy for the same transition in Be^{3+} is :-

(1) 20.4 eV (2) 163.2 eV

(3) 30.6 eV (4) 40.8 eV

38. The wavelength of photon obtained by electron transition between two levels in H– atom and singly ionised He are λ_1 and λ_2 respectively, then :-

(1) $\lambda_2 = \lambda_1$ (2) $\lambda_2 = 2\lambda_1$

(3) $\lambda_2 = \lambda_1/2$ (4) $\lambda_2 = \lambda_1/4$

Assertion & Reason Type Question

Read the assertion and reason carefully to mark the correct option out of the options given below:

(1) If both assertion and reason are true and the reason is the correct explanation of the assertion.

(2) If both assertion and reason are true but reason is not the correct explanation of the assertion.

(3) If assertion is true but reason is false.

(4) If assertion is false but reason is true.

39. ***Assertion*** : Ionic compounds do not exhibit stereo isomerism

Reason : Ionic bonds are non directional

40. ***Assertion*** : LiCl exhibits covalent character.

Reason : Lithium is lightest metal.

41. ***Assertion*** : CO_2 molecule is non–polar while SO_2 is polar.

Reason : Carbon atom is smaller than sulpher.

42. ***Assertion*** : CH_3OH is soluble in water

Reason : CH_3OH is ionic in nature

43. ***Assertion*** : LiI is more soluble in water than LiF.

Reason : LiI has more ionic character.

44. ***Assertion*** : Ionic compounds tend to be non–volalite.

Reason : Inter ionic forces in these compounds are strong.

45. Oxidation number of Os in OsO_4 :

(1) + 2 (2) + 4

(3) + 8 (4) + 10

46. The oxidation state of chromium in potassium dichromate is :

(1) +4 (2) –4

(3) +6 (4) –6

47. Oxidation state of Cl in $CaOCl_2$ is/are

(1) 0 (2) + 1

(3) – 1 (4) + 1, – 1

48. Normality of 0.3 M H_3PO_4 solution is :

(1) 0.3 N (2) 0.4 N

(3) 0.6 N (4) 0.9 N

49. For neutralisation of one mol of NaOH the mass of 70% H_2SO_4 required is :

(1) 48 g (2) 70 g

(3) 49 g (4) 35 g

50. The normality of mixture obtained by mixing 100 mL of 0.2 M H_2SO_4 and 200 mL of 0.2 M HCl is :

(1) 0.0267 (2) 0.2670

(3) 1.0267 (4) 1.1670

51. The normality of solution obtained by mixing 10 mL

Rough Work

of N/5 HCl and 30 mL of N/10 HCl is :

(1) $\frac{N}{15}$ (2) $\frac{N}{5}$

(3) $\frac{N}{7.5}$ (4) $\frac{N}{8}$

52. When 8.3 g copper sulphate reacts with excess of potassium iodide then the amount of iodine liberated is :

(1) 42.3 g (2) 24.3 g

(3) 4.23 g (4) 2.43 g

53. 3.92 g of ferrous ammonium sulphate are dissolved in 100 ml water 20 ml of this solution requires 18 ml of potassium permanganate during titration for complete oxidation. The weight of $KMnO_4$ present in one litre of the solution is

(1) 34.76 g (2) 12.38 g

(3) 1.238 g (4) 3.476 g

54. Equivalent weight of chlorine molecule in the equation is :

$3\ Cl_2 + 6\ NaOH \longrightarrow 5\ NaCl + NaClO_3 + 3\ H_2O$

(1) 42.6 (2) 35.5

(3) 59.1 (4) 71

55. The correct order of radii is :

(1) N < Be < B (2) $Mg^{2+} < Li^{+} < N^{3-}$

(3) Na < Li < K (4) $Fe^{+3} < Fe^{2+} < Fe^{4+}$

56. Minimum first ionisation energy is shown by which electronic configuration :

(1) $1s^2, 2s^2, 2p^5$ (2) $1s^2, 2s^2, 2p^6, 3s^2, 3p^2$

(3) $1s^2, 2s^2, 2p^6, 3s^1$ (4) $1s^2, 2s^2, 2p^6$

57. Which of the following statements is wrong ?

(1) Metals are more than non-metals

(2) There are only few metalloids

(3) Hydrogen can be placed with alkali metals as well as with halogen in periodic table

(4) Non metals are more than metals

58. Among the following elements (whose electronic configuration is give below) the one having the highest ionisation energy is :

(1) [Ne] $3s^2\ 3p^3$ (2) [Ne] $3s^2\ 3p^4$

(3) [Ne] $3s^2\ 3p^5$ (4) [Ne] $3s^2$

59. The IP_1, IP_2, IP_3, IP_4 and IP_5 of an element are 7.1, 14.3, 34.5, 46.8, 162.2 eV respectively. The element is likely to be

(1) Na (2) Si

(3) F (4) Ca

60. Which electronic configuration of an element has abnormally high difference between second and third ionization energy ?

(1) $1s^2,2s^2,2p^6,3s^1$ (2) $1s^2,2s^22p^6,3s^23p^1$

(3) $1s^2,2s^22p^6,3s^23p^2$ (4) $1s^2,2s^22p^6,3s^2$

BIOLOGY

61. In which organisms reproduction is not synonymous with growth -

(1) Bacteria (2) Protozoa

(3) Protista (4) Filamentous algae

62. Which of the following is a defining characteristic of living organisms?

(1) Growth

(2) Ability to make sound

(3) Reproduction

(4) Response to external stimuli

Rough Work

63. Which is the defining distinctive characteristic of organism without exceptions :
(1) Growth (2) Reproduction
(3) Metabolism (4) All these

64. Which among the following has less characters in common in comparison to other?
(1) order (2) Family
(3) Genus (4) Species

65. Correctly matched the List-I with List-II

List-I	List-II
(A) Housefly	(i) Triticum aestivum
(B) Man	(ii) Musca domestica
(C) Wheat	(iii) Mangifera indica
(D) Mango	(iv) Homo sapiens

(1) A – i, B–iv, C – iii, D – ii
(2) A – ii, B–iv, C – i, D – iii
(3) A – ii, B–iv, C – iii, D – i
(4) A – iii, B–iv, C – ii, D – i

66. Taxonomists have developed a variety of taxonomic aids to facilitate .... organism -
(1) Nomenclature
(2) Nomenclature & identification
(3) Identification, Nomenclature & Classification
(4) Nomenclature & Classification

67. Which of the following is a correct taxonomic hierarchy ascedingly :
(1) Kingdom–Phylum–Class–Order – Genus – Species
(2) Kingdom – Class – Phylum – Order – Species
(3) Phylum – Class – Genus – Species – Order
(4) Species–Genus–Order– Class – Phylum – Kingdom

68. Archebacteria differ from eubacteria in of the following respect :
(1) Their cell wall lack peptidoglycan compound
(2) They inhabit extreme environment
(3) 16 s rRNA
(4) All of these

69. Find out the wrong match -
(1) Cholera → Vibrio cholerae
(2) Typhoid → Salmonella typhi
(3) Tetanus → Salmonella typhimeurium
(4) Citrus cauker→ Xanthomonas citri

70. Which of the following shows the presence of chlorophyll 'a' only :
(1) Green algae (2) Red algae
(3) Blue-green algae (4) All of these

71. Mycoplasma have no cell wall, vacuole but we can't place mycoplasma under animal kingdome. Why?
(1) Gene is present
(2) 70's ribosome is present
(3) Osmatic nutritional system is present
(4) It is episome

72. Select incorrect statements :
(1) W.M. Stanley showed that viruses could be crystallized
(2) In addition to protein coat viruses also contain genetic material that could be either RNA or DNA
(3) Virus contains either RNA or DNA
(4) The small subunits of capsid are called

Rough Work

peplomers

73. The heterotrophic members of protista are :
(1) Diatoms and slime mould
(2) Dianoflagellates and Euglinoids
(3) Diatoms and Ciliates
(4) Slime mold and Ciliates

74. Fruiting bodies are present in :
(1) Dinoflagellates (2) Euglenoids
(3) Chrysophytes (4) Slime moulds

75. Which is function of hydrocolloids–
(1) Water loss by transpiration
(2) Water holding
(3) Maximum respiration (4) Peat formation

76. Which is the wrong statement for agar-agar
(1) It is obtain from red algae
(2) It is used in medium during micropropagation
(3) It obtain from mostly fresh water algae
(4) It is used to make ice-cream

77. From the given how many functions are related to plasma membrane :
A. Formation of intercellular junctions
B. Secretion
C. Endocytosis
D. Protein synthesis
E. Pigments synthesis
F. Help in cell division
Correct option is :
(1) 3 (2) 4
(3) 5 (4) 6

78. Lipid component of the membrane is mainly consist of
(1) Phosphoglycerides (2) Cholesterol
(3) Amino acids (4) Sialic acid

79. Stroma of the chloroplast have enzymes for synthesis of
(1) Carbohydrates
(2) Proteins
(3) Vitamins
(4) Both carbohydrates and proteins

80. Which of the following features is common to prokaryotes and many eukaryotes ?
(1) Chromosomes present
(2) Cell wall present
(3) Nuclear membrane present
(4) Sub cellular organelles present

81. Which of the following is wrong statement :
(1) Membrane of human erythrocyte has about 52% lipid and 40% protein.
(2) Lipid component of membrane mainly consist of phosphoglycerides.
(3) Schwann (a British Zoologist) proposed that presence of cell wall is a unique character of plant cells.
(4) Anything less than a complete structure of a cell does not ensure independent living.

82. Which of the following are the major functional part found in chromosomes ?
(1) Proteins, DNA and RNA
(2) Proteins and DNA
(3) Proteins, lipids and DNA
(4) Protein, lipids and carbohydrates

Rough Work

83. Which of the following statements was not explained in the cell theory given jointly by Schleiden and Schwann :
(1) All living organisms are composed of cells and products of cells
(2) Cell is the structural and functional unit of living organisms
(3) Explanation of formation of new cells
(4) None

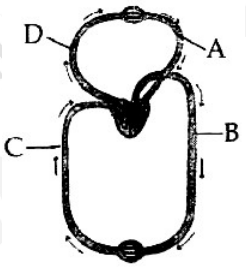
84. Arrange the following cells in an ascending order of their sizes :

I. Mycoplasma	II. Ostrich egg
III. Human RBC	IV. Bacteria
(1) I, II, III, IV	(2) I, IV, III, II
(3) II, IV, I, III	(4) IV, III, II, I

85. All of the following statements are correct about plasmids except :
(1) They are extrachromosomal DNA
(2) They are smaller, circular, double stranded naked DNA that confer certain unique phenotypic characters to some bacteria like resistance to antibiotics
(3) They are used in genetic engineering
(4) It helps in the replication of nucleoid

86. Common cold differs from pneumonia in, that:
(1) Pneumonia is caused by a virus while common cold is caused by bacterium Hemophilus influenzoe
(2) Pneumonia pathogen infects alveoli where as the common cold affects nose and respiratory passage but not the lungs.
(3) Pneumonia is a communicable disease whereas the common cold is a nutritional deficiency disease
(4) Pneumonia can be prevented by a live attenuated bacterial vaccine whereas the common cold has no effective vaccine

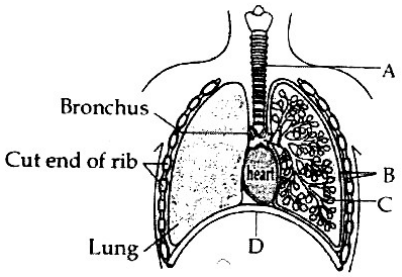
87. Figure shows schematic plan of blood circulation in humans with labels A to D. Identify the label and give its functions



(1) C-Vena Cava – takes blood from body parts to right auricle, PCO_2 = mm 45 Hg
(2) D-Dorsal aorta – takes blood from heart to body parts, PO_2 = 95 mm Hg
(3) A - Pulmonary vein – takes impure blood from body parts , PO_2 = 60 mm Hg
(4) B - Pulmonary artery – takes blood from heart to lungs, PO_2 = 90 mm Hg

Rough Work

88. The figure shows a diagrammatic view of human respiratory sytem with labels A, B, C and D. Select the option which gives correct identification and main function and/or characteristic :



(1) C - Alveoli - thin walled vascular bag like structures for exchange of gases

(2) D-lower end of lungs-diaphragm pulls it down during inspiration

(3) A - trachea - long the supported by complete cartilaginous rings for conducting inspired air

(4) B - pleural membrane - surround ribs on both sides to provide cushion against rubbing

89. Approximately seventy percent of carbon - dioxide absorbed by the blood will be transported to the lungs.

(1) as bicarbonate ions

(2) in the form of dissolved gas molecules

(3) by binding to R.B.C

(4) as carbamino - haemoglobin

90. When you hold your breath, which of the following gas changes in blood would first lead to the urge to breathe?

(1) rising CO_2 and falling O_2 concentration

(2) falling O_2 concentration

(3) rising CO_2 concentration

(4) falling CO_2 concentration

91. Name the pulmonary disease in which alveolar surface area involved in gas exchange is drastically reduced due to damage in the alveolar walls.

(1) Pneumonia (2) Asthma

(3) Pleurisy (4) Emphysema

92. Name the chronic respiratory disorder caused mainly by cigarette smoking:

(1) Asthma

(2) Respiratory acidosis

(3) Respiratory alkalosis

(4) Emphysema

93. Asthma may be attributed to :

(1) allergic reaction of the mast cells in the lungs

(2) inflammation of the trachea

(3) accumulation of fluid in the lungs

(4) bacterial infection of the lungs

94. The partial pressure of oxygen in the alveoli of the lungs is

(1) more than that in the blood

(2) less than that in the blood

(3) less than that of carbon dioxide

(4) equal to that in the blood

Rough Work

95. Lungs do not collapse between breaths and some air always remains in the lungs which can never be expelled because
(1) there is a negative intrapleural pressure pulling at the lung walls
(2) there is a positive intrapleural pressure
(3) pressure in the lungs is higher than the atmospheric pressure
(4) there is a negative pressure in the lungs

96. Which of the following pairs of hormones are not antagonistic (having opposite effects) to each other?
(1) Insulin – Glucagon
(2) Aldosterone – Atrial Natriuretic factor
(3) Relaxin – Inhibin
(4) Parathormone – Calcitonin

97. Changes in GnRH pulse frequency in females is controlled by circulating levels of :
(1) estrogen and inhibin
(2) Progesterone only
(3) progesterone and inhibin
(4) estrogen and progesterone

98. Select the incorrect statement :
(1) LH triggers ovulation in ovary.
(2) LH and FSH decrease gradually during the follicular phase
(3) LH triggers secretion of androgens from the leydig cells
(4) FSH stimulates the sertoli cells which help in spermiogenesis

99. The amino acid Tryptophan is the precursor for the synthesis of :
(1) Thyroxine and Triiodothyronine
(2) Estrogen and Progesterone
(3) Cortisol and Cortisone
(4) Melatonin and Serotonin

100. Which hormones do stimulate the production of pancreatic juice and bicarbonate?
(1) Gastrin and insulin
(2) Cholecystokinin and secretin
(3) Insulin and glucagon
(4) Angiotensin and epinephrine

Rough Work