Dual Degree B.Sc. (Hons.) (Biotechnology)-M.Sc. (Biotechnology)

PHYSICS

1. The force of interaction between two atoms is given by $F = \alpha\beta \exp\left(-\frac{x^2}{\alpha k T}\right)$;

where x is the distance, k is the Boltzmann constant and T is temperature, α and β are two constants. The dimension of β is :

(A) $\left[M^2L^2T^{-2}\right]$ (B) $\left[M^2LT^{-4}\right]$

(C) $\left[M^0L^2T^{-4}\right]$ (D) $\left[MLT^{-2}\right]$

2. The time period of oscillation of a simple pendulum is $T = 2\pi\sqrt{\frac{L}{g}}$. Measured value of length L is 20 cm known to have 1 mm accuracy and time for 100 oscillations of the pendulum is found to be 90 s using wrist watch of 1s resolution. What is the accuracy in determining the value of acceleration due to gravity ?

(A) 3% (B) 4%

(C) 1% (D) 5%

3. In three-dimensional system, the position coordinates of a particle in motion are given below :

$x = a\cos\omega t$, $y = a\sin\omega t$, $z = a\omega t$

The velocity of the particle will be :

(A) $\sqrt{3}\,a\omega$ (B) $2a\omega$

(C) $a\omega$ (D) $\sqrt{2}\,a\omega$

4. A block of base 10 cm × 10 cm and height 15 cm is kept on an inclined plane. The coefficient of friction between them is $\sqrt{3}$. The inclination θ of this inclined plane from the horizontal plane is gradually increased from 0°. Then :

(A) at θ = 30°, the block will start sliding down the plane

(B) the block will remain at rest on the plane up to certain θ and then it will topple

(C) at θ = 60°, the block will start sliding down the plane and continue to do so at higher angles

(D) at θ = 60°, the block will start sliding down the plane and on further increasing θ, it will topple at certain θ

5. A force $\mathrm{F} = -k\left(y\hat{i} + x\hat{j}\right)$ (where k is a positive constant) acts on a particle moving in the x-y plane. Starting from the origin, the particle is taken along the positive x-axis to the point (a, 0) and then parallel to the y-axis to the point (a, a). The total work done by the force F on the particle is :

(A) $-2ka^2$ (B) $2ka^2$

(C) $-ka^2$ (D) ka^2

6. A ball hits the floor and rebound after inelastic collision. In this case :

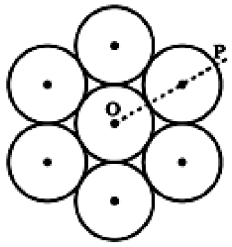
(A) the momentum of the ball just after the collision is same as that just before the collision.

(B) the mechanical energy of the ball remains the same in the collision

(C) the total momentum of the ball and the earth is conserved.

(D) the total mechanical energy of the ball and the earth is conserved

7. Seven identical circular planar disks, each of mass M and radius R are welded symmetrically as shown. The moment of inertia of the arrangement about the axis normal to the plane and passing through the point P is :



(A) $\frac{181\ MR^2}{2}$

(B) $\frac{19\ MR^2}{2}$

(C) $\frac{55\ MR^2}{2}$

(D) $\frac{73\ MR^2}{2}$

8. A satellite S is moving in an elliptical orbit around the earth. The mass of the satellite is very small compared to the mass of the earth :

(A) the acceleration of S is always directed towards the centre of the earth

(B) the angular momentum of S about the centre of the earth changes in direction, but its magnitude remains constant

(C) the total mechanical energy of S varies periodically with time

(D) the linear momentum of S remains constant in magnitude

9. Imagine a light planet revolving around a very massive star in a circular orbit of radius R with a period of revolution T. If the gravitational force of attraction between the planet and the star is proportional to $R^{-5/2}$, then :

(A) T^2 is proportional to R^2

(B) T^2 is proportional to $R^{7/2}$

(C) T^2 is proportional to $R^{3/2}$

(D) T^2 is proportional to $R^{1/2}$

10. A particle executes simple harmonic motion with an amplitude of 5 cm. When the particle is at 4 cm from the mean position, the magnitude of its velocity in SI units is equal to that of its acceleration. Then, its periodic time in second is :

(A) $\frac{8\pi}{3}$ (B) $\frac{4\pi}{3}$

(C) $\frac{3\pi}{8}$ (D) $\frac{7\pi}{3}$

11. A solid sphere of radius r made of a soft material of bulk modulus K is surrounded by a liquid in a cylindrical container. A massless piston of area a floats on the surface of the liquid, covering entire cross section of cylindrical container. When a mass m is placed on the surface of the piston to compress the liquid, the fractional decrement in the radius of the sphere, $\left(\frac{dr}{r}\right)$ is :

(A) $\frac{mg}{Ka}$ (B) $\frac{Ka}{mg}$

(C) $\frac{Ka}{3mg}$ (D) $\frac{mg}{3Ka}$

12. A cylindrical tube open at both ends, has a fundamental frequency f in air. The tube is dipped vertically in water so that half of its length is in water. The fundamental frequency of the air column in now :

(A) $\frac{f}{2}$ (B) $\frac{3f}{4}$

(C) f (D) $2f$

13. In which of the following process, convection *does not* take place primarily ?

(A) Sea and land breeze

(B) Trade wind

(C) Boiling of water

(D) Warming of glass of bulb due to filament

14. When an ideal diatomic gas is heated at constant pressure, the fraction of the heat energy supplied, which increases the internal energy of the gas, is :

(A) 2/5 (B) 3/5

(C) 3/7 (D) 5/7

15. A ray of light travelling in water is incident on its surface open to air. The angle of incidence is θ, which is less than the critical angle. Then, there will be :

(A) only a reflected ray and no refracted ray

(B) only a refracted ray and no reflected ray

(C) a reflected ray and a refracted ray and the angle between them would be less than $180° - 2\theta$

(D) a reflected ray and a refracted ray and the angle between them would be greater than $180° - 2\theta$

16. A concave lens of glass, refractive index 1.5, has both surfaces of same radius of curvature R. On immersion in a medium of refractive index 1.75, it will behave as a :

(A) convergent lens of focal length 3.5 R

(B) convergent lens of focal length 3.0 R

(C) divergent lens of focal length 3.5 R

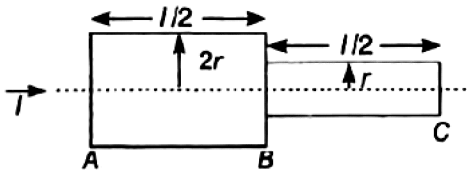
(D) divergent lens of focal length 3.0 R

17. In the Young's double slit experiment using a monochromatic light of wavelength λ, the path difference (in terms of an integer n) corresponding to any point having half the peak intensity is :

(A) $(2n+1)\frac{\lambda}{2}$ (B) $(2n+1)\frac{\lambda}{4}$

(C) $(2n+1)\frac{\lambda}{8}$ (D) $(2n+1)\frac{\lambda}{16}$

18. Two bars of radius r and $2r$ are kept in contact as shown. An electric current I is passed through the bars. Which one of the following is *correct* ?



(A) Heat produced in bar BC is 4 times the heat produced in bar AB

(B) Electric field in both halves is equal

(C) Current density across AB is double that of across BC

(D) Potential difference across AB is 4 times that of across BC

19. Consider a neutral conducting sphere. A positive point charge is placed outside the sphere. The net charge on the sphere is then :

(A) Negative and distribute uniformly over the surface of the sphere

(B) Negative and appears only at the sphere closest to the point charge

(C) Negative and distribute non-uniformly over the entire surface of the sphere

(D) Zero

20. A long, hollow conducting cylinder is kept coaxially inside another long, hollow conducting cylinder of larger radius. Both the cylinders are initially electrically neutral.

(A) A potential difference appears between the two cylinders when a charge density is given to the inner cylinder

(B) A potential difference appears between the two cylinders when a charge density is given to the outer cylinder.

(C) No potential difference appears between the two cylinders when a uniform line charge is kept along the axis of the cylinders

(D) No potential difference appears between the two cylinders when same charge density is given to both the cylinders

21. A charged particle is released from rest in a region of steady uniform electric and magnetic fields which are parallel to each other. The particle will move in a :

(A) Circle (B) Helix

(C) Straight line (D) Cycloid

22. A battery is connected between two points A and B on the circumference of a uniform conducting ring of radius r and resistance R. One of the arcs AB of the ring subtends an angle θ at the centre. The value of the magnetic induction at the centre due to the current in the ring is :

(A) proportional to $2\ (180^\circ - \theta)$

(B) inversely proportional to r

(C) zero, only if $\theta = 180^\circ$

(D) zero for all values of θ

23. A metal rod moves at a constant velocity in a direction perpendicular to its length. A constant uniform magnetic field exists in space in a direction perpendicular to the rod as well its velocity. Select correct statement(s) from the following :

(A) The entire rod is at the same electric potential

(B) There is an electric field in the rod

(C) The electric potential is highest at the centre of the rod and decreases towards its ends

(D) The electric potential is lowest at the centre of the rod and increases towards its ends

24. The electron in a hydrogen atom makes a transition from an excited state to the ground state, which of the following statements is *true* ?

(A) Its kinetic energy, potential energy and total energy decreases.

(B) Its kinetic energy and potential energy increases and its total energy remains same.

(C) Its kinetic energy and total energy decreases and potential energy increases.

(D) Its kinetic energy increases and its potential and total energy decreases.

25. The half-life period of a radioactive element x is same as the mean life time of another radioactive element y. Initially both of them have the same number of atoms. Then :

(A) x and y have the same decay rate initially

(B) y will decay at a faster rate than x

(C) x and y decay at the same rate always

(D) x will decay at a faster rate than y

26. A screw gauge having 100 equal divisions and a pitch length of 1 mm is used to measure the diameter of a wire of length 5.6 cm. The main scale reading is 1 mm and 47th circular division coincides with the main scale. The curved surface area of wire (in cm^2) to appropriate significant figures is :

(A) 1.60 (B) 3.20

(C) 1.25 (D) 2.6

27. For a given plate-voltage, the plate current in a triode valve is maximum when the potential of :

(A) the grid is positive and plate is negative

(B) the grid is positive and plate is positive

(C) the grid is zero and plate is positive

(D) the grid is negative and plate is positive

28. The physical sizes of the transmitter and receiver antenna in a communication system are :

(A) proportional to carrier frequency

(B) inversely proportional to modulation frequency

(C) independent of both carrier and modulation frequency

(D) inversely proportional to carrier frequency

29. A transistor is used in common-emitter mode in an amplifier circuit. When a signal of 20 mV is added to the base emitter voltage, the base current changes by 20 μA and the collector current changes by 2 mA. The load resistance is 5 kΩ. The trans conductance and the voltage gain are :

(A) 0.1 mho, 500

(B) 0.2 mho, 500

(C) 0.3 mho, 1000

(D) 0.2 mho, 100

30. In an electron microscope, the resolution that can be achieved is of the order of the wavelength of electrons used. To resolve a width of 7.5×10^{-12} m, the minimum electron energy required is close to :

(A) 500 keV

(B) 25 keV

(C) 100 keV

(D) 1 keV

31. A student uses a simple pendulum of exactly 1 m length to determine g, the acceleration due to gravity. He uses a stopwatch with the least count of 1 second for this and records 40 seconds for 20 oscillations. For this observation, which of the following statements is *true* ?

(A) Error ΔT in measuring T, the time period is 0.02 seconds

(B) Error ΔT in measuring T, the time period is 1 second

(C) Percentage error in the determination of g is 5%

(D) Percentage error in the determination of g is 2.5%

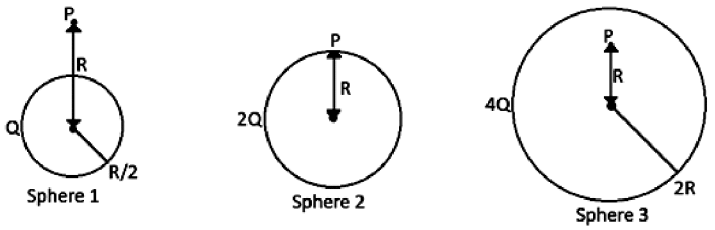
32. In a conductor, if the number of conduction electrons per unit volume is 8.5×10^{28} m^{-3} and mean free time is 25 fs (femto second), its approximate resistivity is :

(Take $m_e = 9.1 \times 10^{-31}$ kg)

(A) 10^{-7} Ω-m (B) 10^{-5} Ω-m

(C) 10^{-6} Ω-m (D) 10^{-8} Ω-m

33. Charges Q, 2Q and 4Q are uniformly distributed in three dielectric solid spheres 1, 2 and 3 of radii R/2, R and 2R respectively. If magnitudes of the electric fields at point P at a distance R from the centre of spheres 1, 2 and 3 are E_1, E_2 and E_3 respectively, then :



(A) $E_1 > E_2 > E_3$ (B) $E_2 > E_1 > E_3$

(C) $E_3 > E_1 > E_2$ (D) $E_3 > E_2 > E_1$

CHEMISTRY

34. The ratio mass oxygen and nitrogen of a particular gaseous mixture is 1 : 4. The ratio of number of their molecules is :

(A) 1 : 4 (B) 7 : 32

(C) 3 : 16 (D) 1 : 8

35. Oxidation numbers of P in PO_4^{3-}, of S in SO_4^{2-} and of Cr in $Cr_2O_7^{2-}$ are respectively :

(A) + 3, + 6 and + 5 (B) – 3, + 6 and + 6

(C) + 5, + 3 and + 6 (D) + 5, + 6 and + 6

36. Which of the following is *not* permissible ?

(A) $n = 4, l = 3, m = 0$

(B) $n = 4, l = 2, m = 1$

(C) $n = 4, l = 4, m = 1$

(D) $n = 4, l = 0, m = 0$

37. What is the ratio of velocities of electron and proton when the de-Broglie wavelength associated with an electron would be equal to that associated with a proton if a proton is 1836 times heavier than an electron ?

(A) 1836 (B) 1/1836

(C) 2 (D) 1

38. The correct bond order in the following species is :

(A) $O_2^+ < O_2^- < O_2^{2+}$

(B) $O_2^- < O_2^+ < O_2^{2+}$

(C) $O_2^{2+} < O_2^- < O_2^+$

(D) $O_2^{2+} < O_2^+ < O_2^-$

39. By what factor does the average velocity of gaseous molecule increase when the temperature (in Kelvin) is doubled ?

(A) 2.0 (B) 2.8

(C) 4.0 (D) 1.4

40. If total enthalpies of reactants and products are H_R and H_P respectively, then for an endothermic reaction :

(A) $H_R < H_P$ (B) $H_R = H_P$

(C) $H_R > H_P$ (D) $H_R \geq H_P$

41. Which of the following is given to a fuel cell's cathode ?

(A) Hydrogen (B) Nitrogen

(C) Oxygen (D) Chlorine

42. 2 moles of an ideal gas expanded isothermally and reversibly from 1 L to 10 L at 300 K. What is the enthalpy change ?

(A) 4.98 kJ (B) 11.47 kJ

(C) –11.47 kJ (D) 0 kJ

43. An element has a face centered cubic (fcc) structure with a cell edge of a. The distance between the centers of two nearest tetrahedral voids in the lattice is :

(A) a (B) $\sqrt{2}\ a$

(C) $a/2$ (D) $3a/2$

44. The correct order of equivalent conductance at infinite dilution of LiCl, NaCl and KCl is :

(A) LiCl > NaCl > KCl (B) KCl > NaCl > LiCl

(C) NaCl > KCl > LiCl (D) LiCl > KCl > NaCl

45. The half life period of a radioactive element is 140 days. After 560 days, one gram of the element will reduce to :

(A) 1/2 g (B) 1/4 g

(C) 1/8 g (D) 1/16 g

46. The enzyme which hydrolyses triglycerides to fatty acids and glycerol is called :

(A) pepsin (B) lipase

(C) maltase (D) zymase

47. Which of the following metal ions plays an important role in muscle contraction ?

(A) K^+ (B) Na^+

(C) Mg^+ (D) Ca^+

48. The order of oxidation state of the phosphorus atom in H_3PO_2, H_3PO_4, H_3PO_3 and $H_4P_2O_6$ is :

(A) $H_3PO_4 > H_3PO_2 > H_3PO_3 > H_4P_2O_6$

(B) $H_3PO_4 > H_4P_2O_6 > H_3PO_3 > H_3PO_2$

(C) $H_3PO_2 > H_3PO_3 > H_4P_2O_6 > H_3PO_4$

(D) $H_3PO_3 > H_3PO_2 > H_3PO_4 > H_4P_2O_6$

49. The tendency of BF_3, BCl_3 and BBr_3 to behave as Lewis acid decreases in the sequence :

(A) $BF_3 > BCl_3 > BBr_3$

(B) $BCl_3 > BF_3 > BBr_3$

(C) $BBr_3 > BCl_3 > BF_3$

(D) $BBr_3 > BF_3 > BCl_3$

50. The number of moles of $KMnO_4$ reduced by one mole of KI in alkaline medium is :

(A) One (B) Two

(C) Five (D) One-fifth

51. Ammonium dichromate is used in some fireworks. The green colored powder blown in the air is :

(A) Cr_2O_3 (B) CrO_3

(C) Cr (D) CO

52. Crystal field splitting energy for high spin d^4 octahedral complex is :

(A) $-0.6\ \Delta_o$ (B) $-1.2\ \Delta_o$

(C) $-0.8\ \Delta_o$ (D) $-1.6\ \Delta_o$

53. Which ore contains both iron and copper ?

(A) Cuprite (B) Azurite

(C) Malachite (D) Chalcopyrite

54. How many liters of water must be added to 1 L of an aqueous solution of HCl with a pH of 1 to create an aqueous solution with pH of 2 ?

(A) 0.1 L (B) 0.9 L

(C) 2.0 L (D) 9.0 L

55. The number of sigma bonds present in toluene is :

(A) 10 (B) 12

(C) 15 (D) 9

56. How many g of Br_2 will react with 5 g of pent-1-ene and 5 g of pent-1-yne ?

(A) 12.03 g, 24.06 g (B) 11.43 *g*, 23.33 g

(C) 10.01 g, 24.06 g (D) 5.0 *g*, 24.06 g

57. An alkene which upon ozonolysis gives CH_3CHO as one of the products is :

(A) 1-Hexene (B) 1-Butene

(C) Ethylene (D) Propylene

58. A halide $C_5H_{11}X$ on treatment with alcoholic KOH gives only pent-2-ene. The halide is :

(A) 1-halopentane

(B) 2-halopentane

(C) 3-halopentane

(D) None of these

59. Which of the following compounds will not show the presence of nitrogen in Lassaigne's test ?

(A) CH_3NH_2 (B) CH_3CONH_2

(C) Ar-NO_2 (D) NH_2-NH_2

60. The reagent with which both acetaldehyde and acetone react easily is :

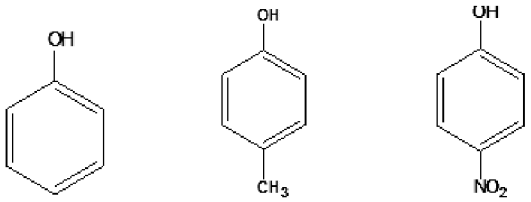
(A) Grignard reagent

(B) Schiff's reagent

(C) Tollen's reagent

(D) Fehling solution

61. The correct acidic order of the following is :



I II III

(A) III > I > II (B) II > I > III

(C) I > II > III (D) I > III > II

62. An organic compound A upon reacting with NH_3 gives B. On heating, B gives C. C in the presence of KOH react with Br_2 to give $CH_3CH_2NH_2$. A is :

(A) CH_3CH_2COOH (B) CH_3COOH

(C) $CH_3CH_2CH_2COOH$ (D) $(CH_3)_2CHCOOH$

63. Which of the following compounds gives benzoic acid on hydrolysis ?

(A) Chlorobenzene (B) Chlorophenol

(C) Benzoyl chloride (D) Chlorotoluene

64. Maltose on treatment with dil. HCl gives :

(A) D-glucose and D-fructose (B) D-glucose

(C) D-fructose (D) D-galactose

65. Air pollution that occurs in sunlight is :

(A) Acid rain (B) Reducing smog

(C) Oxidizing smog (D) Fog

66. The number of repeating units (n) in a polymer is called :

(A) Degree of polymerisation (B) Polydispersity index

(C) Molecular weight of polymer (D) Tacticity of a polymer

BIOTECHNOLOGY

67. Which of the following is commonly used as a vector for introducing a DNA fragment in human lymphocytes ?

(A) Phage λ (B) Ti-plasmid

(C) Retrovirus (D) pBR 322

68. Which two functional groups are characteristic of sugars ?

(A) Carbonyl and phosphate (B) Carbonyl and methyl

(C) Hydroxyl and methyl (D) Carbonyl and hydroxyl

69. Sweet potato is a modified :

(A) Tap root (B) Adventitious root

(C) Stem (D) Rhizome

70. What type of ecological pyramid would be obtained with the following data : Secondary consumer-120 g; Primary consumer-60 g; Primary producer-10 g ?

(A) Upright pyramid of numbers

(B) Pyramid of energy

(C) Inverted pyramid of biomass

(D) Upright pyramid of biomass

71. The correct order of steps in a polymerase chain reaction (PCR) is :

(A) Denaturation, Extension, Annealing

(B) Annealing, Extension, Denaturation

(C) Extension, Denaturation, Annealing

(D) Denaturation, Annealing, Extension

72. Some organs of man have their own specific functions but carry out excretion as a secondary function. Identify them :

(A) Lungs, Kidney, Nephron

(B) Liver, Skin, Lungs

(C) Skin, Kidney, Intestine

(D) Intestine, Liver, Kidney

73. Which one of the following options correctly represents the lung conditions in asthma and emphysema, respectively ?

(A) Increased respiratory surface; Inflammation of bronchioles

(B) Increased number of bronchioles; Increased respiratory surface

(C) Inflammation of bronchioles; Decreased respiratory surface

(D) Decreased respiratory surface; Inflammation of bronchioles

74. The transparent lens in the human eye is held in its place by :

(A) Smooth muscles attached to the ciliary body

(B) Smooth muscles attached to the iris

(C) Ligaments attached to the iris

(D) Ligaments attached to the ciliary body

75. Which of the following is an amino acid derived hormone ?

(A) Estradiol (B) Ecdysone

(C) Epinephrine (D) Estriol

76. Stomatal movement is NOT affected by :

(A) O_2 concentration (B) Light

(C) Temperature (D) CO_2 concentration

77. Which of the following elements is responsible for maintaining turgor in cells ?

(A) Potassium (B) Sodium

(C) Magnesium (D) Calcium

78. Which of the following characteristics represents "Inheritance of blood groups" in humans ?

1. Dominance; 2. Codominance; 3. Multiple allele; 4. Incomplete dominance

(A) 2, 4, and 5 (B) 1, 2, and 3

(C) 2, 3, and 5 (D) 1, 3, and 5

79. Which of the following animals *does not* undergo metamorphosis ?

(A) Moth (B) Tunicate

(C) Earthworm (D) Starfish

80. Which of the following products of light dependent phase are used during light independent phase of photosynthesis ?

(A) RuBP and ATP (B) H_2O and O_2

(C) $NADPH_2$ and ATP (D) ATP and O_2

81. In humans, disorders of nervous system are caused due to the deficiency of vitamin :

(A) Pyridoxine (B) Retinol

(C) Phylloquinone (D) Ascorbic acid

82. Which of the following terms describe human dentition ?

(A) Pleurodont, Monophyodont, Homodont

(B) Thecodont, Diphyodont, Heterodont

(C) Thecodont, Diphyodont, Homodont

(D) Pleurodont, Diphyodont, Heterodont

83. Transpiration will be faster when the day is :

(A) Hot, humid and windy

(B) Hot, dry and windy

(C) Cold, humid and windy

(D) Hot, humid and still wind

84. WBC and RBC are found in human blood in the ratio of :

(A) 1 : 60 (B) 1 : 600

(C) 1 : 6000 (D) 1 : 60000

85. Formation of oxyhaemoglobin inside RBCs is a/an :

(1) Physical process; (2) Chemical process; (3) Enzyme catalyzed reaction; (4) Partial pressure influenced process.

(A) (1), (2), and (3)

(B) (1) and (2)

(C) (2) and (4)

(D) (3) and (4)

86. Which one of the following *does not* enter into the Calvin cycle ?

(A) Carbon dioxide (B) Enzyme

(C) ATP (D) NADP

87. Translocation of food by phloem is in the form of :

(A) Sucrose (B) Protein

(C) Fat (D) Hormones

88. In Mendel's dihybrid cross, how many groups of phenotypic characters are found in F_2 generation (second filial generation) ?

(A) Four (B) Two

(C) One (D) Sixteen

89. What will happen if diameter of arteries is reduced ?

(A) Blood pressure will fall

(B) Blood pressure will increase

(C) Blood pressure will remain same

(D) Blood will coagulate

90. A rose plant obtained from self-cross of heterozygous red has produced 200 flowers. How many of them would be heterozygous red flowers ?

(A) 25 (B) 50

(C) 100 (D) 150

91. The stage of interphase in which the number of cell organelle increase is :

(A) G 1 (B) S

(C) G 2 (D) G 0

92. Which of the following RNAs should be most abundant in animal cells ?

(A) rRNA (B) tRNA

(C) mRNA (D) miRNA

93. A man whose father was colourblind marries a woman who had a colourblind mother and normal father. What percentage of male children of this couple will be colourblind ?

(A) 25%
(B) 0%
(C) 50%
(D) 75%

94. Which one of the following pairs correctly matches a hormone with a disease resulting from its deficiency ?

(A) Luteinising hormone–Failure of ovulation
(B) Insulin–Diabetes insipidus
(C) Thyroxine–Tetany
(D) Parathyroid hormone–Diabetes mellitus

95. The blood vessel that begins and ends in capillaries is :

(A) Renal vein
(B) Renal artery
(C) Hepatic artery
(D) Hepatic portal vein

96. How does pruning help in making the hedge dense ?

(A) It frees axillary buds from apical dominance
(B) The apical shoot grows faster after pruning
(C) It releases wound hormones
(D) It induces the differentiation of new shoots from the rootstock

97. All enzymes of TCA cycle are located in the mitochondrial matrix except one which is located in inner mitochondrial membranes in eukaryotes, and in cytosol in prokaryotes. This enzyme is :

(A) Lactate dehydrogenase

(B) Isocitrate dehydrogenase

(C) Malate dehydrogenase

(D) Succinate dehydrogenase

98. The process of RNA interference has been used in the development of plants resistant to :

(A) Nematodes (B) Fungi

(C) Viruses (D) Insects

99. PCR and restriction fragment length polymorphism are the methods for :

(A) Study of enzymes

(B) Genetic transformation

(C) DNA sequencing

(D) Genetic fingerprinting

100. During which stage, in the complete oxidation of glucose are the greatest number of ATP molecules formed from ADP :

(A) Glycolysis

(B) Kreb's cycle

(C) Conversion of pyruvic acid to acetyl Co-A

(D) Electron transport chain

GENERAL APTITUDE

101. Direction : Study the following information carefully and answer the question given below :

Anuj started walking from his home at 7.00 AM and his shadow was on his right. After walking for 32 m he took a left turn and walks for 12 m. Thereafter he again took a left turn and walks 27 m and stopped there. Find the shortest distance of the initial and final position of Anuj and in which direction is he with respect to his starting point ?

(A) 25 m, South
(B) 13 m, North-West
(C) 25 m, North-East
(D) 13 m, South-East

102. Complete the series :

320 160 240 600 2100 ?

(A) 9650
(B) 9450
(C) 8850
(D) 8350

103. Direction : Study the following information carefully and answer the question given below :

If A + B means A is the father of B

If A × B means A is the sister of B

If A $ B means A is the wife of B

If A % B means A is the mother of B

If A ÷ B means A is the son of B

Which among the following expressions is true if Y is the son of X is definitely false ?

(A) W % L × T × Y ÷ X
(B) W + L × T × Y ÷ X
(C) X + L × T × Y ÷ W
(D) W $ X + L + Y + T

104. Direction : Read the information carefully and answer the question given below :

Four friends – Ram, Laxman, Bharat and Shatrughan were having a conversation. They were expressing their thoughts in a coded language.

Ram says, "le po ki ba" when he wants to convey that "friends make life live". Laxman says, "te ki mo ba" when he wants to convey that "without friends life impossible". Bharat says, "lo mo se te" when he wants to convey that "without trouble gain impossible". Shatrughan says, "st ba po lo" when he wants to convey that "life make trouble joy".

What is the code for "life impossible without" ?

(A) te mo se

(B) ba mo te

(C) se ki ba

(D) ki te ba

105. Plead :..... :: Submerge : Dip

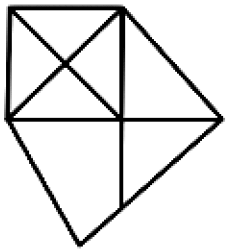
(A) Avoid

(B) Dismiss

(C) Ask

(D) Covet

106. How many triangles are there in the given figure ?



(A) 15 (B) 16

(C) 17 (D) 18

107. Direction : Read the following information carefully and answer the question given below :

8 persons from A to H are sitting around a square table such that 4 persons sit at each of the corners while the rest 4 sit at the middle of the sides. The ones sitting at the corners are facing inside while the rest are facing outside. The persons whose name starts with consecutive letters do not sit adjacent. B sits second to the right of A, who is on the immediate left of C. F sits on the immediate right of D, who sits at one of the corners. At least one person sits between C and G.

Who sits diagonally opposite to B ?

(A) H (B) D

(C) C (D) Either C or D

108. **Direction :** In this question, on the basis of the information given in the statement, you have to assume everything in the statement to be true, then decide which of the suggested courses of action logically follow(s) for pursuing.

Give answer :

(a) if only I follows.

(b) if only II follows.

(c) if either I or II follows.

(d) if neither I nor II follows.

(e) if both I and II follow.

Statement : There has been an unprecedented increase in the number of students applying for admission to first Std. in a local school making it difficult for the school authority to convince the parents of rejected applicants.

Courses of Action :

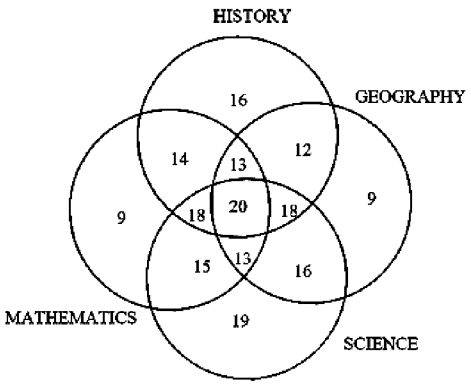
I. There has been an unprecedented increase in the number of students applying for admission to first Std. in a local school making it difficult for the school authority to convince the parents of rejected applicants.

II. The school authority should open another school in the area to accommodate the remaining students.

(A) a (B) b

(C) c (D) d

109. Read the following Venn Diagram and answer the question given below :



The number of students who took any three of the above subjects was :

(A) 62

(B) 63

(C) 64

(D) 65

110. Shailendra is shorter than Keshav but taller than Rakesh. Madhav is the tallest. Ashish is a little shorter than Keshav and little taller than Shailendra. If they stand in the order of increasing heights, who will be the second ?

(A) Ashish

(B) Shailendra

(C) Rakesh

(D) Madhav

GENERAL ENGLISH

111. Direction : Which of the phrases given below should replace the phrase given in bold in the following sentence to make the sentence grammatically correct ?

I would rather be a poor man in a garret with plenty of good books to read than a king **who did not loved** reading :

(A) who do not loved
(B) who did not love
(C) whom did not loved
(D) whom did not love

112. The four sentences (labelled 1, 2, 3, 4) given below, when properly sequenced would yield a coherent paragraph. Decide on the proper sequence of the order of the sentences and key in the sequence of the four numbers as your answer.

1. To the uninitiated listener, atonal music can sound like chaotic, random noise.
2. Atonality is a condition of music in which the constructs of the music do not 'live' within the confines of a particular key signature, scale, or mode.
3. After you realize the amount of knowledge, skill, and technical expertise required to compose or perform it, your tune may change, so to speak.
4. However, atonality is one of the most important movements in 20th century music.

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

113. Fill in the blank :

My uncle apprised me.....the incident.

(A) of (B) about

(C) in (D) on

114. **Direction :** Select the option which contains the part of the sentence which has an error (spelling, grammatical or contextual) :

He had no (A)/ accuse for attacking (B)/ that old man. (C)/ No error (D)

(A) He had no (B) accuse for attacking

(C) that old man (D) No error

115. **Direction :** This question has two blanks, each blank indicating that something has been omitted. Choose the set of words for each blank that best fits in the context of the sentence :

Population growth tapers off with.....literacy, access to contraception, and social and economic ..... .

(A) increased, progress

(B) decreased, progress

(C) improved, regress

(D stagnant, duress

116. Find the correctly spelt word :

(A) Eccumenikal (B) Ecumenical

(C) Ecuemenicel (D) Ekumanical

117. In this question, out of the four alternatives, select the alternative which best expresses the meaning of the idiom/phrase :

Sword of Damocles

(A) Life full of quarrels

(B) Imminent danger

(C) In a state of suspense and anxiety

(D) To apologize for one's past actions

118. Out of the four alternatives choose the one which can be substituted for the given words/sentence in the question :

Very poor or bad

(A) Gnarly (B) Bully

(C) Lousy (D) Rad

119. Find the antonym of ECLAT :

(A) Apathy (B) Dullness

(C) Silence (D) Disinterest

120. Find the synonym of REDOLENT :

(A) Ubiquitous (B) Odorous

(C) Shy (D) Bellicose