Model Test Paper-3

Time : 3½ hours.   *Maximum Marks : 200*

PHYSICS

1. There are two combination of n equal resistances. In combination A, all the resistances are in series and in combination B, all the resistances are in parallel. The ratio of the resistances of combination A to that of combination B is
   (a) $n^2 : 1$
   (b) $n : 1$
   (c) $1 : 1/n$
   (d) $1 : n^2$

2. If the time period of a magnet is T when $T \propto \sqrt{x}$, then x represents
   (a) length of the magnet
   (b) moment of inertia of the magnet
   (c) breadth of the magnet
   (d) mass of the magnet

3. The electric intensity E, current density J and specific resistance p are related to each other through the relation
   (a) $E = p/J$
   (b) $E = Jp$
   (c) $E = J/p$
   (d) $E = JE$

4. The distances of two planets from the Sun are 10^{13} and 10^{12} metres respectively. The ratio of time periods of these two planet is
   (a) $10\sqrt{10}$
   (b) 100
   (c) $1\sqrt{10}$
   (d) 10

5. There will be an increase in potential energy of the system, if work is done upon the system by
   (a) a conservative force
   (b) a non-conservative force
   (c) any conservative or nonconservative force
   (d) none of the above

6. The amplitude of a particle in SHM decreases from 20 cm to 15 cm in 2 minutes. Its energy decreases by nearly
   (a) 22.5%
   (b) 25%
   (c) 50%
   (d) 12.5%

7. A small masses of rock like material surrounded by vapours of large masses and revolving in highly elliptical orbits are called
   (a) meteorites
   (b) galaxy
   (c) comets
   (d) asteroids

8. In a n - p - n transistor circuit, the collector current is 10 mA. If 90% of the electrons emitted reach the collector, then
   (a) the base current will be 2 mA
   (b) the emitter current will be 11 mA
   (c) the emitter current will be 9 mA
   (d) the base current will be 0.1 mA

9. What led to the discovery of proton ?
   (a) scattering of α-particles by the heavier nuclei
   (b) artificial disintegration of $_7N^{14}$ with α-particles.
   (c) artificial disintegration of $_4Be^9$ with α-particles
   (d) radioactive decay of certain elements

10. Maxwell's equation involving $d\vec{B}/dt$ is obtained from
    (a) Biot-Savart's law
    (b) Ampere's law
    (c) Gauss' law
    (d) Faraday's law

11. Two coils of self-inductances L_1 and L_2 are placed so close together that effective flux in one coil is completely linked with the other. If M is the mutual inductance between them, then
    (a) $M = (L_1L_2)^2$
    (b) $M = L_1/L_2$
    (c) $M = L_1 L_2$
    (d) $M = \sqrt{(L_1L_2)}$

12. The north pole of a bar magnet is rapidly introduced into a solenoid at the end A. Which of the following statements taking place ?
    (a) the end A of the solenoid behaves like a north pole
    (b) the end A of the solenoid behaves like a south pole
    (c) no induced e.m.f. is developed
    (d) the end A of the solenoid acquires positive potential

13. A material produces a magnetic field which opposes the applied magnetic field, then it is
(a) electromagnetic (b) paramagnetic
(c) diamagnetic (d) ferromagnetic

14. To reduce the range of voltmeter, its resistance need to be reduced. A voltmeter has resistance R_0 and range V. Which of the following resistances when connected in parallel will convert it into a voltmeter of range V/n ?
(a) $(n-1) R_0$ (b) $(n+1) R_0$
(c) nR_0 (d) none of these

15. What is the magnetic field at the point of intersections of diagonals of a current carrying square loop of each side L while the current through the loop is I ?
(a) $\dfrac{\mu_0 8\sqrt{2I}}{4\pi L}$ (b) $\dfrac{\mu_0 4\sqrt{2I}}{4\pi L}$
(c) $\dfrac{\mu_0 \sqrt{2I}}{4\pi L}$ (d) none of these

16. The radius of the trajectory of a charged particle in a uniform magnetic field is proportional to
(a) momentum of the particle
(b) energy of the particle
(c) charge on the particle
(d) magnetic field

17. A wire of resistance 3Ω is cut into three equal pieces, which are joined to form a triangle. The equivalent resistance between any two corners of the triangle is
(a) $\dfrac{1}{4}\Omega$ (b) $\dfrac{2}{3}\Omega$
(c) $\dfrac{3}{2}\Omega$ (d) 4Ω

18. Two capacitors of capacitances 4 μF and 6 μF are connected across a 120 V battery in series with each other. What is the potential difference across the 4 μF capacitor ?
(a) 60 V (b) 48 V
(c) 40 V (d) 72 V

19. The persistence of sound in a hall is called
(a) reverberation (b) acoustics
(c) resonance (d) articulation

20. Which of the following statements is correct about the stationary wave ?

(a) particles at the consecutive anti-nodes are in same phase
(b) particles at the consecutive anti-nodes differ in phase by π
(c) all the particles of the medium vibrate in the same phase
(d) the phase lag between the particles continuously varies with the increase in distance

21. When a tuning fork produces sound waves in air, which one of the following properties of sound is same in the material of tuning fork as well as air?
(a) velocity (b) frequency
(c) wavelength (d) amplitude

22. The relation between velocity amplitude a, the displacement amplitude 'A' and the angular frequency ω of S.H.M. is
(a) $A = \omega a$ (b) $a = \omega A$
(c) $A = \omega v$ (d) $a = \omega A^2$

23. Two steam engines X and Y have their source at 1000 K and 1100 K and their sinks are at 500 K and 400 K respectively. If η_x and η_y be their efficiencies, then which of the following statements about their efficiencies is true ?
(a) $\eta_x = \eta_y$ (b) $\eta_x < \eta_y$
(c) $\eta_x > \eta_y$
(d) the data is not sufficient to make the above prediction

24. What are thermal radiations ?
(a) electromagnetic waves
(b) mechanical longitudinal waves
(c) mechanical transverse waves
(d) none of these

25. Cloudy nights are usually warmer, because clouds
(a) have low thermal conductivity
(b) do not radiate heat
(c) do not absorb heat
(d) have high thermal conductivity

26. Let R be the radius of soap bubble and σ be the surface tension of soap solution. If p be the excess of pressure inside the soap bubble, then
(a) $p \propto R \sigma$ (b) $p \propto \dfrac{R}{\sigma}$
(c) $p \propto \dfrac{\sigma}{R}$ (d) $p \propto \dfrac{1}{R\sigma}$

27. A gale blows over a house. The force due to the gale on the roof is
    (a) in the direction of gale
    (b) upward   (c) downward
    (d) in the direction of gale

28. Density of ice is ρ and that of water is σ. What will be the decrease in volume when a mass M of ice melts?

    (a) $M\left(\dfrac{1}{\rho}-\dfrac{1}{\sigma}\right)$ (b) $\dfrac{\sigma-\rho}{M}$

    (c) $\dfrac{M}{\sigma-\rho}$ (d) $\dfrac{1}{M}\left(\dfrac{1}{\rho}-\dfrac{1}{\sigma}\right)$

29. A bird is sitting in a wire cage, which is hanging from a spring balance. How will the reading change when the bird flies inside the cage?
    (a) it will be more than earlier one
    (b) it will be less than earlier one
    (c) it will remain unchanged
    (d) it cannot be predicted

30. The bulk modulus of rubber is 9×10^8 Nm^{-2}. To what depth below the surface of sea should the rubber ball be taken as to decrease its volume by 0.1% ?
    (a) 100 m   (b) 10 m
    (c) 1 m   (d) 1 km

31. We have two wires W_1 and W_2. Both are made of same material and have the same length. The radius of cross-section of W_2 wire is twice that of W_1. Same load is suspended from both of them. If the strain in W_1 be 4, then in W_2 it will be
    (b) 4   (b) 2
    (c) 1   (d) 8

32. Two wires, made of the same material and of same area of cross section, are respectively one metre and two metres long. Force required to change the length of one metre wire by 1 cm is F_1. The force required to change the length of the $2m$ wire by 1 cm will be

    (a) F_1 (b) $\dfrac{F_1}{4}$

    (c) $\dfrac{F_1}{2}$ (d) $2F_1$

33. A planet is revolving around the Sun in an elliptical orbit. Its closest distance from the Sun is r and the farthest distance is R. If the orbital velocity of the planet closest of the Sun be v, then what is the velocity at the farthest point?

    (a) $\left(\dfrac{r}{R}\right)^{1/2}$ (b) $\dfrac{vR}{r}$

    (c) $\dfrac{vr}{R}$ (d) $v\left(\dfrac{R}{r}\right)^{1/2}$

34. Which of the following is not true for stationary satellite of the earth ?
    (a) it is stationary in space
    (b) its angular speed is equal to that of earth about its own axis.
    (c) its time period is 24 hours
    (d) it revolves from west to east

35. Two identical copper spheres of radius k are in contact with each other. If the gravitational attraction between them is R, then which of the following relations is correct ?

    (a) $F \alpha \dfrac{1}{R^2}$ (b) $F \alpha R^4$

    (c) $F \alpha R^2$ (d) $F \alpha \dfrac{1}{R^4}$

36. If the gravitational mass of a body on the moon be denoted by M_m and that on the earth by M_e, then

    (a) $M_m = \sqrt{M_e}$ (b) $M_m = M_e$

    (c) $M_m = \dfrac{1}{6}M_e$ (d) $M_m = 6M_e$

37. If the radius of the circular path of particle going round the circle is double without changing its frequency of rotation, then centripetal force on it will be
    (a) doubled   (b) unchanged
    (c) halved   (d) quadrupled

38. It is easier for a swimmer jumping into water from a height to describe a loop in the air by
    (a) keeping the arms and legs straight
    (b) spreading the arms and legs
    (c) pulling the arms and legs closer
    (d) none of these

39. Three identical balls each of radius 10 cm and

mass 1 kg each are placed touching one another on a horizontal surface. Where is their centre of mass located ?
(a) at the centre of one ball
(b) at the point of contact of any two spheres
(c) on the horizontal surface
(d) none of these

40. A nucleus of mass number A originally at rest emits α-particle with speed v. What will be the recoil speed of the daughter nucleus ?
(a) $v/(A - 4)$ (b) $4v/(A + 4)$
(c) $4v(A - 4)$ (d) $v/(A + 4)$

Instructions for Q. No. 41 to 60
Directions : Each of the questions given below consists of two statements, an assertions (A) and reason (R). Select the number corresponding to the appropriate response in the answer sheet as follows.
(a) *If both assertion and reason are true and the reason is a correct explanation of the assertion*
(b) *If both assertion and reason are true but the reason is not a correct explanation of the assertion*
(c) *If the assertion is true, but the reason is false*
(d) *If both assertion and reason are falses*

41. *Assertion (A) :* In a radioactive disintegration an electron is emitted by the nucleus.
Reason (R) : Electrons are always present inside the nucleus.

42. *Assertion (A) :* In Rutherford's experiment, α-particles from a radium source were allowed to fall on a 10^{-4} mm thick gold foil. Most of α-particles passed straight through the foil.
Reason (R) : The entire positive charge and nearly whole of the mass of the nucleus is concentrated in the nucleus.

43. *Assertion (A) :* The relative velocity of two photons travelling in opposite direction is C.
Reason (R) : The rest mass of a photon is zero.

44. *Assertion (A) :* Tiny drops of liquid resist deforming forces better than bigger drops.
Reason (R) : Excess pressure inside a drop is directly proportional to the surface tension.

45. *Assertion (A) :* The couple acting on a body is not equal to the rotational K.E. of the body.
Reason (R) : Couple and K.E. have different units

46. *Assertion (A) :* A thin aluminium disc spinning freely about a central pivot is quickly brought to rest when placed between the poles of a strong U-shaped magnet.
Reason (R) : A current induced in a disc rotating in a magnetic field produces a force which tends to oppose the disc's motion.

47. *Assertion (A) :* The period of simple pendulum is independent of the mass of the bob.
Reason (R) : Inertial and gravitational masses are equivalent.

48. *Assertion (A) :* The frequencies of incident, reflected and refracted beam of monochromatic light incident from one medium to another are the same.
Reason (R) : The incident, the reflected and the refracted rays are coplanar.

49. *Assertion (A) :* Radio waves can be polarised.
Reason (R) : Sound waves in air are longitudinal in nature.

50. *Assertion (A) :* A hollow metallic closed container maintained at a uniform temperature can act as a black body for radiations.
Reason (R) : All metals acts as black bodies.

51. *Assertion (A) :* The Sun appears bigger at sunrise and sunset than at mid-day.
Reason (R) : The phenomenon of interference bends light rays.

52. *Assertion (A) :* On a rainyday it is safer to drive a car or a bus at high speed.
Reason (R) : Coefficient of friction is higher on wetting the surface.

53. *Assertion (A) :* Electric appliances with metallic body e.g. heaters have two pin connections, whereas an electric bulb has three pin connection.
Reason (R) : Three pin connections reduce heating of connecting wires.

54. *Assertion (A) :* Environmental damage has increased the amount of ozone in the atmosphere.
Reason (R) : Increase of ozone increases the amount of ultraviolet radiation on the earth.

55. *Assertion (A) :* The rainbow is seen sometimes in the sky when it is raining to an observer with his back towards the Sun.
Reason (R) : Total internal reflection from water droplets causes dispersion. The final rays are in the backward direction.

56. *Assertion (A) :* The relative velocity of two photons travelling in opposite directions is C.
Reason (R) : The rest mass of photon is zero.

57. *Assertion (A) :* Brilliant colours are seen in thin layer of oil on the surface.
Reason (R) : White light is composed of several colours.

58. *Assertion (A) :* Activity of 10^8 undecayed radioactive nuclei of half life 50 days is equal to that of 1.2×10^8 undecayed nuclei of some other material with half life 60 days.
Reason (R) : Activity is proportional to half life.

59. *Assertion (A) :* Any hollow metallic closed container maintained at a uniform temperature can act as a source of black body radiation.
Reason (R) : All metals act as black bodies.

60. *Assertion (A) :* In LCR series circuit. The resonance occurs at one frequency only.
Reason (R) : At resonance the inductive reactance is equal to the capacitive reactance.

CHEMISTRY

61. 'Placedo' is often given to patients. It is
(a) a sugar pill
(b) a broad spectrum antibiotic
(c) an anti-depressant
(d) a tonic

62. The presence of a bacterium, virus or foreign protein triggers the production of specialised protein molecules known as antibodies or
(a) immunoglobulin (b) lymphocyte
(c) myoglobin (d) antigen

63. A tyndall effect would most likely be observed in which one of the following ?
(a) sol (b) precipitate
(c) solution (d) solvent

64. Natural rubber is a
(a) polyisoprene (b) polyamide
(c) polyester (d) polysaccharide

65. The radio element has half-life of one day. After three days, the amount of element disintegrated will be
(a) $\frac{1}{16}$ of original amount
(b) $\frac{1}{3}$ of original amount
(c) $\frac{1}{8}$ of original amount
(d) $\frac{7}{8}$ of original amount

66. Which one among the following is not an organometallic compound ?
(a) trimethoxy titanium chloride
(b) trimethyl aluminium
(c) trimethyl boron
(d) tetracarbonyl nickel

67. Which of the following electronic configurations will have the highest magnetic moment ?
(a) d^7 (b) d^4
(c) d^3 (d) d^5

68. Green colour is imparted to the flame by
(a) potassium salt (b) calcium salt
(c) sodium salt (d) barium salt

69. The alkaline earth metals have an outer electronic configuration of
(a) ns^1 (b) ns^2np^6
(c) ns^2 (d) ns^2np^1

70. The energy associated with adenosine triphosphate molecule is stored in
(a) C – O bonds (b) C – N bonds
(c) C – C bonds (d) O – P bonds

71. A peptide bond consists of a
(a) acetal linkage (b) hemiacetal linkage
(c) glycosidic linkage (d) amide linkage

72. In a chemical reaction, negative catalyst will increase the value of
(a) reaction rate
(b) ΔS
(c) ΔH
(d) activation energy

73. Beta rays have greater penetrating power than the alpha rays of similar energy because
    (a) α-rays are positively-charged species carrying 2 units of charge
    (b) β-rays have negligible mass and consequently very high velocities
    (c) β-rays are a steam of electrons with negative charge
    (d) α-rays are attracted by the electron while the beta particles are repelled by the cloud

74. I.U.P.A.C. name of complex, $K_3[Al(C_2O_4)_3]$ is
    (a) potassium aluminium (III) oxalate
    (b) potassium trioxalato-aluminate (III)
    (c) potassium alumino oxalate
    (d) potassium trioxalato-aluminate

75. From the following oxides of nitrogen which is paramagnetic ?
    (a) N_2O_3 (b) N_2O
    (c) N_2O_5 (d) NO_2

76. Which will be the major product when an alkyl halide reacts with potassium cyanide ?
    (a) nitro compounds   (b) isocyanides
    (c) nitriles   (d) amines

77. Reduction of ethanoic acid with $LiAlH_4$ produces
    (a) ethanoic anhydride (b) ethanal
    (c) ethanol   (d) lithium ethanoate

78. A tertiary alcohol is obtained
    (a) by the reaction of a ketone and a Grignard reaction
    (b) when an aldehyde is reduced by $LiAlH_4$
    (c) by the reaction is obtained
    (d) when a ketone is reduced with $LiAlH_4$

79. When trichloromethane is slowly oxidised by air in the presence of light the product formed is
    (a) phosgene   (b) phosphine
    (c) carbon-dioxide   (d) diethylcarbonate

80. The reaction
    N_2O_5 (soln.) $\rightleftharpoons$ $2NO_2$ (soln.) + 1/2 O_2 (g),
    is found to be first order with respect to N_2O_5. Given that the first order rate constant is $6.2 \times 10^{-4}\ S^{-1}$, the rate of the reaction when N_2O_5 is 1.25, mol L^{-1} is
    (a) 3.10×10^{-5} mol $L^{-1}\ S^{-1}$
    (b) 7.75×10^{-4} mol $L^{-1}\ S^{-1}$
    (c) 1.55×10^{-4} mol $L^{-1}\ S^{-1}$
    (d) 15.50×10^{-4} mol $L^{-1}\ S^{-1}$

81. Electrical conductivity is affected by
    (a) the viscosity of the solvent (i.e., solute-solvent interaction)
    (b) the solvation of ions (i.e., solute-solvent interaction)
    (c) the interionic attraction (i.e., solute-solute interaction)
    (d) all of these.

82. Of the following combinations, predict the Fe that could lead to a reaction. Use the information provided below : Fe^{3+} (aq) + e^- $\rightarrow$ Fe^{2+} (aq), $E^0 = +0.77$ V
    Cl_2 (g) + 2 e^- $\rightarrow$ Cl^- (aq), $E^0 = +1.36$ V
    (a) Fe^{2+} (aq) + Cl^- (aq)
    (b) Fe^{3+} (aq) + Cl_2 (g)
    (c) Fe^{2+} (aq) + Cl_2 (g)
    (d) Fe^{3+} (aq) + Cl^- (aq)

83. Bond dissociation energies for $H_2(g)$, $Cl_2(g)$ and $HCl(g)$ are 104, 58 and 103 k cals respectively. The enthalpy of formation of $HCl(g)$ is
    (a) 59 k cals   (b) –22 k cals
    (c) 22 k cals   (d) –59 k cals

84. Animal cell swells when placed in
    (a) hypotonic solution (b) hypertonic solution
    (c) isotonic solution (d) saturated solution

85. Which of the following has 8 : 8 coordination ?
    (a) CsCl   (b) NaCl
    (c) CaF_2 (d) Na_2O

86. For the angular momentum quantum number $l = 4$, the magnetic quantum number m has a set of
    (a) 8 values   (b) 5 values
    (c) 4 values   (d) 9 values

87. The energy of the ground state of the hydrogen atom is -2.17×10^{-18} J per atom. Its value in J mol^{-1} will be
    (a) -2.17×10^{-18} J mol^{-1}
    (b) -4.34×10^{-18} J mol^{-1}
    (c) -2.624×10^6 J mol^{-1}
    (d) -1.312×10^6 J mol^{-1}

88. Identify the incorrect statement regarding monosaccharides
    (a) they also contain either an aldehyde or a keto functional group
    (b) all monosaccharides are polyhydroxy com-

pounds containing a number of alcoholic groups

(c) there are about twenty naturally occurring monosaccharides

(d) two important monosaccharides are starch and cellulose

89. The molecular formula of an organic compound with a molecular weight of 78 and empirical formula of CH is
(a) C_4H_4
(b) C_8H_8
(c) C_6H_6
(d) C_3H_3

90. For complete hydrogenation of one mole of propyne, the quantity of hydrogen required is
(a) three moles
(b) two moles
(c) one mole
(d) less than one mole

91. Treatment of ethyne with ozone followed by treatment with zinc and water, leads to the formation of
(a) formaldehyde
(b) an ozonide
(c) a diketone
(d) a diol

92. The number of secondary carbons in 2, 2-dimethyl butane is
(a) 1
(b) 0
(c) 4
(d) 2

93. Hard steel can be further hardened by heating it to red hot and then cooling it by plunging it into cold water. This process is called
(a) tempering
(b) annealing
(c) quenching
(d) smelting

94. Extraction of iron from its ore consists of smelting and refining. Smelting is carried out in a
(a) electric furnace
(b) open health convertor
(c) bessemer convertor
(d) blast furnace

95. The element that does not belong to group 13 of the periodic table is
(a) rubidium
(b) aluminium
(c) boron
(d) gallium

96. Identify the statement that is not correct as far as structure of diborane is concerned
(a) the hydrogen atoms are not in the same plane in diborane
(b) each boron atom forms four bonds in diborane

(c) there are two bridging hydrogen atoms in diborane

(d) all B-H bonds in diborane are similar

97. Concentrated sulphuric acid has a charring action on carbohydrates because it
(a) has strong acidic properties
(b) has strong affinity towards water
(c) acts as an oxidising agent
(d) is a diprotic acid

98. Which of the following methods is used to remove permanent hardness of water ?
(a) addition of calcium chloride solution to water
(b) addition of sodium carbonate solution to water
(c) addition of magnesium chloride solution to water
(d) boiling water sufficiently

99. The factor that does not affect the rate of a chemical reaction in solution is
(a) the presence of a catalyst
(b) the temperature of the reactions
(c) the concentration of the reactants
(d) a change in pressure

100. Standard electrode potential refers to the electrode potential of
(a) the metal in combination with 1 mol L^{-1} solution of its ions
(b) the metal in combination with its ions of any concentration
(c) the metal alone
(d) the metal in combination with 1 N solution of its ions

Instructions for Q. No. 101 to 120
Directions : Each of the questions given below consists of two statements, an assertions (A) and reason (R). Select the number corresponding to the appropriate response in the answer sheet as follows.

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

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

(c) If the assertion is true, but the reason is false

(d) If both assertion and reason are falses

101. *Assertion (A)* : The lactic acid shows the geometrical isomerism.
Reason (R) : Lactic acid has carbon-carbon double bond.

102. *Assertion (A)* : 2-Hydroxy i.e. butane dioic acid is known as malic acid.
Reason (R) : It is present in unripe apples.

103. *Assertion (A)* : During the fermentation of grape juice, a reddish brown coloured crust is formed.
Reason (R) : Impure potassiam hydrogen tartrate is of reddish brown colour and it is known as argol.

104. *Assertion (A)* : Amines are more basic than ethers and esters.
Reason (R) : Nitrogen is less electronegative than oxygen, it is in better position to accommodate the positive charge of the proton.

105. *Assertion (A)* : An orbital cannot have more than two electrons, moreover, if an orbital has two electrons they must have opposite spins.
Reason (R) : No two electrons in an atom can have same set of all the four quantum numbers

106. *Assertion (A)* : The pairing of electrons in the orbitals of a particular sub-shell does not occur until all the orbitals of the sub-shell are singly occupied.
Reason (R) : Singly occupied orbitals must have the electrons with parallel spins.

107. *Assertion (A)* : Fluorine molecules has bond order one.
Reason (R) : The number of electrons in antibonding molecular orbitals is two less than that in bonding molecular orbitals.

108. *Assertion (A)* : The molality of the solution does not change with change in temperature.
Reason (R) : The molality is expressed in units of moles per 1000 gm of solvent.

109. *Assertion (A)* : The molecularity of the reaction $H_2 + Br_2 \rightarrow 2HBr$ is two.
Reason (R) : The order of this reaction is 3/2.

110. *Assertion (A)* : Sodium ammonium hydrogen phosphate tetrahydrate is used in the bead test.

Reason (R) : The colourless transparent sodium metaphosphate combines with metallic oxides giving coloured orthophosphates.

111. *Assertion (A)* : Alpha (α) - amino acids exist as internal salt in solution as they have amino and carboxylic acid groups in near vicinity.
Reason (R) : H^+ ion given by carboxylic group (-COOH) is captured by amino group (-NH$_2$) having lone pair of electrons.

112. *Assertion (A)* : Methanoic acid reduces mercuric chloride to mercurous chloride on heating while ethanoic acid does not.
Reason (R) : Methanoic acid is a stronger acid than ethanoic acid.

113. *Assertion (A)* : Sulphur dioxide and chlorine are both bleaching agents.
Reason (R) : Both are drying agents.

114. *Assertion (A)* : In case the central atom in a molecule is surrounded only by shared pairs of electrons, the molecule has a regular geometry.
Reason (R) : The shared electron pairs repel each other with equal force so all bonds are equidistant from each other.

115. *Assertion (A)* : Nitrous acid (HNO_2) may act as an oxidising as well as a reducing agent.
Reason (R) : The oxidation number of nitrogen remains same in all the compounds.

116. *Assertion (A)* : The bond order in a molecule can have any value, positive or negative, integral or fractional or zero.
Reason (R) : The bond order in a molecule depends upon the number of electrons in the bonding and antibonding molecular orbitals.

117. *Assertion (A)* : Phenol undergoes Kolbe's reaction whereas ethanol does not.
Reason (R) : Phenoxide ion is more basic than ethoxide ion.

118. *Assertion (A)* : A spectral line will be observed for a $2p_x$-$2p_y$ transition.
Reason (R) : The energy is released in the form of wave of light when electron drops from $2p_x$ to $2p_y$ orbital.

119. *Assertion (A)* : Aromatic aldehydes and also formaldehyde undergo Cannizzaro reaction with strong alkali.
Reason (R) : Aldehydes which have α - hydrogen atoms undergo Cannizzaro reaction.

120. *Assertion (A)* : With halogens and alkali, amides give primary amines having one carbon atom less.
Reason (R) : The reaction of amides with alkali is a qualitative test of amides.

BIOLOGY

121. Where would you find chondrin secreting chondrocytes ?
    (a) nerve cells   (b) bone
    (c) cartilage   (d) muscles

122. Dermis in frog's skin comprises
    (a) stratum spongiosum and compactum
    (b) compactum and malpighian
    (c) corneum and malpighian
    (d) malpighian and stratum spongiosum

123. Hairs in mammals are developed from
    (a) stratum compactum
    (b) stratum corneum
    (c) stratum germinativum
    (d) stratum spongiosum

124. Eutheria are characterised by
    (a) skin with glands   (b) true- placenta
    (c) hair   (d) skin with glands

125. In the flying birds, the quill feathers are useful for
    (a) giving shape to the bird
    (b) gaining external heat
    (c) flight in air
    (d) preventing loss of heat from the body

126. A four-chambered heart is found in
    (a) men
    (b) all vertebrates
    (c) all animals
    (d) some reptiles, birds and mammals

127. Among mammals, placenta is not found in
    (a) *Platypus*   (b) man
    (c) mouse/horse   (d) kangaroo

128. Tadpole larva is a connecting link between
    (a) reptiles and aves
    (b) amphibians and mammals
    (c) fishes and amphibians
    (d) amphibians and reptiles

129. Ontogenetically, liver is
    (a) endodermal   (b) mesodermal
    (c) ectodermal   (d) none of these

130. In frog, micromeres and megameres are formed during
    (a) third cleavage   (b) second cleavage
    (c) first cleavage   (d) fourth cleavage

131. Which of the following constitutes symbiosis ?
    (a) mutualism and commensalism
    (b) commensalism and predation
    (c) proto-cooperation and mutualism
    (d) commensalism only

132. The type of inter-specific interaction in which one of the species is unaffected, and other is harmed, is called as
    (a) predation   (b) parasitism
    (c) neutralism   (d) antibiosis

133. What percentage of Earth surface forms the grassland ?
    (a) 48%   (b) 10%
    (c) 3%   (d) 19%

134. Besides leucoplasts, starch grains can be stored in
    (a) chromoplasts   (b) chloroplast
    (c) mitochondria   (d) lysosome

135. Fraternal twins are produced when
    (a) single ovum is fertilized by two sperms
    (b) single fertilized ovum divides into two
    (c) two ova are fertilized simultaneously
    (d) two ova develop partheno-genetically

136. The genetic constitution of klinefelter's syndrome is
    (a) 44 + XY   (b) 44 + XO
    (c) 44 + XX   (d) 44 + XXY

137. Polyploidy brings about
    (a) instant speciation (b) gradual speciation
    (c) both (a) and (b)   (d) none of these

138. The book Voyage of the Beagle has a relationship with which one of the following ?
     (a) atavism   (b) lamarckism
     (c) theory of natural selection
     (d) none of these

139. Which of the following statements about photosynthesis is not true ?
     (a) photosynthesis is rapid in green light
     (b) oxygen is produced during photosynthesis from the breakdown of water
     (c) carbon dioxide is absorbed by the leaves in bright light
     (d) plants can photosynthesise without an increase in dry weight

140. The products of light reaction in photosynthesis are
     (a) ferrodoxin and cytochrome b_6
     (b) ATP and NADPH
     (c) ADP and glucose
     (d) plastoquinone and cytochrome f

141. Grana and stroma lamellae are the parts of
     (a) chloroplast   (b) golgi body
     (c) ribosome   (d) mitochondria

142. Which of the following plant shows whole plant senescence ?
     (a) gram   (b) mustard
     (c) wheat   (d) all of these

143. The pigment phytochrome was discovered by
     (a) Borthwick & Hendricks
     (b) Skoog   (c) Went
     (d) Melchers

144. A green scum suddenly appears on the village pond, most likely cause is
     (a) increase in O_2 (b) increase in excreta
     (c) increase in CO_2
     (d) increase in inorganic minerals

145. Which of the following can determine the distribution of a plant of animal species ?
     I.   rainfall   II. temperature
     III. sources of fond
     IV. sex of the individual
     (a) II and IV   (b) I and III
     (c) I, II and III   (d) Only IV

146. Which of the following techniques is an important aspect of *in vitro* culture in the field of experimental embryology ?
     (a) aeration   (b) aseptic conditions
     (c) nutrient medium   (d) all of these

147. In a seed, developing from a bitegmic ovule, the testa is the mature
     (a) both outer and inner integuments
     (b) outer integument   (c) inner integument
     (d) none of these

148. Which of the following statements is correct
     (a) the lateral meristems are present at the tip of the root
     (b) the primary permanent tissue can never become meristematic
     (c) the secondary meristems are those which develop into permanent tissues
     (d) cambium of roots is a primary meristems

149. The example of monocots showing secondary growth in stem is
     (a) *Asparagus*   (b) *Cocos*
     (c) *Lilium*   (d) *Yucca*

150. When T.S. of a dicot plant is seen under microscope, the middle region is dark but the outer region is light; the outer region is known as
     (a) annual ring   (b) sapwood
     (c) heartwood   (d) growth ring

151. Wounds in plants are healed by the activity of
     (a) intercalary meristem
     (b) lateral meristem
     (c) apical meristem
     (d) hemicellulose

152. Wood is a general term for
     (a) vessels
     (b) secondary xylem
     (c) primary xylem
     (d) secondary vascular elements

153. The perianth is the term used when
     (a) calyx is absent and corolla is similar to calyx
     (b) androecium and gynoecium are similar
     (c) calyx and corolla are similar
     (d) none of these

154. *Utricularia* is a
 (a) leafless plant
 (b) stemless plant
 (c) rootless plant
 (d) non-flowering plant

155. Which of the following functions are carried out by the leaf ?
 I. photosynthesis   II. transpiration
 III. respiration   IV. translocation
 (a) II and III   (b) I and II
 (c) I and III   (d) all of the above

156. Botanical name of pitcher plant is
 (a) *Dionoea*   (b) *Drosera*
 (c) *Nepenthes*   (d) *Utricularia*

157. Quinine, important in the treatment of malaria, is extracted from
 (a) stem of *Hevea*
 (b) bark of *Cinnamon*
 (c) bark of *Cinchona*
 (d) leaves of *Ocimum*

158. The pulse among following is
 (a) *Ocimum sanctum*
 (b) *Dalbergia latifolia*
 (c) *Coffea arabica* (d) *Cicer arietium*

159. Hemp fibres are obtained from
 (a) *Linum*   (b) *Cannabis*
 (c) *Corchorus*   (d) *Hibiscus*

160. Which is a medicinal plant ?
 (a) *Aconitum*   (b) *Linum*
 (c) *Dalbergia*   (d) *Tectona*

Instructions for Q. No. 161 to 180
Directions : Each of the questions given below consists of two statements, an assertions (A) and reason (R). Select the number corresponding to the appropriate response in the answer sheet as follows.
 (a) If both assertion and reason are true and the reason is a correct explanation of the assertion
 (b) If both assertion and reason are true but the reason is not a correct explanation of the assertion
 (c) If the assertion is true, but the reason is false
 (d) If both assertion and reason are falses

161. *Assertion (A) :* Symbiosis is also furnished by mycorrhiza.
 Reason (R) : In this case symbiosis is established between alga and virus.

162. *Assertion (A) :* Starved leaves show protoplasmic respiration.
 Reason (R) : They have protein as their respiratory substrates.

163. *Assertion (A) :* R.Q. during anaerobic respiration is always infinity.
 Reason (R) : Oxygen is never evolved.

164. *Assertion (A) :* All food chains will come to stand still if bacteria disappear from earth.
 Reason (R) : Bacteria are only associated with the soil fertility and hardly have any role for food chains.

165. *Assertion (A) :* Fruits are stored in CO_2 environment.
 Reason (R) : With increase in CO_2, the rate of respiration decreases.

166. *Assertion (A) : Monocystis* parasites in one hosts.
 Reason (R) : Monocystis is monogenetic.

167. *Assertion (A) :* Chordates have poor regeneration power while non chordates have good regeneration power.
 Reason (R) : Non chordates have asexual reproduction so they have good regeneration power.

168. *Assertion (A) :* Earthworms mate in April-June.
 Reason (R) : Copulation in earthworm lasts for one month.

169. *Assertion (A) :* Blood takes no part in reproduction in cockroaches.
 Reason (R) : Blood in them lacks respiratory pigments.

170. *Assertion (A) :* In a graafian follicle, the primary oocyte and the follicle cells may be considered as sibling cells.
 Reason (R) : Both are derived from oogonia.

171. *Assertion (A) :* Glycolysis begins in the cytoplasm and causing split into 2 three-carbon intermediates, then rearranged further to yield two molecules of pyruvate.

Reason (R) : During glycolysis four ATP and two NADPH molecules are produced and net yield is only two ATP molecules.

172. *Assertion (A)* : Translocations involve transfers of genetic material between non-homologous chromosomes.
Reason (R) : Translocation involve shifting, not deleting or adding genetic material which can cause chromosomal defects when gametes are formed.

173. *Assertion (A)* : A tadpole whose thyroid gland has been removed may not metamorphose.
Reason (R) : Calcitonin and thyroxine are produced from thyroid gland. These hormones stimulate protein synthesis which are important for tissue growth and development in amphibian tadpoles.

174. *Assertion (A)* : Gene conversion in eukaryotes occurring mainly at synapsis during meiosis, whereby a donor DNA sequence, a few hundred bases or perhaps a kilobase in length is transferred from one gene to another having substantial sequence homology.
Reason (R) : It may be responsible for much diversity in some mammalian immunoglobulin production.

175. *Assertion (A)* : Cortisol is a protein hormone of mammals which promotes gluconeogenesis and lowers blood pressure.
Reason (R) : Low plasma cortisol level promotes release of corticotropin releasing factor (CRF) from the cortex, causing release in turn of ACTH from the posterior pituitary.

176. *Assertion (A)* : Molecules of 3 phosphoglyceraldehyde get isomerized to produce dihydroxy acetone phosphate.
Reason (R) : The isomerization is catalyzed by the enzyme *phosphate triose isomerase.*

177. *Assertion(A):* Antitranspirants are material applied to plants for retarding transpiration.
Reason (R) : Abscisic acid and phenyl mercuric acetate are not antitranspirants.

178. *Assertion(A):* When the chromosomes are highly coiled and condensed at the time of cell division, it is possible to photograph and count them.
Reason (R) : Each species has a characteristic chromosome number.

179. *Assertion(A):* DNA replicates after mitosis.
Reason (R) : In mitosis the chromosomal number does not stay constant.

180. *Assertion(A):* In collateral vascular bundles phloem is situated towards the inner side.
Reason (R) : In monocot stem the cambium is present.

GENERAL KNOWLEDGE

181. The time difference between I.S.T. and G.M.T. is
(a) $5\frac{1}{2}$ hrs (b) 9 hrs
(c) $12\frac{1}{2}$ hrs (d) $8\frac{1}{2}$ hrs.

182. 'Pulitzer' prizes are awarded to Americans for excellence in
(a) films (b) social work
(c) journalism (d) meidcine.

183. Doldrum is an area of
(a) low temperature (b) low rainfall
(c) low pressure (d) low humidity.

184. The U.N. Day is observed on
(a) 24th October (b) 24th January
(c) 24th Septemper (d) 24th June.

185. Triputi temple is located in
(a) Karnataka (b) Andhra Pradesh
(c) Tamil Nadu (d) Kerala.

186. Port Blair is situated in
(a) North Andaman (b) South Andaman
(c) Middle Andaman (d) Little Andaman.

187. The first of the GAEL (Global Alliance for the elimination of Leprosy) was held in
(a) New Delhi (b) Bombay
(c) Culcutta (d) Paris.

188. Which of the following are the recipient of Bharat Ratan Award for year 2000.
(a) Lata Mangeshkar
(b) Ustad Bismillah Khan
(c) Asha Bhosle (d) Both (a) and (b).

189. Which mirror is used as a rear view mirror in vehicles?
(a) plain (b) convex
(c) concave (d) spherical.

190. Dronacharya Award is for
     (a) best sports persons
     (b) best coaches
     (c) best persons in archery
     (d) best shooters.

191. Tehri Dam is being built on the river
     (a) Yamuna   (b) Godavari
     (c) Kaveri   (d) Bhagirathi.

192. The state in South India which generates electricity based on hydel power only is
     (a) Karnataka   (b) Kerala
     (c) Tamil Nadu   (d) Andhra Pradesh.

193. The acid present in lemons and oranges is
     (a) acetic acid   (b) hydrochloric acid
     (c) citric acid   (d) oxalic acid.

194. Who wrote "Sare Jahanse Achchha Hindustan Hamara"?
     (a) Ghalib   (b) Iqbal
     (c) Nehru   (d) Azad.

195. Which country is honoured by having all the three International beauty crowns in the same year
     (a) Venezuala   (b) Italy
     (c) South America   (d) India.

196. Who among the following is the author of the book "Bradman's Best"?
     (a) Roland Perry
     (b) Barry Richards
     (c) Richard Mulvaney (d) Jom Brokaw.

197. Which of the following computer viruses is named after a cherry and caffeine soft drink popular with programmes?
     (a) Sircam   (b) Code Pink
     (c) Code Red   (d) Malisa.

198. Megger is an instrument to measure
     (a) very low resistance
     (b) insulation resistance
     (c) inductance of a coil
     (d) all of the above.

199. A red object, when seen through a thick blue glass, appears
     (a) red   (b) violet
     (c) green   (d) black.

200. The most important and the main musical instrument in "Nautanki" from of folk theatre is
     (a) nagara   (b) tabla
     (c) flute   (d) mohuri.

■ ■ ■