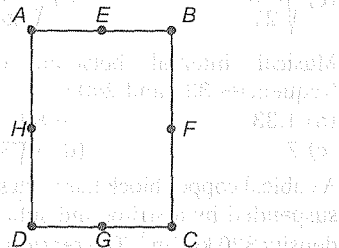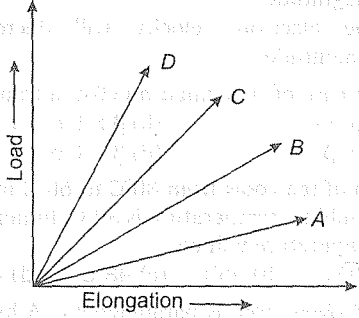# Manipal
## Medical Entrance Exam
Solved Paper 2011

Physics

1. In Young's experiment, the wavelength of red light is 7800 Å and that of blue light is 5200 Å. The value of n for which $(n + 1)$th blue band coincides with nth red band is
   (a) 1   (b) 2
   (c) 3   (d) 4

2. The hubble constant has the dimensions of
   (a) time   (b) time^{-1}
   (c) length   (d) mass

3. A boy has 60 kg weight. He wants to swim in a river with the help of a wooden log. If relative density of wood is 0.6. What is the minimum volume of wooden log?
   (Density of river water is 1000 kg/m^3)
   (a) 0.66 m^3 (b) 150 m^3
   (c) $\frac{3}{1}$ m^3 (d) $\frac{3}{20}$ m^3

4. When a triode is used as an amplifier the phase difference between the input signal voltage and output is
   (a) zero   (b) π (c) $\frac{\pi}{2}$ (d) $\frac{\pi}{3}$

5. For Balmer series that lies in the visible region, the shortest wavelength corresponds to quantum number
   (a) $n = 1$ (b) $n = 2$
   (c) $n = 3$ (d) $n = \infty$

6. A double convex lens ($\mu = 3/2$) of focal length 20 cm is totally immersed in water ($\mu = 4/3$). Its focal length now will be
   (a) 20 cm   (b) 30 cm
   (c) 40 cm   (d) 10 cm

7. Under which of the following conditions is the law $pV = RT$ obeyed most closely by a real gas?
   (a) High pressure and high temperature
   (b) Low pressure and low temperature
   (c) Low pressure and high temperature
   (d) High pressure and low temperature

8. An artificial satellite revolves around the earth in a circular orbit with a speed v. If m is the mass of the satellite, its total energy is
   (a) $\frac{1}{2} mv^2$ (b) $-\frac{1}{2} mv^2$
   (c) $-mv^2$ (d) $\frac{3}{2} mv^2$

9. When the intermolecular distance decreases due to compressive force, there is
   (a) zero resultant force between molecules
   (b) repulsive force between molecules
   (c) attractive force between molecules
   (d) no force between molecules

10. A 0.5 kg ball moves in a circle of radius 0.4 m at a velocity of 4 m/s. The centripetal force on the ball is
   (a) 10 N   (b) 20 N   (c) 40 N   (d) 80 N

11. In the unmagnetized state, magnetic domains of a magnetic substance are oriented at
   (a) 60°   (b) 90°
   (c) randomly   (d) 150°

12. If the radius of the earth were to shrink by 1%, its mass remaining the same, the acceleration due to gravity on the earth's surface would
   (a) decrease by 1%
   (b) remain unchanged
   (c) increase by 1%
   (d) increase by 2%

13. One-fourth length of a spring of force constant k is cut away. The force constant of the remaining spring will be
   (a) $\frac{3}{4} k$ (b) $\frac{4}{3} k$
   (c) k (d) $4k$

with amplitude of 0.1 m. At a certain instant when its displacement is 0.02 and its acceleration is 0.5 m/s^2. The maximum velocity of the particle is (in m/s)
(a) 0.01   (b) 0.05
(c) 0.5   (d) 0.25

15. The area of cross-section of a steel wire $(Y = 2.0 \times 10^{11} \text{ N/m}^2)$ is 0.1 cm². The force required to double its length will be
(a) 2×10^{12} N   (b) 2×10^{11} N
(c) 2×10^{10} N   (d) 2×10^{6} N

16. If a glass rod is dipped in mercury and withdrawn out, the mercury does not wet the rod because
(a) angle of contact is acute
(b) cohesion force is more
(c) adhesion force is more
(d) density of mercury is more

17. Gas exerts pressure on the walls of the container because gas
(a) has weight
(b) molecules have momentum
(c) molecules collide with each other
(d) molecules collide with the walls of the container

18. The bulk modulus of an ideal gas at constant temperature is
(a) equal to its pressure
(b) equal to its volume
(c) equal to $p/2$
(d) cannot be determined

19. If in an isothermal process the volume of ideal gas is halved, then we can say that
(a) internal energy of the system decreases
(b) internal energy of the system increases
(c) work done by the gas is negative
(d) work done by the gas is positive

20. X-ray beam of intensity I_0 passes through an absorption plate of thickness d. If absorption coefficient of material of plate is μ, the correct statement regarding the transmitted intensity I of X-ray is
(a) $I = I_0(I - e^{-\mu d})$ (b) $I = I_0 e^{-\mu d}$
(c) $I = I_0(I - e^{d/\mu})$ (d) $I = I_0 e^{-\mu/e}$

21. A 2 μF capacitor is charged to 100 V and then its plates are connected by a conducting wire, the heat produced is

(c) 0.01 J   (d) 0.00 J

22. Gauss is unit of which quantity?
(a) H (b) B
(c) ϕ (d) I

23. A body starts to fall freely under gravity. The distances covered by it in first, second and third seconds are in ratio
(a) 1 : 3 : 5   (b) 1 : 2 : 3
(c) 1 : 4 : 9   (d) 1 : 5 : 6

24. Two bodies of masses m and $2m$ have same momentum. Their respective kinetic energies K_1 and K_2 are in the ratio
(a) 1 : 2   (b) 2 : 1
(c) $1 : \sqrt{2}$ (d) 1 : 4

25. If the velocity of projection is increased by 1% (other things remaining constant) the horizontal range will increase by
(a) 1%   (b) 2%
(c) 4%   (d) 8%

26. Light of frequency v is incident on a substance of threshold frequency $v_0 (v_0 < v)$. The energy of the emitted photoelectron will be
(a) $h(v - v_0)$ (b) h/v
(c) $he(v - v_0)$ (d) h/v_0

27. Line spectrum contains information about the
(a) atoms of the prism
(b) atoms of the source
(c) molecules of the source
(d) atoms as well as molecules of the source

28. A radioactive material has a half-life of 8 yr. The activity of the material will decrease to about $\frac{1}{8}$ th of its original value in
(a) 256 yr   (b) 128 yr
(c) 64 yr   (d) 24 yr

29. The ratio of forward bias to reverse bias resistance of p-n junction diode is
(a) 10^{-1}:1   (b) 10^{-2}:1
(c) 10^{-3}:1   (d) 10^{-4}:1

30. The time of revolution of an electron around a nucleus of charge Ze in nth Bohr's orbit is directly proportional to
(a) n (b) $\dfrac{n^3}{Z^2}$
(c) $\dfrac{n^2}{Z}$ (d) $\dfrac{Z}{n}$

31. The average kinetic energy of thermal neutron is of the order of
    (a) 0.03 eV (b) 3 eV
    (c) 3 keV (d) 3 MeV
    (Boltzmann's constant $k_B = 8 \times 10^{-5}$ eV/K)

32. If the velocity of sound in air is 336 m/s. The maximum length of a closed pipe that would produce a just audible sound will be
    (a) 3.2 cm (b) 4.2 m
    (c) 4.2 cm (d) 3.2 m

33. The phenomenon of rotation of plane polarized light is called
    (a) Kerr effect (b) double refraction
    (c) optical activity (d) dichroism

34. Infrared radiation was discovered in 1800 by
    (a) William Wallaston (b) William Herschel
    (c) Wilhelm Roentgen (d) Thomas Young

35. White light is passed through a dilute solution of potassium permagnate. The spectrum produced by the emergent light is
    (a) band emission spectrum
    (b) line emission spectrum
    (c) band absorption spectrum
    (d) line absorption spectrum

36. The ionization energy of Li^{2+} is equal to
    (a) $9\ hcR$ (b) $6\ hcR$
    (c) $2\ hcR$ (d) hcR

37. The error in the measurement of radius of sphere is 0.3%, what is percentage error in the measurement of its volume?
    (a) 0.3% (b) 0.6%
    (c) 0.9% (d) $\frac{4}{3}\pi(0.3)^3$

38. In a rectangle $ABCD$ ($BC = 2\,AB$), the moment of inertia along axis will be minimum through

    (a) BC (b) BD
    (c) HF (d) EG

39. A child is sitting on a swing. Its minimum and maximum heights from the ground are 0.75 m and 2 m respectively, its maximum speed will be

    (a) 5 m/s (b) 8 m/s
    (c) 10 m/s (d) 15 m/s

40. An oscillator is basically an amplifier with gain
    (a) less than unity (b) more than unity
    (c) zero (d) 0.5

41. Which one of the following represents simple harmonic motion?
    (a) $x^2 = a + bv$ (b) $x = \sqrt{a + bv^2}$
    (c) $x = a - bv$ (d) $x = \sqrt{a - bv^2}$

42. The load *versus* elongation graph of four wires of same length and of the same material is shown in figure. The thinnest wire is represented by the line

    (a) OA (b) OB
    (c) OC (d) OD

43. An ideal choke of 10 H is joined in series with resistance of 5 Ω and a battery of 5 V. The current in the circuit in 2 s after joining in ampere will be
    (a) e^{-1} (b) $1 - e^{-1}$
    (c) $1 - e$ (d) e

44. Generally semiconductor can be used safely between the temperatures
    (a) – 75°C and 200°C (b) 0°C and 75°C
    (c) – 25°C and 300°C (d) – 40°C and 1000°C

45. In a given process on an ideal gas $dW = 0$ and $dQ < 0$, then for the gas
    (a) the temperature will decrease
    (b) the volume will increase
    (c) the pressure will remain constant
    (d) the temperature will increase

46. The wavelength of light in air is 6000 Å and in medium its value is 4000 Å. It means that the refractive index of that medium with respect to air is
    (a) 1.2 (b) 2.4
    (c) 0.66 (d) 1.5

(a) towards the base
(b) away from base
(c) parallel to base
(d) towards or away from base depending on the location

48. A uniform electric field and a uniform magnetic field are produced, pointed in the same direction. An electron is projected with its velocity pointing in the same direction
    (a) the electron will turn to its left
    (b) the electron will turn on its right
    (c) the electron velocity will increase in magnitude
    (d) the electron velocity will decrease in magnitude

49. In the case of constant α and β of a transistor
    (a) $\alpha\beta = 1$ (b) $\beta > 1, \alpha < 1$
    (c) $\alpha = \beta$ (d) $\beta < 1, \alpha > 1$

50. A cup of tea cools from 80°C to 60°C in 1 min. The ambient temperature is 30°C. In next 1 min its temperature will be
    (a) 40°C (b) 45°C (c) 48°C (d) 42°C

51. A hydrogen atom is paramagnetic. A hydrogen molecule is
    (a) diamagnetic
    (b) paramagnetic
    (c) ferromagnetic
    (d) antiferromagnetic

52. A DC circuit contains 10 Ω of resistance in series with 10 H coil. The impedance of the circuit is
    (a) 10 Ω (b) 20 Ω
    (c) 1 Ω (d) zero

53. Critical temperature of CO_2 is 31.2°C. In summer, the room temperature is 40°C
    (a) CO_2 cannot be liquefied
    (b) can be liquefied with increase of pressure
    (c) can be liquefied with decrease of pressure
    (d) can be liquefied if temperature of CO_2 is decreased below 31.2°C

54. In a meter bridge with a standard resistance of 5 Ω in the left gap, the ratio of balancing lengths on the meter bridge wire is 2 : 3. The unknown resistance is
    (a) 3.3 Ω (b) 7.5 Ω
   (c) 10 Ω (d) 15 Ω

used and $\angle S_1 C S_2 = \theta$, then the fringe width will be
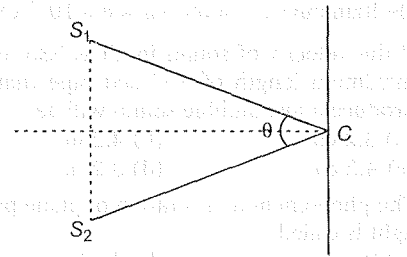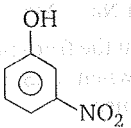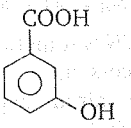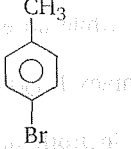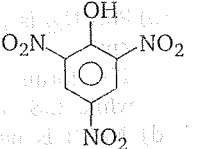
(a) $\dfrac{\lambda}{\theta}$ (b) $\dfrac{\lambda}{2\theta}$

(c) $\lambda\theta$ (d) $\dfrac{2\lambda}{\theta}$

56. If at the same temperature and pressure, the densities of two diatomic gases are d_1 and d_2 respectively, the ratio of mean kinetic energy per molecule of gases will be
    (a) 1 : 1 (b) $d_1 : d_2$
    (c) $\sqrt{d_1} : \sqrt{d_2}$ (d) $\sqrt{d_2} : \sqrt{d_1}$

57. In AC circuit a resistance of R Ω is connected in series with an inductance L. If the phase difference between the current and voltage is 45°, the inductive reactance will be
    (a) $R / 2$ (b) $R / 4$
    (c) R (d) None of these

58. A metallic wire of density d of floats in water. The maximum radius of the wire, so that it may not sink is
    (a) $\sqrt{2\pi\, dgT}$ (b) $\sqrt{\dfrac{2T}{\pi dg}}$
    (c) $\sqrt{\dfrac{\pi dg}{2T}}$ (d) $\sqrt{\dfrac{2Tg}{\pi d}}$

59. Musical interval between two notes of frequencies 320 and 240 is
    (a) 1.33 (b) 80
    (c) 7 (d) 1.78

60. A cubical copper block has each side 2.0 cm. It is suspended by a string and submerged in oil of density 820 kg/m^3. The tension in the string is (density of copper 8920 kg/m^3, $g = 10$ m/s^2)
    (a) 0.648 N (b) 0.712 N
    (c) 0.066 N (d) 1.37 N

Chemistry

1. Bond polarity of diatomic molecule is because o
   (a) difference in electron affinities of two atoms
   (b) difference in electronegativities of two atoms
   (c) difference in ionisation potentials
   (d) All of the above

2. The structure of PF_5 molecule is
   (a) square planar
   (b) tetrahedral
   (c) trigonal bipyramidal
   (d) pentagonal bipyramidal

3. A solid is made of two elements X and Z. The atoms Z are in CCP arrangement while the atoms X occupy all the tetrahedral sites. What is the formula of the compound?
   (a) XZ (b) XZ_2 (c) X_2Z (d) X_2Z_3

4. This graph expresses the various steps of the system containing 1 mole of gas. Which type of process system has when it moves from C to A?
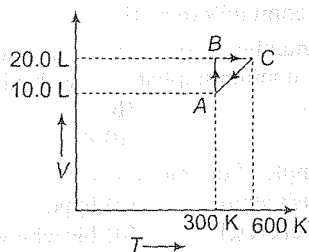
   (a) Isochoric   (b) Isobaric
   (c) Isothermal   (d) Cyclic

5. During the evaporation of liquid
   (a) the temperature of the liquid will rise
   (b) the temperature of the liquid will fall
   (c) may rise or fall depending on the nature
   (d) the temperature remains unaffected

6. A system absorb 600 J of heat and work equivalent to 300 J on its surroundings. The change in internal energy is
   (a) 300 J   (b) 400 J
   (c) 500 J   (d) 600 J

7. The enthalpies of combustion of carbon and carbon monoxide are -393.5 and -283 kJ mol^{-1} respectively. The enthalpy of formation of carbon monoxide per mole is
   (a) -676.9 kJ   (b) 676.5 kJ
   (c) 110.5 kJ   (d) -110.5 kJ

8. A reversible chemical reaction having two reactants in equilibrium. If the concentrations of the reactants are doubled, then the equilibrium constant will
   (a) be halved   (b) also be doubled
   (c) reamins the same   (d) None of these

9. For which order half-life period is independent of initial concentration?
   (a) Zero   (b) First   (c) Second   (d) Third

10. Ammonia gas dissolves in water to form NH_4OH. In this reaction water acts as
    (a) a conjugate base   (d) a non-polar solvent
    (c) an acid   (d) a base

11. If acetic acid is mixed with sodium acetate then H^+ ion concentration will be
    (a) increased   (b) decreased
    (c) remains unchanged   (d) pH decreased

12. A weak acid HX has the dissociation constant 1×10^{-5} M. It forms a salt NaX on reaction with alkali. The degree of hydrolysis of 0.1 M solution of NaX is
    (a) 0.0001%   (b) 0.01%
    (c) 0.1%   (d) 0.15%

13. The electron affinity of halogens are F = 322, Cl = 349, Br = 324, I = 295 kJ mol^{-1}. The higher value for Cl as compared to that of F is due to
    (a) weaker electron-electron repulsion in Cl
    (b) higher atomic radius of F
    (c) smaller electronegativity of F
    (d) more vacant p-subshell in Cl

14. The first ionization potential of Na, Mg, Al and Si are in the order,
    (a) Na > Mg > Al > Si (b) Na > Mg > Al < Si
    (c) Na < Al < Mg < Si (d) Na < Mg < Al > Si

15. NaCN is sometimes added in the froth floatation process as a depressant when ZnS and PbS minerals are expected because
    (a) ZnS forms soluble complex $Na_2[Zn(CN)_4]$ while PbS forms froth
    (b) $Pb(CN)_2$ is precipitated while no effect on ZnS
    (c) PbS forms soluble complex $Na_2[Pb(CN)_4]$ while ZnS form froth
    (d) NaCN is never added in froth floatation process

(c) $CuCO_3 \cdot Cu(OH)_2$ (d) Cu_2O

17. White phosphorus (P_4) has
    (a) four P—P single bonds
    (b) four lone pair of electrons
    (c) PPP angle of 60°
    (d) light P—P single bonds

18. Which of the following is most polarised?
    (a) Kr   (b) Ar   (c) He   (d) Xe

19. On dissolving moderate amount of sodium metal in liquid NH_3 at low temperature, which one of the following does not occur?
    (a) Na^+ ions are formed in the solution
    (b) Blue coloured solution is obtained
    (c) Liquid NH_3 becomes good conductor of electricity
    (d) Liquid ammonia remains diamagnetic

20. Which of the following has highest ionic radii?
    (a) Fe^{3+} (b) Cr^{3+}
    (c) Mn^{3+} (d) Co^{3+}

21. The basic character of the transition metal monoxides follows the order
    (At no. of Ti = 22, V = 23, Cr = 24, Fe = 26)
    (a) TiO > VO > CrO > FeO
    (b) VO > CrO > TiO > FeO
    (c) CrO > VO > FeO > TiO
    (d) TiO > FeO > VO > CrO

22. Which of the following is not an element?
    (a) 22 carat gold   (b) Graphite
    (c) Diamond   (d) Rhombic sulphur

23. Which of the following weights less when weighted in magnetic field?
    (a) $SrCl_3$ (b) $FeCl_3$
    (c) $TiCl_3$ (d) VCl_3

24. Picric acid is

(a)
OH
NO$_2$

(b)
COOH
OH

(c)
CH$_3$
Br

(d)
OH
O$_2$N   NO$_2$
NO$_2$

temperature
    (a) 1-hydroxy butane
    (b) 2-hydroxy butane
    (c) 2-hydroxy-2-methyl propane
    (d) 1-hydroxy-2-methyl propane

26. $A \xrightarrow{HCN} B \xrightarrow{H_3O^+}$ Lactic acid.
    Identify A
    (a) HCHO   (b) CH_3CHO
    (c) C_6H_5CHO (d) CH_3COCH_3

27. Which one of the following undergoes reaction with 50% sodium hydroxide solution to give the corresponding alcohol and acid?
    (a) Phenol   (b) Benzaldehyde
    (c) Butanal   (d) Benzoic acid

28. Catalyst $SnCl_2/HCl$ is used in
    (a) Stephen's reduction
    (b) Cannizzaro's reaction
    (c) Clemmensen reduction
    (d) Rosenmund's reduction

29. The number of ions formed when cuprammonium sulphate is dissolved in water is
    (a) zero   (b) 1
    (c) 2   (d) 4

30. An example of double salt is
    (a) potash alum   (b) hypo
    (c) $K_4[Fe(CN)_6]$ (d) bleaching powder

31. In $Fe(CO)_5$, the Fe—C bond possesses
    (a) π character only
    (b) both σ and π characters
    (c) ionic character
    (d) σ character only

32. Formic acid and acetic acid are distinguished by
    (a) $NaHCO_3$ (b) $FeCl_3$
    (c) Victor Mayer test   (d) Tollen's reagent

33. The main product obtained in the reaction of acetamide and HNO_2 is
    (a) CH_3CN (b) CH_3NC
    (c) CH_3NH_2 (d) CH_3COOH

34. $CaC_2 + H_2O \longrightarrow A \xrightarrow{H_2SO_4/HgSO_4} B$
    Identify A and B in the given reaction
    (a) C_2H_2 and CH_3CHO
    (b) CH_4 and HCOOH
    (c) C_2H_4 and CH_3COOH
    (d) C_2H_2 and CH_3COOH

35. Which one of the following has the minimum boiling point?
    (a) *n*-butane   (b) 1-butyne
    (c) 1-butene   (d) Isobutene

36. Which of these do not form Grignard reagent?
    (a) CH_3Cl (b) CH_3F (c) CH_3Br (d) CH_3I

37. In alkaline hydrolysis of a tertiary halide by aqueous alkali if concentration of alkali is doubled, then the reaction
    (a) will be doubled   (b) will be halved
    (c) will remain constant (d) None of the above

38. The functional group which is found in amino acid is
    (a) —COOH   (b) —NH_2 group
    (c) —CH_3 group   (d) Both (a) and (b)

39. Glucose and manose are
    (a) anomers   (b) epimers
    (c) ketohexoses   (d) disaccharides

40. The antiseptic present in Dettol is
    (a) qodine   (b) chloroxylenol
    (c) bithional   (d) None of these

41. Reduction of nitrobenzene in the presence of Zn/NH_4Cl gives
    (a) hydrazobenzene
    (b) aniline
    (c) azobenzene
    (d) N-phenyl hydroxylamine

42. Amongst the following the most basic compound is
    (a) *p*-nitroaniline   (b) acetanilide
    (c) aniline   (d) benzylamine

43. Reaction of aniline with acetyl chloride in the presence of NaOH gives
    (a) acetanilide
    (b) *p*-chloroaniline
    (c) a red dye
    (d) aniline hydrochloride

44. A metal oxide has the formula A_2O_3. It can be reduced by hydrogen to give free metal and water. 0.1596 g of this metal oxide requires 6 mg of hydrogen for complete reduction. What is the atomic weight of metal?
    (a) 52.3   (b) 57.5   (c) 55.8   (d) 59.3

45. An electron moves away from the nucleus, its potential energy
    (a) increases   (b) decreases
    (c) remains constant   (d) None of these

46. An *f*-shell containing 6 unpaired electrons can exchange

47. The electronic configuration of P in H_3PO_4 is
    (a) $1s^2 2s^2 2p^6 3s^2 3p^6$
    (b) $1s^2 2s^2 2p^6 3s^2$
    (c) $1s^2 2s^2 2p^6$
    (d) $1s^2 2s^2 2p^6 3s^2 3p^6 4s^1$

    (a) 6 electrons   (b) 9 electrons
    (c) 12 electrons   (d) 15 electrons

48. Underlined carbon is sp^3 hydridised in
    (a) $CH_3\underline{C}H\!=\!CH_2$ (b) $CH_3—\underline{C}H_2—NH_2$
    (c) $CH_3\underline{C}ONH_2$ (d) $CH_3CH_2\underline{C}N$

49. Acetaldehyde is the rearrangement product of
    (a) methyl alcohol   (b) allyl alcohol
    (c) vinyl alcohol   (d) All of these

50. Which of the following does not show S_{N_2} reaction?
    (a) Vinylic halide, $\!>\!C\!=\!C\!<^X$
    (b) Allyl chloride, $CH_2\!=\!CH—CH_2Cl$
    (c) Chlorobenzene, C_6H_5Cl
    (d) All of the above

51. *Meso* tartaric acid is optically inactive due to the presence of
    (a) molecular symmetry
    (b) molecular asymmetry
    (c) external compensation
    (d) two asymmetric C-atoms

52. IUPAC name of $CH_3OC_2H_5$ is
    (a) ethoxy methane   (b) methoxy ethane
    (c) Both (a) and (b)   (d) None of these

53. Which of the following applies in the reaction
    $$CH_3CHBrCH_2CH_3 \xrightarrow{Alco. KOH} ?$$
    (I) $CH_2CH\!=\!CHCH_3$ (major product)
    (II) $CH_2\!=\!CHCH_2CH_3$ (minor product)
    (a) Hofmann's rule   (b) Saytzeff's rule
    (c) Kharasch effect   (d) Markownikoff's rule

54. In which case Raoult's law is not applicable?
    (a) 1M NaCl   (b) 1M urea
    (c) 1M glucose   (d) 1M sucrose

55. The freezing point of one molal NaCl solution assuming NaCl to be 100% dissociated in water is (molal depression constant is 1.86)
    (a) – 2.72°C   (b) – 3.72°C
    (c) 2.72°C   (d) 3.72°C

56. On passing 3 A of electricity for 50 min, 1.8 g metal deposits. The equivalent mass of metal is
    (a) 9.3   (b) 19.3
    (c) 38.3   (d) 39.9

$Zn + Cu^{2+} \longrightarrow Cu + Zn^{2+}$ is 1.10 V at 25°C. The emf for the cell reaction, when 0.1 M Cu^{2+} and 0.1 M Zn^{2+} solutions are used at 25°C is
(a) 1.10 V   (b) – 1.10 V
(c) 2.20 V   (d) – 2.20 V

58. Purple of cassius is
(a) colloidal solution of Au
(b) colloidal solution of Pt
(c) colloidal solution of Ag
(d) colloidal solution of As

heat, so, according to Le-Chatelier principle, the amount of substance adsorbed should
(a) increase with decrease in T
(b) increase with increase in T
(c) decrease with decrease in T
(d) decrease with increase in T

60. The oxidation number of iron in Fe_3O_4 is
(a) + 2   (b) + 3
(c) $\dfrac{8}{3}$ (d) $\dfrac{2}{3}$

Biology

1. 'Chance favours the trained mind'. This statement was made by
(a) Ian Wilmut   (b) Robert Koch
(c) Louis Pasteur   (d) James D Watson

2. In agar plate medium having bacteriophages and bacteria, there are clear transparent area called
(a) transport parts   (b) holes
(c) bacteriophages   (d) plaques

3. Species is
(a) population of one type
(b) a group of interbreeding populations
(c) a group of individuals inhabiting geographical area
(d) population of individuals having same genotypes and phenotypes

4. Most of the broad spectrum antibiotics have been obtained from
(a) Actinomycetes   (b) bacilli
(c) spirochaetes   (d) archaebacteria

5. Which is a wrong statement?
(a) Plasmids of cyanobacteria have been used in biotechnology
(b) DNA of cyanobacteria is circular and double-stranded
(c) Cyanobacteria possess single linkage group
(d) Like bacteria, they also exhibit genetic recombination

6. Quinine, the remedy for malaria is extracted from
(a) stem of *Hevea*   (b) bark of *Cinchona*
(c) bark of *Cinnamon*   (d) leaves of *Ocimum*

7. Which part of *Ephedra* yields ephedrine?
(a) Flowers
(b) Stem or whole plant
(c) Leaves
(d) Roots

8. Which is not a larva of sponge?
(a) Tornaria   (b) Parenchymula
(c) Stereogastrula   (d) Amphiblastula

9. Which of these phenomenon is found in *Hydra*?
(a) Metamerism   (b) Metabolism
(c) Metamorphosis   (d) Sexual dimorphism

10. Complete metamorphosis occurs in
(a) bedbug
(b) silverfish
(c) grasshopper
(d) moths and mosquitoes

11. *Equus* rests on
(a) one digit   (b) three digits
(c) four digits   (d) five digits

12. Which of the following stains is used for determination of cytochrome oxidase activity in the cell?
(a) Eosin   (b) Neutral red
(c) Janus green B   (d) Methylene blue

13. The cell theory is not applicable to
(a) algae   (b) fungi
(c) viruses   (d) lichens

14. $Na^+ – K^+$ pump is found in the membranes of many cells, like nerve cells. It works against electrochemical gradient and involve an integral protein ATPase. For each molecule of ATP used
(a) 3 ions of Na^+ are pumped out and 2 K^+ are taken in
(b) 3 ions of Na^+ are taken in and 2 K^+ are pumped out

(c) 2 ions of Na^+ are thrown out and $3\,K^+$ are absorbed

(d) 3 ions of K^+ are absorbed and $3\,Na^+$ are pumped out

15. Which one is not protein?
   (a) Actin   (b) Myosin
   (c) Albumin   (d) Haematin

16. Maximum number of enzymes are found in
   (a) herbivores   (b) carnivores
   (c) omnivores   (d) None of these

17. A gene whose phenotypic effect kills the bearer is called
   (a) lethal   (b) pleiotropic
   (c) supplementary (d) complementary

18. Balbiani rings are the structural features of
   (a) allosomes
   (b) autosomes
   (c) polytene chromosomes
   (d) Lampbrush chromosomes

19. Which of the following statements regarding a double helical molecule of DNA is true?
   (a) Each strand is identical
   (b) Each strand replicates itself
   (c) Bases are perpendicular to the axis
   (d) All hydroxyl groups of pentose are involved in linkage

20. The central dogma is not applicable in the case of
   (a) retroviruses   (b) all prokaryotes
   (c) all animal viruses (d) all plant viruses

21. A gene which synthesises a repressor protein is
   (a) operator gene   (b) promotor gene
   (c) structural gene (d) regulator gene

22. The immediate product of transcription in eukaryotes will be
   (a) hn-RNA   (b) mRNA
   (c) c-DNA   (d) Sn-RNA

23. Mr. Sharma has Bb autosomal gene pair and d allele sex-linked. What will be the proportion of Bd in sperms?
   (a) 0   (b) 1/4
   (c) 1/2   (d) 1/8

24. The category of molecules produced by the Miller-Urey experiment was
   (a) organic polymers
   (b) inorganic polymers
   (c) organic monomers
   (d) inorganic monomers

25. In mammals, Melanocyte Stimulating Hormone (MSH) is
   (a) steroid hormone   (b) vestigial hormone
   (c) effective hormone (d) protein hormone

26. Birbal Sahni worked on
   (a) algae   (b) bryophytes
   (c) fossil plants   (d) angiosperms

27. Modern man differs from apes in
   (a) protruding eyes
   (b) thick body hairs
   (c) wearing of clothes
   (d) arms shorter than legs

28. *Orobanche* grow in
   (a) wheat field
   (b) paddy field
   (c) mustard field
   (d) dense tropical forest

29. Coconut fruit is dispersed by
   (a) man   (b) wind   (c) birds   (d) water

30. Outermost part of bark consisting of dead cells refers to
   (a) rhytidome   (b) phellem
   (c) phellogen   (d) phelloderm

31. In hypertonic solution, water potential of cell
   (a) increases
   (b) decreases
   (c) first increases and then decreases
   (d) remains unchanged

32. The stage of ornithine cycle at which arginase enzyme used is
   (a) Ornithine $\longrightarrow$ citrulline
   (b) Arginine $\longrightarrow$ ornithine
   (c) Citrulline $\longrightarrow$ Argino succinic acid
   (d) Ornithine $\longrightarrow$ Urea

33. Oxygen produced in photosynthesis comes from H_2O was shown by
   (a) Robert Mayer   (b) Ruben and Kamen
   (c) Calvin   (d) Robert Hill

34. The RQ of $C_{39}H_{72}O_6$ is
   (a) 2.71   (b) 1.34
   (c) 0.718   (d) 3.250

35. Match the following columns.

Column I	Column II
A. Skeletal tissue	1. Between muscles
B. Blood	2. Vascular tissue
C. Areolar tissue	3. Sweat glands
D. Serous glands	3. Cartilage

(c) 2 1 3 4

(d) 4 2 1 3

36. Compare the statement A and B.

Statement A Liver is 3-lobed in frog, 5-lobed in rabbit and 4-lobed in man.

Statement B Liver is ectodermal in origin select the correct description.

(a) Both the statements 'A' and 'B' are correct and 'B' is the correct explanation of 'A'

(b) Both the statements 'A' and 'B' are correct and 'B' is not correct explanation of A.

(c) Statement A is correct and B is wrong

(d) Statement A is wrong and B is correct

37. Which of these are never present in frog's ovary?

(a) Oogonia

(b) Corpus luteum

(c) Ovarian follicles

(d) Germinal epithelium

38. Amylopsin acts upon

(a) polypeptides

(b) polysaccharide in any medium

(c) polysaccharide in acidic medium

(d) polysaccharide in alkaline medium

39. The medullary respiratory centre is directly affected

(a) chemically   (b) physically

(c) neuronally   (d) None of these

40. Blood of which vessel in mammals carries least percentage of urea?

(a) Renal vein   (b) Dorsal aorta

(c) Renal artery   (d) Posterior vena cava

41. Match the following columns.

Column I	Column II
A. Polyuria	1. WBCs pus in urine
B. Pyuria	2. High level of uric acid in blood
C. Gout	3. Excess of urine output
D. Haematuria	3. Presence of blood (R3Cs) in urine

	A	B	C	D
(a)	3	1	2	4
(b)	2	3	1	4
(c)	1	2	3	4
(d)	4	3	2	1

(d) All of the above

43. Which of the following is not a sesamoid bone?

(a) Radius   (b) Patella

(c) Fibulla   (d) Pisciform

44. Rigidity that develops in the muscle after death is known as

(a) twitch   (b) treppe

(c) tetanus   (d) Rigor Mortis

45. Acetylcholine is

(a) neural messenger

(b) antistress hormone

(c) chemical messenger

(d) chemical transmitter

46. Heariny is controlled by

(a) cerebellum

(b) diencephalon

(c) frontal lobe of cerebrum

(d) temporal lobe of cerebrum

47. When a person suffers from a marked fall in blood pressure, it is helpful to administer to him the following hormone

(a) GH   (b) insulin

(c) thyroxine   (d) adrenaline

48. Nurse tissue technique is applied in

(a) pollen culture   (b) embryo culture

(c) ovule culture   (d) ovary culture

49. Compare the statement A and B.

Statement A Ethylene is a gas which acts as growth regulator of plants.

Statement B It is the most simple plant hormone.

(a) Both the statements 'A' and 'B' are correct and 'B' is the correct explanation of 'A'

(b) Both the statements 'A' and 'B' are correct and 'B' is not correct explanation of A.

(c) Statement A is correct and B is wrong

(d) Statement A is wrong and B is correct

50. Maximum amount of growth in root occurs

(a) in the presence of light

(b) at its apex

(c) behind the apex

(d) in the presence of soil

51. Which of the following is found inside Graafian follicle?

(a) Cortex   (b) Medulla

(c) Corpus luteum   (d) Membrane follicle

52. Human embryo will be called as a foetus after
    (a) two months   (b) six months
    (c) four months   (d) seven months

53. Functional kidney of frog's tadpole is
    (a) pronephros   (b) mesonephros
    (c) holonephros   (d) metanephros

54. Growth hormone activity is
    (a) increased by thyroxine
    (b) unaffected by thyroxine
    (c) decreased by thyroxine
    (d) None of the above

55. Helical contractile sheath is found in
    (a) virus   (b) bacterium
    (c) fungus   (d) bacteriophage

56. The process in which DNA of a bacterial cell is transferred into another bacterial cell by a virus is known as
    (a) conjugation   (b) transduction
    (c) reproduction   (d) transformation

57. With which one of the following organism a bacterium resembles most?
    (a) Yeast   (b) Virus
    (c) *Amoeba*   (d) *Anabaena*

58. Mycoplasma can multiply
    (a) in culture media
    (b) in body of living host only
    (c) in bacterial cells
    (d) on dead and decaying organic matter

59. The disease caused by *Entamoeba gingivalis* is spread through
    (a) air   (b) kissing
    (c) housefly   (d) *Anopheles*

60. Gill of mushroom are meant for
    (a) reproduction   (b) respiration
    (c) assimilation   (d) nutrition

61. How many microsporangia are found in a monothecous anther?
    (a) Only one   (b) Two
    (c) Four   (d) Many

62. Resin or terpentine oil is obtained from
    (a) *Pinus*   (b) *Cedrus*
    (c) *Cycas*   (d) None of these

63. The unit used for the measurement of size of cell is
    (a) nm   (b) mm   (c) Å   (d) µm

64. Which one is a prokaryote?
    (a) *Spirogyra*   (b) *Agaricus*
    (c) Bacteriophage   (d) *Streptococcus*

65. The primary function of intermediate filament is
    (a) generate movement
    (b) provide mechanical stability
    (c) transport organelles within the cell
    (d) stabilize microtubules against disassembly

66. Mitochondria will be found in abundance in cells of tissues having
    (a) minimum activity   (b) average activity
    (c) maximum activity   (d) None of these

67. The blood cell which shows phagocytosis is
    (a) platelet   (b) basophil
    (c) monocyte   (d) eosinophil

68. Zygotic meiosis occurs in
    (a) *Pinus*   (b) *Marchantia*
    (c) *Dryopteris*   (d) *Chlamydomonas*

69. Variations occur mostly due to
    (a) Linkage   (b) nutrition
    (c) segregation   (d) crossing over

70. The ovum of human female has autosomes
    (a) 22   (b) 22 pairs
    (c) 23 pairs   (d) 44 pairs

71. Which of the following enzymes is not required for DNA synthesis?
    (a) Ligase   (b) DNAse
    (c) DNA polymerase   (d) RNA polymerase

72. A potent inhibitor of protein synthesis that act's as an analogue of aminoacyle-*t*RNA is
    (a) rifampicin   (b) puromycin
    (c) mitomyocin   (d) streptomycin

73. Loreal pit in vipers act as which receptor?
    (a) Photo   (b) Thermo
    (c) Auditory   (d) Gustatory

74. Milk glands are characteristics of
    (a) all vertebrates
    (b) only mammals
    (c) only placental mammals
    (d) only ruminants

75. Irregular flowers are
    (a) asymmetrical   (b) symmetrical
    (c) achlamydous   (d) All of these

76. Funnel-shaped style and stigma develops in
    (a) *Crocus sativus*   (b) *Hibiscus*
    (c) *Helianthus*   (d) *Gloriosa*

77. Papain (a proteolytic enzyme) is found in the latex of
    (a) *Carica*   (b) *Ficus*
    (c) *Nerium*   (d) *Euphorbia*

(b) barometer
(c) manometer
(d) auxanometer

English

Directions (Q. Nos. 1-5) *Read the following passage carefully and answer the questions given below it.*

Education, as Mahatama Gandhi described it, 'is the tool for the development of consciousness and reconstitution of society". Since Independence, India has stressed reforming and restructuring the educational system as part of State intervention. The National Policy on Education (NPE), 1986, which is hailed as a landmark in the Indian educational system, provided a comprehensive framework to guide the development of education in the country. The NPE and its Programme of Action was again updated in 1992 through similar consensual process involving all the State Governments, resource organizations and educationists.

What has been worrying the critics and educationists alike is the non-fulfilment of one of the NPE objectives : education of girl. It has been stated in the NPE that the 'Education For All' meet should have a strong gender focus as Education For All by definition is gender inclusive.

1. According to Mahatma Gandhi, education is
   (a) a medium through which people are taught to become sensitive to the realities around them
   (b) a tool to develop their conscience and Constitution
   (c) a tool to develop their understanding of the Constitution of society
   (d) an instrument to develop their society Consciously

2. The National Policy on Education provided
   (a) guidelines for the comprehension of education in the country
   (b) guidance material to develop education in the country
   (c) a comprehensive plan for the development of education in the country

(c) P-S-I and P-S-II   (d) None of these

80. When 100% carbon is oxidized to CO_2, the efficiency of such respiration is
    (a) 40%   (b) 60%   (c) 90%   (d) 100%

(d) comprehensive development of education in the country

3. According to the passage, critics and educationists are worried that
   (a) the education of girls is one of the objectives of NPE
   (b) the objectives of NPE have not been fulfilled
   (c) non-fulfilment of NPE leads to the education of girls
   (d) one of the objectives of NPE has not been fulfilled

4. According to the passage, 'a strong gender focus' means
   (a) a focus on the strength of gender
   (b) a focus on strong gender
   (c) a strong focus on gender bias
   (d) a focus on male-female ratio

5. In the passage, the author makes a plea for
   (a) free education
   (b) universal education
   (c) the education of men
   (d) the education of women

Directions (Q. Nos. 6-9) *Choose the alternative which can be substituted for the given group of words.*

6. A person who maliciously destroys by fire.
   (a) Antagonist   (b) Activist
   (c) Terrorist   (d) Incendiary

7. A house for storing grains.
   (a) Cellar   (b) Store
   (c) Godown   (d) Granary

8. A person very hard to please.
   (a) Obstinate   (b) Unconquerable
   (c) Fastidious   (d) Invincible

9. A person claiming to be superior in culture and intellect to others.
   (a) Intellectual   (b) Aristocrat
   (c) Elite   (d) Highbrow