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Content

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TOPIC 1

MODERN PHYSICS

SECTION - I : STRAIGHT OBJECTIVE TYPE

22.1 If first excitation potential of a hydrogen like atom is V electron volt, then the ionization energy of this atom will be:

(1) V electron volt

(2) $\dfrac{3\,V}{4}$ electron volt

(3) $\dfrac{4\,V}{3}$ electron volt

(4) cannot be calculated by given information.

22.2 An electron of mass 'm', when accelerated through a potential V has de–Broglie wavelength λ. The de–Broglie wavelength associated with a proton of mass M accelerated through the same potential difference will be:

(1) $\lambda \sqrt{\dfrac{M}{m}}$

(2) $\lambda \sqrt{\dfrac{m}{M}}$

(3) $\lambda \left(\dfrac{M}{m}\right)$

(4) $\lambda \left(\dfrac{m}{M}\right)$

22.3 Two hydrogen atoms are in excited state with electrons residing in n = 2. First one is moving towards left and emits a photon of energy E_1 towards right. Second one is moving towards left with same speed and emits a photon of energy E_2 towards left. Taking recoil of nucleus into account during emission process

(1) $E_1 > E_2$

(2) $E_1 < E_2$

(3) $E_1 = E_2$

(4) information insufficient

22.4 In a hydrogen atom following the Bohr's postulates the product of linear momentum and angular momentum is proportional to $(n)^x$ where 'n' is the orbit number. Then 'x' is :

(1) 0

(2) 2

(3) –2

(4) 1

22.5 Consider atoms H, He^+, Li^{++} in their ground states. If L_1, L_2 and L_3 are magnitude of angular momentum of their electrons about the nucleus respectively then :

(1) $L_1 = L_2 = L_3$

(2) $L_1 > L_2 > L_3$

(3) $L_1 < L_2 < L_3$

(4) $L_1 = L_2 = L_3$

22.6 In an x - ray tube, if the accelerating potential difference is changed, then:
(1) the frequency of characteristic x – rays of a material will get changed
(2) number of electrons emitted will change
(3) the difference between λ_0 (minimum wavelength) and $\lambda_{k\alpha}$ (wavelength of k_α x – ray) will get changed
(4) difference between $\lambda_{k\alpha}$ and $\lambda_{k\beta}$ will get changed.

22.7 The voltage applied to an X-ray tube is 18 kV. The maximum mass of photon emitted by the X-ray tube will be:
(1) 2×10^{-13} kg
(2) 3.2×10^{-36} kg
(3) 3.2×10^{-32} kg
(4) 9.1×10^{-31} kg

22.8 When a metallic surface is illuminated with monochromatic light of wavelength λ, the stopping potential is $5\,V_0$. When the same surface is illuminated with light of wavelength 3λ, the stopping potential is V_0. Then the work function of the metallic surface is :

(1) $\dfrac{hc}{6\lambda}$

(2) $\dfrac{hc}{5\lambda}$

(3) $\dfrac{hc}{4\lambda}$

(4) $\dfrac{2hc}{4\lambda}$

22.9 The rest mass of the photon of frequency ν is:

(1) $h\nu$

(2) zero

(3) $\dfrac{h\nu}{C^2}$

(4) infinite

22.10 A heavy nucleus having mass number 200 gets disintegrated into two small fragments of mass number 80 and 120. If binding energy per nucleon for parent atom is 6.5 M eV and for daughter nuclei is 7 MeV and 8 MeV respectively, then the energy released in the decay will be:

(1) 200 MeV   (2) – 220 MeV   (3) 220 MeV   (4) 180 MeV

22.11 The energy released per a.m.u. mass of substance spent is maximum in :

(1) fission   (2) fusion   (3) radio active decay   (4) k − capture

22.12 In a hypothetical atom, if transition from n = 4 to n = 3 produces visible light then the possible transition to obtain infrared radiation is :

(1) n = 5 to n = 3   (2) n = 4 to n = 2   (3) n = 3 to n = 1   (4) none of these

22.13 The ionization energy of hydrogen atom is 13.6 eV. Hydrogen atoms in the ground state are excited by electromagnetic radiation of energy 12.1 eV. How many spectral lines will be emitted by the hydrogen atoms?

(1) one   (2) two   (3) three   (4) four

22.14 The energy difference between the first two levels of hydrogen atom is 10.2 eV. What is the corresponding energy difference for a singly ionized helium atom ?

(1) 10.2 eV   (2) 20.4 eV   (3) 40.8 eV   (4) 81.6 eV

22.15 If the binding energy of the electron in a hydrogen atom is 13.6 eV, the energy required to remove the electron from the first excited state of Li^{2+} is :

(1) 30.6 eV   (2) 13.6 eV   (3) 13.6 eV   (4) 122.4 eV

22.16 Which of the following transitions in hydrogen atoms emit photons of highest frequency ?

(1) n = 2 to n = 6   (2) n = 6 to n = 2   (3) n = 2 to n = 1   (4) n = 1 to n = 2

22.17 Binding energy per nucleon of $_1H^2$ and $_2He^4$ are 1.1 MeV and 7.0 MeV respectively. Energy released in the process $_1H^2 + _1H^2 = _2He^4$ is

(1) 20.8 MeV   (2) 16.8 MeV   (3) 25.2 MeV   (4) 23.6 MeV

22.18 The Davisson and Germer experiment verified the :

(1) Wave nature of electrons   (2) Wave nature of light
(3) Speed of light   (4) None of these

22.19 A metal surface is illuminated by a light of given intensity and frequency to cause photoemission. If the intensity of illumination is reduced to one fourth of its original value, then the maximum kinetic energy of the emitted photoelectrons would be :

(1) unchanged   (2) 1/16th of original value
(3) twice the original value   (4) four times the original value

22.20 Photoelectric effect can be explained by assuming that light

(1) is a form of transverse waves   (2) is a form of longitudinal waves
(3) can be polarised   (4) consists of quanta

22.21 Mark the correct statement: In photo electric effect -
(1) electrons are emitted from metal surface when light falls on it.
(2) the kinetic energy of photo electrons is more for light of longer wavelength in comparison to that due to shorter wavelength.
(3) both of the above
(4) none of the above

22.22 The ratio of deBroglie wavelengths of a proton and an alpha particle of same energy is .

(1) 1   (2) 2   (3) 4   (4) 0.25

22.23 The ratio of de broglie wavelengths of a proton and an alpha particle moving with the same velocity is

(1) 1   (2) 2   (3) 4   (4) 0.25

22.24 The ratio of de Broglie wavelengths of a proton and a neutron moving with the same velocity is nearly

(1) 1   (2) $\sqrt{2}$ (3) $1/\sqrt{2}$ (4) none of the above

22.25 Two particles have identical charges. If they are accelerated through identical potential differences, then the ratio of their deBroglie wavelength would be

(1) $\lambda_1 : \lambda_2 = 1 : 1$ (2) $\lambda_1 : \lambda_2 = m_2 : m_1$

(3) $\lambda_1 : \lambda_2 = \sqrt{m_2} : \sqrt{m_1}$ (4) $\lambda_1 : \lambda_2 = \sqrt{m_1} : \sqrt{m_2}$

22.26 The Lyman series of hydrogen spectrum lies in the region

(1) Infrared   (2) visible   (3) Ultraviolet   (4) of x – rays

22.27 The size of an atom is of the order of

(1) 10^{-8} m   (2) 10^{-10} m   (3) 10^{-12} m   (4) 10^{-14} m

22.28 Which one of the series of hydrogen spectrum is in the visible region

(1) Lyman series   (2) Balmer series   (3) paschen series   (4) Bracket series

22.29 The Rutherford α–particle experiment Shows that most of the α–particles pass through almost unscattered while some are scattered through large angles. What information does it give about the structure of the atom:

(1) Atom is hollow

(2) The whole mass of the atom is concentrated in a small centre called nucleus

(3) Nucleus is positively charged

(4) All the above

22.30 The ionization potential for second He electron is

(1) 13.6 eV   (2) 27.2 eV   (3) 54.4 eV   (4) 100 eV

22.31 An electron makes a transition from orbit n= 4 to the orbit n = 2 of a hydrogen atom. The wave number of the emitted radiation (R = Rydberg's constant) will be

(1) $\dfrac{16}{3R}$ (2) $\dfrac{2R}{16}$ (3) $\dfrac{3R}{16}$ (4) $\dfrac{4R}{16}$

22.32 If a_0 is the Bohr radius, the radius of the n = 2 electronic orbit in triply ionized beryllium is -

(1) $4a_0$ (2) a_0 (3) $a_0/4$ (4) $a_0/16$

22.33 Which energy state of doubly ionized lithium (Li^{++}) has the same energy as that of the ground state of hydrogen ? Given Z for lithium = 3 :

(1) $n = 1$ (2) $n = 2$ (3) $n = 3$ (4) $n = 4$

22.34 In Bohr's model of hydrogen atom, the centripetal force is provided by the Coulomb attraction between the proton and the electron. If a_0 is the radius of the ground state orbit, m is the mass and e the charge of an electron and ε_0 is the vacuum permittivity, the speed of the electron is :

(1) zero   (2) $\dfrac{e}{\sqrt{\varepsilon_0 a_0 m}}$ (3) $\dfrac{e}{\sqrt{4\pi\varepsilon_0 a_0 m}}$ (4) $\dfrac{\sqrt{4\pi\varepsilon_0 a_0 m}}{e}$

22.35 If an orbital electron of the hydrogen atom jumps from the ground state to a higher energy state, its orbital speed reduces to half its initial value. If the radius of the electron orbit in the ground state is r, then the radius of the new orbit would be :

(1) $2r$ (2) $4r$ (3) $8r$ (4) $16r$

22.36 Three photons coming from excited atomic-hydrogen sample are picked up. Their energies are 12.1eV, 10.2eV and 1.9eV. These photons must come from

(1) a single atom   (2) two atoms

(3) three atom   (4) either two atoms or three atoms

22.37 In a hypothetical atom, if transition from n = 4 to n = 3 produces visible light then the possible transition to obtain infrared radiation is :

(1) n = 5 to n = 3　　　(2) n = 4 to n = 2　　　(3) n = 3 to n = 1　　　(4) none of these

22.38 The ionization energy of hydrogen atom is 13.6 eV. Hydrogen atoms in the ground state are excited by electromagnetic radiation of energy 12.1 eV. How many spectral lines will be emitted by the hydrogen atoms?

(1) one　　　　　　　(2) two　　　　　　　(3) three　　　　　　　(4) four

22.39 50% of the x-ray coming from a coolidge tube is able to pass through 0.1 mm thick aluminium foil. If the potential difference between the target and the filament is increased, the fraction of the x ray passing through the same foil will be

(1) 0%　　　　　　　(2) <50%　　　　　　(3) >50%　　　　　　(4) 50%

22.40 Why do we not use X-rays in the RADAR

(1) They can damage the target　　　　　(2) They are absorbed by the air

(3) Their speed is low　　　　　　　　　(4) They are not reflected by the target

22.41 Production of continuous X-rays is caused by

(1) Transition of electrons from higher levels to lower levels in target atoms.

(2) Retardiation of incident electron when it enters the target atom.

(3) Transition of electrons from lower levels to higher levels in target atoms.

(4) Neutralising the incident electron.

22.42 The graph between the square root of the frequency of a specific line of characteristic spectrum of X-rays and the atomic number of the target will be
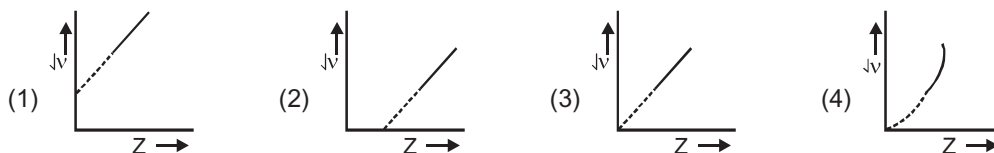

22.43 The minimum wavelength λ_{min} in the continuous spectrum of X-rays is

(1) Proportional to the potential difference V between the cathode and anode.

(2) Inversely proportional to potential difference V between the cathode and anode.

(3) Proportional to the square root of the potential difference V between the cathode and the anode.

(4) Inversely proportional to the square root of the potential difference V between the cathode and the anode.

22.44 For the structural analysis of crystals, X-rays are used because

(1) X-rays have wavelength of the order of the inter-atomic spacing.

(2) X-rays are highly penetrating radiations.

(3) Wavelength of X-rays is of the order of nuclear size.

(4) X-rays are coherent radiations.

22.45 The energy of a photon of frequency ν is $E = h\nu$ and the momentum of a photon of wavelength λ is $p = h/\lambda$. From this statement one may conclude that the wave velocity of light is equal to :

(1) 3×10^8 ms^{-1}　　　(2) $\dfrac{E}{p}$　　　(3) $E\,p$　　　(4) $\left(\dfrac{E}{p}\right)^2$

22.46 The de Broglie wavelength of an electron moving with a velocity 1.5×10^8 ms^{-1} is equal to that of a photon. The ratio of the kinetic energy of the electron to that of the energy of photon is :

(1) 2　　　　　　　(2) 4　　　　　　　(3) $\dfrac{1}{2}$　　　　　　　(4) $\dfrac{1}{4}$

22.47 Let p and E denote the linear momentum and the energy of a photon. For another photon of smaller wavelength (in same medium)
(1) both p and E increase
(2) p increases and E decreases
(3) p decreases and E increases
(4) both p and E decreases

22.48 Two separate monochromatic light beams A and B of the same intensity (energy per unit area per unit time) are falling normally on a unit area of a metallic surface. Their wavelength are λ_A and λ_B respectively. Assuming that all the incident light is used in ejecting the photoelectrons, the ratio of the number of photoelectrons from beam A to that from B is

(1) $\left(\dfrac{\lambda_A}{\lambda_B}\right)$
(2) $\left(\dfrac{\lambda_B}{\lambda_A}\right)$
(3) $\left(\dfrac{\lambda_A}{\lambda_B}\right)^2$
(4) $\left(\dfrac{\lambda_B}{\lambda_A}\right)^2$

22.49 Which one of the following graphs in figure shows the variation of photoelectric current (*I*) with voltage (*V*) between the electrodes in a photoelectric cell ?
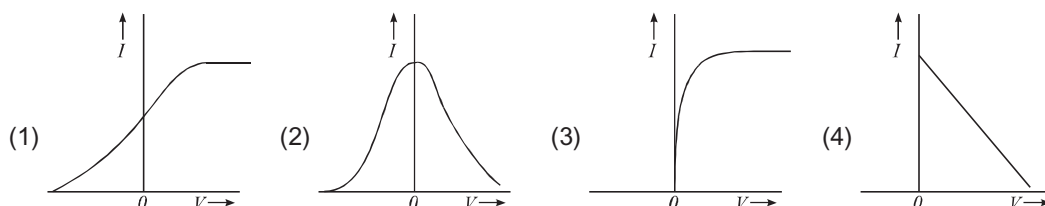
22.50 The collector plate in an experiment on photoelectric effect is kept vertically above the emitter plate. Light source is put on and a saturation photocurrent is recorded. An electric field is switched on which has vertically downward direction
(1) The photocurrent will increase
(2) The kinetic energy of the electrons will increase
(3) The stopping potential will decrease
(4) The threshold wavelength will increase

22.51 Figure shows the intensity-wavelength relations of X-rays coming from two different Coolidge tubes. The solid curve represents the relation for the tube A in which the potential difference between the target and the filament is V_A and the atomic number of the target material is Z_A. These quantities are V_B and Z_B for the other tube. Then,
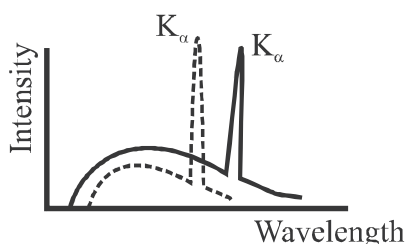
(1) $V_A > V_B, Z_A > Z_B$
(2) $V_A > V_B, Z_A < Z_B$
(3) $V_A < V_B, Z_A > Z_B$
(4) $V_A < V_B, Z_A < Z_B$

22.52 The relation between λ_1: wavelength of series limit of Lyman series, λ_2: the wavelength of the series limit of Balmer series & λ_3: the wavelength of first line of Lyman series is :
(1) $\lambda_1 = \lambda_2 + \lambda_3$
(2) $\lambda_3 = \lambda_1 + \lambda_2$
(3) $\lambda_2 = \lambda_3 - \lambda_1$
(4) none of these

22.53 If λ_{min} is minimum wavelength produced in X-ray tube and $\lambda_{k\alpha}$ is the wavelength of k_α line. As the operating tube voltage is increased.
(1) $(\lambda_k - \lambda_{min})$ increases
(2) $(\lambda_k - \lambda_{min})$ decreases
(3) $\lambda_{k\alpha}$ increases
(4) λ_{ka} decreases

**22.54** According to Moseley's law the ratio of the slopes of graph between $\sqrt{\nu}$ and Z for K_β and K_α is :
(1) $\sqrt{\dfrac{32}{27}}$
(2) $\sqrt{\dfrac{27}{32}}$
(3) $\sqrt{\dfrac{33}{22}}$
(4) $\sqrt{\dfrac{22}{33}}$

22.55 If the frequency of K_α X-ray emitted from element with atomic number 31 is f, then the frequency of K_α X-ray emitted from the element with atomic number 51 would be (assume that screening constant for K_α is 1) :

(1) $\dfrac{5}{3}$ f   (2) $\dfrac{51}{31}$ f   (3) $\dfrac{9}{25}$ f   (4) $\dfrac{25}{9}$ f

22.56 In a discharge tube when 200 volt potential difference is applied 6.25×10^{18} electrons move from cathode to anode and 3.125×10^{18} singly charged positive ions move from anode to cathode in one second. Then the power of tube is:

(1) 100 watt   (2) 200 watt   (3) 300 watt   (4) 400 watt

22.57 The wavelengths of K_α x-rays of two metals 'A' and 'B' are $\dfrac{4}{1875\,R}$ and $\dfrac{1}{675\,R}$ respectively, where 'R' is rydberg constant. The number of elements lying between 'A' and 'B' according to their atomic numbers is

(1) 3   (2) 6   (3) 5   (4) 4

22.58 An image of the sun is formed by a lens of focal length 30 cm on the metal surface of a photo-electric cell and it produces a current I. The lens forming the image is then replaced by another lens of the same diameter but of focal length 15 cm. The photoelectric current in this case will be : (In both cases the plate is kept at focal plane and normal to the axis lens).

(1) I/2   (2) 2 I   (3) I   (4) 4 I

22.59 When a monochromatic source of light is at a distance of 0.2 m from a photoelectric cell, the cut-off voltage and the saturation current are respectively 0.6 V and 18 mA. If the same source is placed 0.6 m away from the cell, then :

(1) the stopping potential will be 0.2 V   (2) the stopping potential will be 1.8 V
(3) the saturation current will be 6.0 mA   (4) the saturation current will be 2.0 mA

22.60 Which one of the following statements is NOT true for de Broglie waves ?
(1) All atomic particles in motion have waves of a definite wavelength associated with them
(2) The higher the momentum, the longer is the wavelength
(3) The faster the particle, the shorter is the wavelength
(4) For the same velocity, a heavier particle has a shorter wavelength

22.61 The mass number of a nucleus is
(1) always less than its atomic number
(2) always more than its atomic number
(3) equal to its atomic number
(4) sometimes more than and sometimes equal to its atomic number

22.62 The stable nucleus that has a radius 1/3 that of Os^{189} is -
(1) $_3Li^7$ (2) $_2He^4$ (3) $_5B^{10}$ (4) $_6C^{12}$

22.63 Two protons are kept at a separation of 50Å. F_n is the nuclear force and F_e is the electrostatic force between them, then
(1) $F_n \gg F_e$ (2) $F_n = F_e$ (3) $F_n \ll F_e$ (4) $F_n \approx F_e$

22.64 Masses of nucleus, neutron and protons are M, n_m and m_p respectively. If nucleus has been divided in to neutrons and protons, then
(1) $M = (A - Z)\,m_n + Zm_p$ (2) $M = Zm_n + (A - Z)\,m_p$
(3) $M < (A - Z)\,m_n + Zm_p$ (4) $M > (A - Z)m_n + Zm_p$

22.65 A positron of 1MeV collides with an electron of 1 MeV and gets annihilated and the reaction produces two γ-ray photons. If the effective mass of each photon is 0.0016 amu, then the energy of each γ-ray photon is about-
(1) 1.5 MeV   (2) 3 MeV   (3) 6 MeV   (4) 2 MeV

22.66 As the mass number A increases, the binding energy per nucleon in a nucleus
(1) increases
(2) decreases
(3) remains the same
(4) varies in a way that depends on the actual value of A.

22.67 An α-particle is bombarded on ^{14}N. As a result, a ^{17}O nucleus is formed and a particle is emitted. This particle is a
(1) neutron
(2) proton
(3) electron
(4) positron

22.68 A free neutron decays into a proton, an electron and :
(1) A neutrino
(2) An antineutrino
(3) An α-particle
(4) A β-particle

22.69 Radioactivity is -
(1) irreversible process
(2) spontaneous disintegration process
(3) not effected by temperature or pressure
(4) process obeying all of the above

22.70 The specific activity of radium is nearly -
(1) 1 Bq
(2) 1 Ci
(3) 3.7×10^{10} Ci
(4) 1 mCi

22.71 A freshly prepared radiocative source of half-life 2 h emits radiation of intensity which is 64 times the permissible safe level. The minimum time after which it would be possible to work safely with this source is -
(1) 6 h
(2) 12 h
(3) 24 h
(4) 128 h

22.72 10 grams of ^{57}Co kept in an open container decays β–particle with a half-life of 270 days. The weight of the material inside the container after 540 days will be very nearly -
(1) 10 g
(2) 7.5 g
(3) 5 g
(4) 2.5 g

22.73 After a time equal to four half lives, the amount of radioacitve material remaining undecayed is -
(1) 6.25 %
(2) 12.50 %
(3) 25.0 %
(4) 50.0 %

22.74 The decay constant of the parent nuclide in Uranium series is λ. Then the decay constant of the stable end product of the series will be -
(1) $\lambda/238$
(2) $\lambda/206$
(3) $\lambda/208$
(4) zero

22.75 If mass of the fissionable material is less than the critical mass, then
(1) fission and chain reactions both are impossible
(2) fission is possible but chain reaction is impossible
(3) fission is impossible but chain reaction is possible
(4) fission and chain reaction both are possible.

22.76 Atom bomb was first made by
(1) Otto hahn
(2) Fermi
(3) Oppentieimer
(4) Taylor

22.77 How much uranium is required per day in a nuclear reactor of power capacity of 1 MW
(1) 15 mg
(2) 1.05 gm
(3) 105 gm
(4) 10.5 kg

22.78 Which of the following materials is used for controlling the fission
(1) heavy water
(2) graphite
(3) cadmium
(4) Berillium oxide

22.79 Atomic reactor is based on
(1) controlled chain reaction
(2) uncontrolled chain reaction
(3) nuclear fission
(4) nuclear fusion

22.80 Thermal neutron means
(1) neutron being heated
(2) the energy of these neutrons is equal to the energy of neutrons in a heated atom
(3) these neutron have energy of a neutron in a nucleus has at normal temperature
(4) such neutrons gather energy released in the fission process

22.81 The graph of $\ell n\,(R/R_0)$ versus $\ell n\,A$ (R = radius of a nucleus and A = its mass number) is
(1) a straight line
(2) a parabola
(3) an ellipse
(4) none of them

22.82 Let F_{pp}, F_{pn} and F_{nn} denote the magnitudes of the nuclear force by a proton on a proton, by a proton on a neutron and by a neutron on a neutron respectively. When the separation is 1 fm,

(1) $F_{pp} > F_{pn} = F_{nn}$ (2) $F_{pp} = F_{pn} = F_{nn}$ (3) $F_{pp} > F_{pn} > F_{nn}$ (4) $F_{pp} < F_{pn} = F_{nn}$

22.83 When a β^--particle is emitted from a nucleus, the neutron-proton ratio :

(1) is decreased   (2) is increased   (3) remains the same   (4) first (A) then (B)

22.84 Free ^{238}U nuclei kept in a train emit alpha particles. When the train is stationery and a uranium nucleus decays, a passenger measures that the separation between the alpha particle and the recoiling nucleus becomes x in time t after the decay. If a decay takes place when the train is moving at a uniform speed υ, the distance between the alpha particle and the recoiling nucleus at a time t after the decay, as measured by the passenger will be -

(1) x + υt   (2) x - υt

(3) x   (4) depends on the direction of the train

22.85 A sample of radioactive material has mass m, decay constant λ, and molecular weight M. Avogadro constant = N_A. The initial acitvity of the sample is :

(1) λm (2) $\dfrac{\lambda m}{M}$ (3) $\dfrac{\lambda m\, N_A}{M}$ (4) $mN_A e^{\lambda}$

22.86 Two radioactive sources A and B initially contain equal number of radioactive atoms. Source A has a half-life of 1 hour and source B has a half-life of 2 hours. At the end of 2 hours, the ratio of the rate of disintegration of A to that of B is :

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

22.87 Two identical samples (same material and same amount) P and Q of a radioactive substance having mean life T are observed to have activities A_P & A_Q respectively at the time of observation. If P is older than Q, then the difference in their ages is:

(1) $T\, \ell n \left(\dfrac{A_P}{A_Q}\right)$ (2) $T\, \ell n \left(\dfrac{A_Q}{A_P}\right)$ (3) $\dfrac{1}{T}\, \ell n \left(\dfrac{A_P}{A_Q}\right)$ (4) $T\left(\dfrac{A_P}{A_Q}\right)$

22.88 Two isotopes P and Q of atomic weight 10 and 20, respectively are mixed in equal amount by weight. After 20 days their weight ratio is found to be 1 : 2. Isotope P has a half-life of 10 days. The half-life of isotope Q is

(1) zero   (2) 5 days   (3) 20 days   (4) inifinite

22.89 In a fission reaction

$$^{236}_{92}U \longrightarrow\ ^{117}X + ^{117}Y + n + n$$

the average binding energy per nucleon of X and Y is 8.5 MeV whereas that of ^{236}U is 7.6 MeV. The total energy liberated will be about :

$$^{236}_{92}U \longrightarrow\ ^{117}X + ^{117}Y + n + n$$

(1) 200 keV   (2) 2 MeV   (3) 200 MeV   (4) 2000 MeV

22.90 The stopping potential as a function of frequency of incident radiation is plotted for two different photo electric surfaces A and B. The graphs show the work function of A is
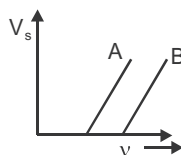
(1) Greater than that of B   (2) Smaller than that of B

(3) Same as that of B   (4) No comparison can be done from given graphs

22.91 In an electron gun electron are accelerated through a potential difference V. If e = charge of electron and m = mass of electron then maximum electron velocity will be

(1) 2eV/m   (2) $\sqrt{2eV/m}$ (3) $\sqrt{2m/eV}$ (4) $V^2/2em$

22.92 The ground State energy of hydrogen atom is – 13.6 eV. What is the potential energy of the electron in this state

(1) 0 eV   (2) – 27.2 eV   (3) 1 eV   (4) 2 eV

22.93 Penetration power of X-rays depend on
(1) current flowing in filament   (2) nature of target
(3) applied potential difference   (4) all of the above

22.94 The momentum of Photon having energy E is
(1) E/C   (2) 1/E   (3) E/C^2 (4) None of the above

22.95 The wavelength of x-ray photon is 0.01 Å, its momentum in Kg m/sec is
(1) 6.6×10^{-22} (2) 6.6×10^{-20} (3) 6.6×10^{-46} (4) 6.6×10^{-27}

22.96 The accelerating voltage of an electron gun is 50,000 volt. De-Broglie wavelength of the electron will be-
(1) 0.55 Å   (2) 0.055 Å   (3) 0.077 Å   (4) 0.095 Å
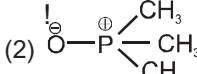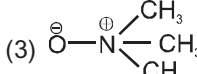
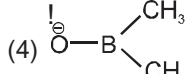## SECTION - II : ASSERTION AND REASON TYPE
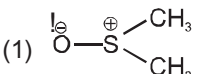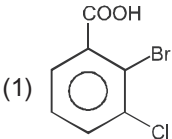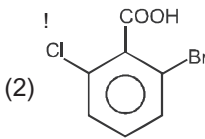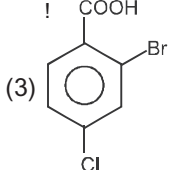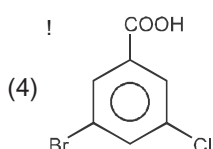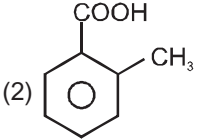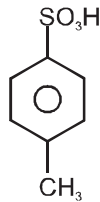
Direction :
     Read the assertion and reason carefully to mark the correct option out of the options given below :
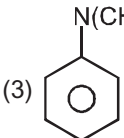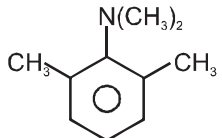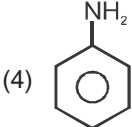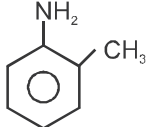   (1) If both assertion and reason are true and the reason is the correct explanation of the assertion.
     (2) If both assertion and reason are true but reason is not the correct explanation of the assertion.
     (3) If both assertion is true but reason is false.
     (4) If the assertion and reason both are false.

22.97 **Assertion :** In process of photoelectric emission, all emitted electrons donot have same kinetic energy.
Reason : If radiation falling on photosensitive surface of a metal consists of different wavelengths, then energy acquired by electrons absorbing photons of different wavelengths shall be different.

22.98 **Assertion :** $_{Z}X^{A}$ undergoes 2α decays, 2β decays (negative β) and 2γ decays. As a result the daughter product is $_{Z-2}Y^{A-8}$.

Reason : In α decay the mass number decreases by 4 unit and atomic number decreases by 2 unit. In β decay (negative β) the mass number remains unchanged and atomic number increases by 1 unit. In γ decay, mass number and atomic number remains unchanged.

22.99 **Assertion :** Q- value of a reaction : A + B $\rightarrow$ C + Q is – 30 MeV. The minimum kinetic energy of bombarding nucleus to initiate the nuclear reaction is 30 MeV.
Reason : Momentum will not be conserved in the endoergic reaction also.

22.100 **Assertion :** In spontaneous fission, the energy is always released.
Reason : Spontaneous fission occurs to lower the binding energy of reactant nuclei.

22.101 **Assertion :** Though light of a single frequency (monochromatic light) is incident on a metal, the kinetic energies of emitted photoelectrons are not equal.
Reason : The energy of electrons just after they absorb photons incident on metal surface may be lost in collision with other atoms in the metal before the electron is ejected out of the metal.
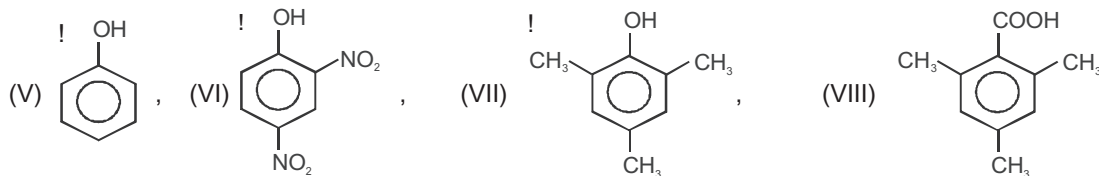
TOPIC

2

FUNDAMETAL CONCEPT IN ORGANIC REACTION MECHANISM

SECTION - I : STRAIGHT OBJECTIVE TYPE

2.1 $PhCONH_2$ and PhCOOH can be distinguished by
(I) NaOH,   (II) $NaHCO_3$ (III) 2, 4-DNP   (IV) $C_2H_5OH + H_2SO_4$
(1) II and III   (2) I and IV   (3) I, II and IV   (4) I, II, III and IV

2.2 In which of the following delocalisation of anion is not possible ?

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

2.3 The correct stability order of the following resonance structures is :

    (I)   (II)   (III)   (IV)

(1) (IV) > (I) > (III) > (II)   (2) (II) > (IV) > (I) > (III)
(3) (III) > (II) > (IV) > (I)   (4) (I) > (IV) > (III) > (II)

2.4 (X) $(C_6H_3ClBrCOOH)$ are a dihalosubstituted benzoic acids. The strongest acid among all isomers is -

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

2.5 Which of the following is correct ?

(1)   [Basic strength]

(2)   [Acidic strength]

(3)   [Basic strength]

(4)   [Basic strength]

2.6 How many compounds will liberate CO_2 gas when reacted with $NaHCO_3$?

(I) HCOOH, (II) $CH_3-\overset{\underset{||}{O}}{C}-O-OH$, (III) CH_3SO_3H, (IV) HNO_3,

(V) [phenol with OH], (VI) [phenol with OH and two NO₂ groups (2,4-dinitrophenol)], (VII) [2,4,6-trimethylphenol with OH, three CH₃], (VIII) [2,4,6-trimethylbenzoic acid with COOH, three CH₃]

(1) 4 (2) 6 (3) 5 (4) 3

2.7 Which of the following statement is correct ?
(1) The complete transfer of electron takes place in the inductive effect.
(2) Inductive effect increases with increase in distance.
(3) The resonance structures are hypothetical structure and they do not represent any real molecule.
(4) The energy of resonance hybrid is always more than that of any resonating structure.

2.8 The order of acidity of the H-atoms underlined in the following compounds:

(I) $Ph-C\underline{H}_2-CH_3$ (II) $Ph-O\underline{H}$ (III) $Ph-COO\underline{H}$ (IV) $Ph-N\underline{H}_2$
(1) II > III > I > IV (2) II > IV > III > I (3) III > IV > I > II (4) III > II > IV > I

2.9 Pyridine is less basic than triethylamine because :
(1) Pyridine has aromatic character (2) Nitrogen in pyridine is sp^2 hybridised
(3) Pyridine is a cyclic system (4) In pyridine, lone pair of nitrogen is delocalised
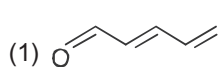
2.10 Phenol is less acidic than formic acid because.
(1) In phenol l.p. of oxygen is delocalised with benzene
(2) Phenol is aromatic & formic acid is nonaromatic.
(3) No. of resonating structures of phenoxide ion is more than fomate ion.
(4) Conjugate base of formic acid is more stabilised by equally stable resonating structures than **phenol.**

2.11 In which case conjugate acid is resonance stabilized ?

(i) [pyridine structure] (ii) [pyrrole structure with N-H]
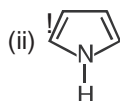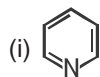
(1) Only i (2) Only ii (3) both i and ii (4) None of these

2.12 The least and most stable resonating structure respectively are :
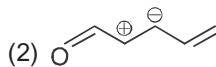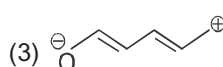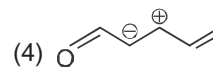
(1) [structure O with chain] (2) [structure O with ⊕ and ⊖] (3) [structure ⊖ O chain with ⊕] (4) [structure O with ⊖ and ⊕]
(1) 2, 1 (2) 2, 3 (3) 4, 1 (4) 1, 2

2.13 In which of the following all groups show positive inductive effect ?

(1) $-ONa, -Cl, CCl_3$ (2) $-\overset{\underset{||}{O}}{C}-Cl, -COONa, CH_3$
(3) $-CMe_3, -SO_3Na, COONa$ (4) $-COONa, -ONa, \overset{\oplus}{N}H_3$

2.14 In which delocalisation of positive charge is possible

(1) [benzene with $\overset{\oplus}{N}H_3$] (2) [pyrrole with $\overset{H\,\,\,\,H}{\underset{\oplus}{N}}$] (3) [benzene with $\overset{\oplus}{O}H_2$] (4) [seven-membered ring with $O^\ominus$ and ⊕]
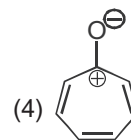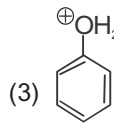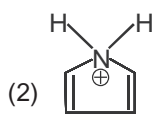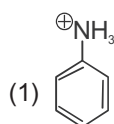
2.15 Arrange the stability of following double bonds :
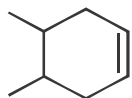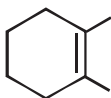
| I | II | III |

(1) I < II < III (2) II < I < III (3) I < III < II (4) II < III < I

2.16 The correct acidic strength (K_a) order of the following compounds is :
(I) $ClCH_2COOH$ (II) CH_3COOH (III) $ClCH_2CH_2COOH$ (IV) $(CH_3)_2CHCOOH$
(1) II < IV < I < III   (2) IV < II < III < I   (3) III < I < IV < II   (4) IV < II < I < III

2.17 How many p-orbitals are participated in the delocalisation of electrons in the given ion is

(1) 2   (2) 4   (3) 5   (4) 6

2.18 Write the total number of hyperconjugable hydrogen atoms in the following species :

(i) $Ph - CH_2 - HC = CH - \underset{\underset{CH_3}{|}}{\overset{\overset{CH_3}{|}}{C}} - CH_3$ **(ii)**
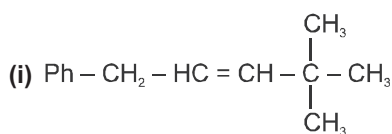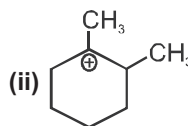
(1) 20   (2) 5   (3) 8   (4) 10

2.19 $C_2H_5OH \xrightarrow{X} C_2H_5Cl$, X can not be :
(1) $SOCl_2$ (2) PCl_3 (3) PCl_5 (4) NaCl

2.20 Alkyl halide is directly converted into alcohol by :
(1) Addition reaction   (2) Substitution reaction
(3) Dehydrogenation   (4) Elimination reaction

2.21 An S_N2 reaction at an asymmetric carbon of a compound always gives :
(1) an enantiomer of the substrate   (2) A product with opposite optical rotation
(3) A mixture of diastereomers   (4) A single stereoisomer

2.22 The conversion of $Cl - CH = CH - Cl$ to $CHCl_2 - CHCl_2$ can be carried out with :
(1) HCl (excess)   (2) Cl_2 / $h\nu$ (3) Cl_2 / CCl_4 (4) Cl_2 / NaOH

2.23 Ka value of phenol is more than that of ethanol because :
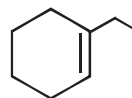(1) Phenoxide ion is stronger base than ethoxide ion.
(2) Phenoxide ion is more stable than ethoxide ion due to resonance.
(3) Phenoxide ion is less stable than ethoxide ion.
(4) Phenoxide ion is bulkier than ethoxide ion.

2.24 In which of the following rate of S_N1 reaction is very fast ?

(1) $CH_3 - CHCl - CH_3$ (2) $Ph - \underset{\underset{CH_3}{|}}{\overset{\overset{Cl}{|}}{CH}}$
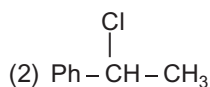
(3) $CH_3CH_2 - O - CH_2 - Cl$ (4) $CH_3 - CH = CH - Cl$

2.25 The correct order of relative acidic strength of phenol, ethtyl alcohol and water is-
(1) Phenol > Water > Ethyl alcohol   (2) Ethyl alcohol > Water > Phenol
(3) Ethyl alcohol > Phenol > Water   (4) Water > Phenol > Ethyl alcohol

2.26 Which is the decreasing order of stability

(i) $CH_3-\overset{+}{C}H-CH_3$ (ii) $CH_3-\overset{+}{C}H-O-CH_3$ (iii) $CH_3-\overset{+}{C}H-CO-CH_3$

(1) (i) > (iii) > (ii)   (2) (i) > (ii) > (iii)   (3) (iii) > (ii) > (i)   (4) (ii) > (i) > (iii)

2.27 Which order is correct for both nucleophilicity and basicity ?

(1) $Cl^- < I^-$ (2) $H_2O < H_2S$ (3) $MeO^- > F^-$ (4) $EtO^- < OH^-$

2.28 For the following species.
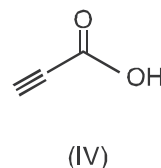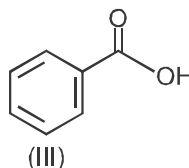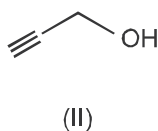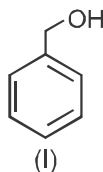
The correct order of acidity is :

(1) IV > III > II > I   (2) III > IV > I > II   (3) III > I > IV > II   (4) IV > II > III < I

2.29 Among the following compounds, the strongest base is :

(1) $NH_2-\overset{\overset{O}{\|}}{C}-NH_2$ (2) $NH_2-\overset{\overset{NH}{\|}}{C}-NH_2$ (3) $C_6H_5-NH_2$ (4) $CH_3-NH-CH_3$

2.30 Consider the following compounds, the correct basicity order is :
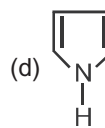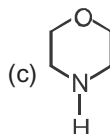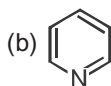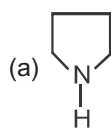
(1) d > a > b > c   (2) a > c > d > b   (3) b > c > d > a   (4) a > c > b > d

2.31 In which compound carbon-carbon double bond length is maximum ?

(1) Ethene   (2) Propene   (3) 2-Butene   (4) 2,3–Dimethyl-2-butene

2.32 Consider the following carbanions :
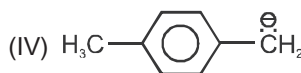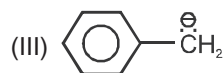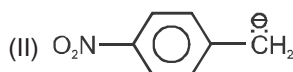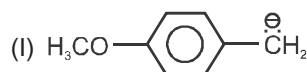
Correct decreasing order of pK_b is :

(1) II > III > IV > I   (2) III > IV > I > II   (3) I > IV > III > II   (4) II > I > III > IV

2.33 Consider the following carbocations :

(I) $C_6H_5-\overset{\oplus}{C}H_2$ (II) $C_6H_5-CH_2-\overset{\oplus}{C}H_2$ (III) $C_6H_5-\overset{\oplus}{C}H-CH_3$ (IV) $C_6H_5-\overset{\oplus}{C}(CH_3)_2$
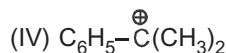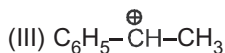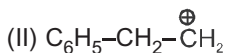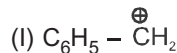
The correct sequence of the stability order is :

(1) I > II > III > IV   (2) II > I > III > IV   (3) IV > III > II > I   (4) IV > III > I > II

2.34 Consider the following groups

(I) –OAc,   (II) –OMe,   (III) –OSO_2Me (IV) –OSO_2CF_3
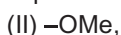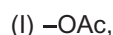
The order of leaving power is :

(1) I > II > III > IV   (2) IV > III > I > II   (3) III > II > I > IV   (4) II > III > IV > I

2.35 Basic strength of compounds

(I) CH_3-CH_2-OH ; (II) $CH_3-CH-OH$; (III) $CH_3-\underset{\underset{CH_3}{|}}{\overset{\overset{CH_3}{|}}{C}}-OH$
$\qquad\qquad\qquad\qquad\qquad\qquad\quad \underset{CH_3}{|}$
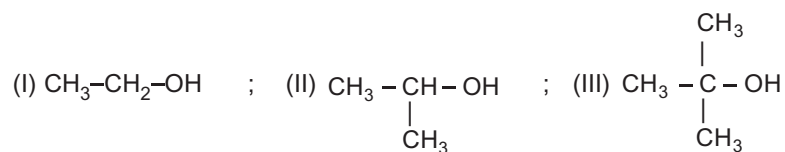
(1) III > II > I (2) I > III > II (3) II > I > III (4) III > I > II

2.36 Grignard reagent behave as nucleophile. It react with carbonyl compounds to form adduct. The type of reaction is-
(1) Electrophilic addition reactions (2) Nucleophilic addition reactions
(3) Substitution reaction (4) Elimination reaction

2.37
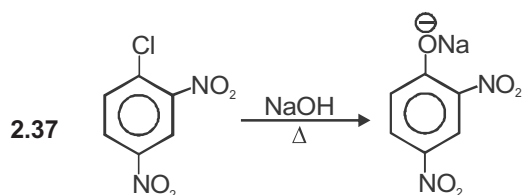
The above transformation proceeds through
(1) Electrophilic-addition (2) Benzyne intermediate
(3) Nucleophilic substitution (4) Electrophilic substitution

2.38 Racemic mixture is obtain in which substrate when it is treated with CH_3OH

(1) $CH_3-\underset{\underset{H}{|}}{\overset{\overset{H}{|}}{C}}-CH_2-Cl$
(2) $CH_3-\underset{\underset{H}{|}}{\overset{\overset{CH_3}{|}}{C}}-CH_2-Cl$
(3) $CH_3-\underset{\underset{D}{|}}{\overset{\overset{CH_2CH_3}{|}}{C}}-CH_2-Cl$
(4) $CH_3-\underset{\underset{H}{|}}{\overset{\overset{CH_2CH_3}{|}}{C}}-CH_2-Cl$

2.39 $\xrightarrow{H_2O/Acetone}$ Possible no. of product and fractions on fractional distillation are respectively.
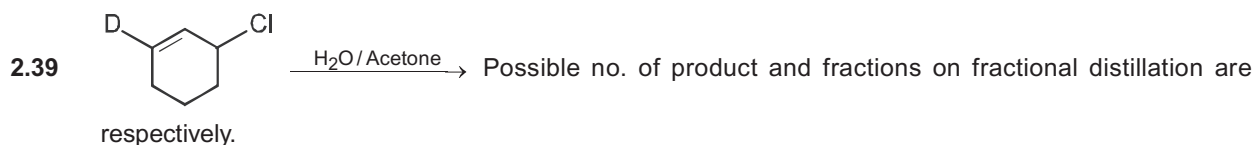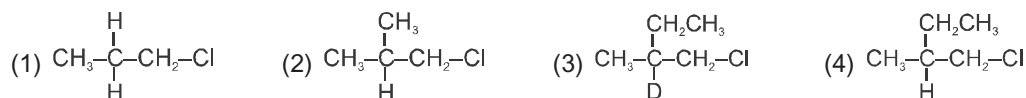
(1) 2, 1 (2) 4, 2 (3) 6, 3 (4) 8, 4

2.40 Which is the correct matched for the following reactions

(1) $-CH=CH_2 \xrightarrow{Br_2/Fe}$ Free Radical reaction

(2) $-CH_3 \xrightarrow{Cl_2/Fe}$ Electrophilic addition

(3) $-CH=CH_2 \xrightarrow{HBr/R_2O_2}$ Electrophilic substitution

(4) $-CH=CH_2 \xrightarrow[\Delta]{CH_3NH_2}$ Nucleophilic substitution
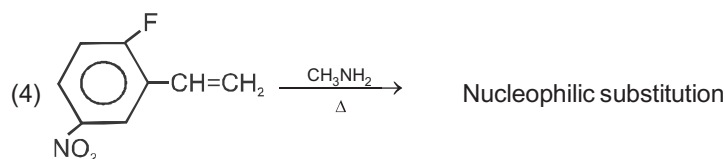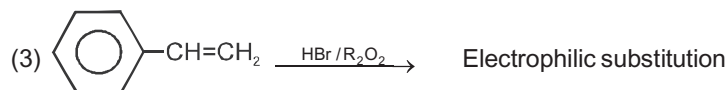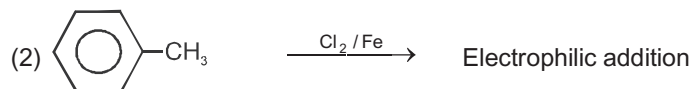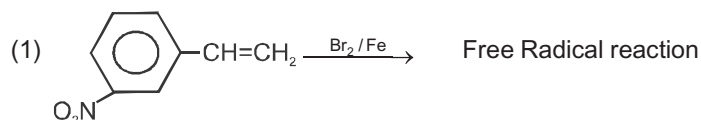
2.41 The major product of following sequence of reactions is

(1)

(2)

(3)

(4)
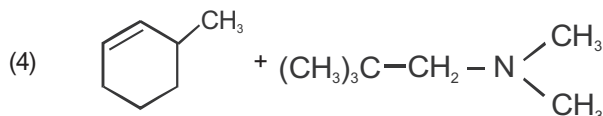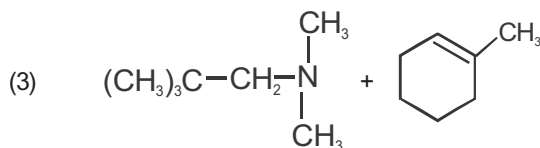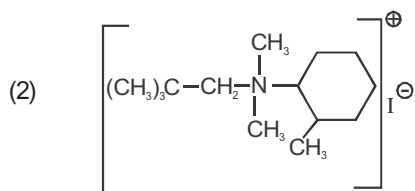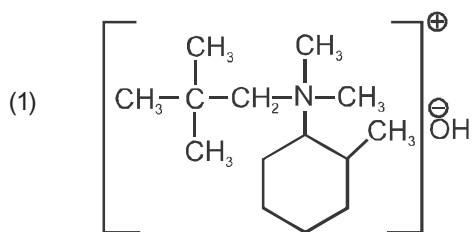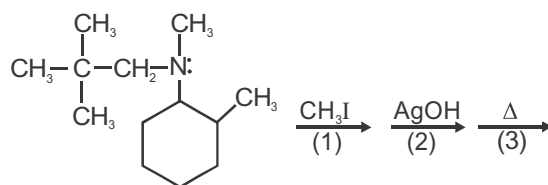
SECTION - II : ASSERTION AND REASON TYPE

DIRECTIONS : **Each question has 4 choices (1), (2), (3), and (4) out of which ONLY ONE is correct.**

(1) Assertion is True, Reason is True; Reason is a correct explanation for Assertion.
(2) Assertion is True, Reason is True; Reason is NOT a correct explanation for Assertion.
(3) Assertion is True, Reason is False.
(4) Assertion is False, Reason is True.

2.42 **Assertion :** In the resonating structures of formate ion one oxygen atom is double bonded and one is single bonded.
Reason : In the formate ion both C–O bond length are different.

2.43 **Assertion :** Resonance energy of phenanthrene is more than anthracene.
Reason : Phenanthrene has more aromatic character and more delocalisation than anthrance.

2.44 **Assertion :** Halogens are deactivating groups but have ortho-para directing nature.
Reason : Deactivating nature of halogen can be explained by – I effect & ortho-para directing nature can be explained by (stability of intermediate by) + M effect.

2.45 **Assertion :** Nitrobenzene gives metanitrotoluene on reaction with $CH_3Cl/AlCl_3$.
Reason : Nitro group is activating group and meta-directing.

2.46 **Assertion :** CH_3–CH_2–O–CH_2–Cl react faster than $CH_2 - CH_2 - O - CH_3$ when treated with CH_3MgBr.
$\underset{\displaystyle Cl}{\displaystyle |}$
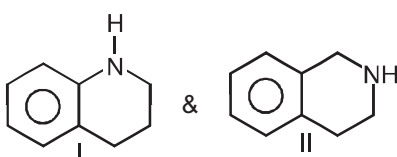
Reason : Resonance stabilised carbonium ion is formed in the above reaction by the ionization of CH_3–CH_2–O–CH_2–Cl .

2.47 **Assertion :** 3-chlorocyclopropene is solvolyzed in methanol at much higher rate than 5-chlorocyclo penta-1, 3-diene.
Reason : The intermediate carbocation of 5-chlorocyclopenta-1,3-diene is more stable than the carbocation formed by 3-chlorocyclopropene.

2.48 **Assertion :** Catechol is less acidic than resorcinol.
Reason : Ortho substituted phenols are less acidic than their coressponding meta & para isomers.

2.49 **Assertion :** & Out of I & II, I is more reactive for friedel crafts reaction.

Reason : Electron density at phenyl ring is more in I than in II

2.50 **Assertion :** In Allkyl groups +I effect order is $(CH_3)_3C– > (CH_3)_2CH– > CH_3–CH_2– > CH_3–$ but hyperconjugation effect order is $(CH_3)_3C– < (CH_3)_3CH– < CH_3–CH_2– < CH_3–$
Reason : Because both effects are opposite one has electron withdrawing and another has electron donating nature.

UNIT-IX
APPLICATION BIOLOGY-PLANT BREEDING & DISEASE CONTROL

SECTION-I : STRAIGHT OBJECTIVE TYPE

1. Atlas-66 is a protein rich variety of -
(1) rice   (2) Maize   (3) Wheat   (4) Mustard

2. Pusa Sawani is a variety of
(1) Wheat   (2) Okra   (3) Cauliflower   (4) Rapeseed Mustard

3. Virus free plants can be obtained through
(1) Shoot tip culture   (2) Haploid culture   (3) Protoplast fusion   (4) Embryo culture

4. Name the tissue culture technique used to grow nonviable inter-specific hybrids
(1) Androgenic haploids   (2) Shoot tip culture
(3) Somatic embryogenesis   (4) Embryo rescue

5. In maize, high aspartic acid small contents of nitrogen and sugar provides resistance against
(1) Stem borer   (2) Bollworm   (3) Aphids   (4) Gall wasp

6. Importing better varieties and plants from outside and acclimitising them of local environment is
(1) Selection   (2) Cloning   (3) Introduction   (4) Heterosis.

7. Heterosis is
(1) Appearance of spontaneous mutation   (2) Induction of mutation
(3) Mixture of two or more traits   (4) Superiority of hybrids over their parents.

8. Cutting of anthers from the intersexual flowers of female parents is
(1) Emasculation   (2) Male sterile line
(3) Arificial pollination   (4) Selective or differential reproduction.

9. Polyploidy is induced through
(1) Colchicine   (2) Irradiation   (3) Mutagenic chemicals (4) Ethylene.

10. Dee-geo-woo-gen is dwarfing gene of
(1) Rice   (2) Barley   (3) Oat   (4) Maize.

11. Amber coloured Wheat is produced form red coloured Mexican Wheat is
(1) Sharbati sonora   (2) Pusa Lerma   (3) Both 1 and 2   (4) Tanchung Native I.

12. Natural resistance to late blight of Potato present in
(1) Solanum tuberosum   (2) Solanum acaule   (3) S. demissum   (4) S. Stolniferum

13. Grains of major cereals and millets lack amino acids
(1) Methionine and cysteine   (2) Methionine and lysine
(3) Tryptophan and cysteine   (4) Lysine and tryptophan

14. Lysine rich Maize variety is
(1) Protina   (2) Rattan   (3) Shakti   (4) All the above

15. Prolonged use of seeds of Lathyrus sativus causes a debilitating disorder due to presence of
(1) Amygdalin   (2) Cyanogenie glucosides
(3) Neurotoxin   (4) Glucodsinolates.

16. Evaluation of newly evolved varieties is carried out by
(1) All agricultural universities
(2) ICAR
(3) IARI
(4) National Bureau of Plant Genetic Resources

17. A techniques of micropropagation is
(1) Multiples shoot production
(2) Multiples shoot production and somatic embryogenesis
(3) Growth of micro-organisms on culture medium
(4) Somatic embryogenesis.

18. Name the tissue culture technique used to grow nonviable inter-specific hybrids
(1) Androgenic haploids
(2) Shoot tip culture
(3) Somatic embryogenesis
(4) Embryo rescue

19. Variations appearing in tissue culture are
(1) Culture variations
(2) Auxotrophs
(3) Somaclonal variations
(4) pangenetic variations

20. Somatic hybridisation is achieved through
(1) Grafting
(2) Protoplast fusion
(3) Conjugation
(4) Recombinant DNA technology

21. Which one is required for protoplast fusion
(1) Treatment with cellulase and pectinase
(2) Electrofusion or PEG treatment
(3) Both 1 and 2
(4) Recombinant DNA technology

22. Virus free plants can be obtained through
(1) Shoot tip culture
(2) Haploid culture
(3) Protoplast fusion
(4) Embryo culture

23. Which technique can be helpful in over-coming hybridisation barrier
(1) Shoot tip culture
(2) Embryo rescue
(3) Protoplast fusion
(4) both 2 and 3

24. Majority of improved Indian Rice varieties have arisen from a cross between
(1) Oryza sativa indica x Oryza nivara
(2) Oryza sativa indica x O. sativa japonica
(3) oryza japonica X O. nivara
(4) O. rufipogon X O. nivara

25. In tissue bacterial culture glassware and nutrients are sterilised through
(1) Water bath at 200°C
(2) Dry air oven at 200°C
(3) Dehumidifier
(4) Autoclave

26. Azotobacter and Bacillus polymyxa are
(1) Decomposers
(2) Nonsymbiotic nitrogen fixers
(3) Symbiotic nitrogen fixers
(4) Pathogenic bacteria

27. First bioinsecticide developed on commercial scale was
(1) Quinine
(2) DDT
(3) Organophosphates
(4) Sporeine

28. Quarantine regulation is meant for
(1) Preventing entry of diseased plants / pathogen / wild plants of the country
(2) Spraying diseased plants with insecticides
(3) Promoting dry farming
(4) Growing fruit trees in all the states.

29. Hybrid vigour is best maintained in vegetatively reproducing plants because they are
(1) Resistant to diseases
(2) Easily propagated
(3) With long life span
(4) Little liable to lose vigour due to absence of sexual reproduction.

30. Thurioside is proteinaceous toxin obtained from
(1) Biofertiliser
(2) Green manure
(3) Bacterial origin
(4) Farmyard manure

31. Pomato is
(1) Somatic hybrid (2) Natural mutant (3) Androgenic haploid (4) Somatic embryoid

32. Haploid plants are obtained by culturing
(1) Root tip (2) Endosperm (3) Young leaves (4) Pollen grain/Anther

33. Devine and Collego are two trade names for
(1) Bioherbicides (2) Bioinsecticides (3) Biofungicide (4) Natural insecticides

34. Enzyme required for nitrogen fixation is
(1) Nitrogenase (2) Nitroreductase (3) Transaminase (4) Transferase

35. Differentiation of shoot in tissue culture is controlled by
(1) High auxin: cytokinin ratio (2) High cytokinin: auxin ratio
(3) High gibberellin: auxin ratio (4) High gibberellin: cytokinin ratio

36. Azolla is used as a biofertiliser because it
(1) Multiplies very fast to produce massive biomass
(2) Has association of nitrogen fixing Rhizobium
(3) Has association of nitrogen fixing cyanobacteria
(4) Has association of mycorrhiza

37. Which one is a neem product used as insect repellent
(1) Rotenone (2) Azadirachtin (3) Parathion (4) Endrin

38. Organic forming is the technique of raising crops through use of
(1) Manures (2) Resistant varieties (3) Biofertilisers (4) All of these

39. From which one of the following plants, the insecticide pyrethrum is prepared ?
(1) Cymbopogon (2) Tephrosia (3) Chrysanthemum (4) Vetivera

40. India's Wheat yield revolution of 1960s was possible primarily due to
(1) Hybrid seeds (2) Mutations resulting in plant height reduction
(3) Increased chlorophyll content (4) Quantitative trait mutation.

41. Ability of plant cells to regenerate into complete plant is known as
(1) Pleuropotency (2) Totipotency (3) Tissue culture (4) Cell cloning

42. Both in solid and suspension culture, the commonly used auxin is
(1) NAA (2) IBA (3) 2,4-D (4) 2,4,5-T

43. In Maize, hybrid vigour is produced by
(1) Crossing two inbreed lines (2) Inducing mutations
(3) Bombarding the protoplast with DNA (4) Harvesting seeds from most productive plants

44. Root knot disease of Brinjal is due to
(1) Phytophthora infestans (2) Meloidogyne incognita
(3) Fusarium udum (4) Xanthomonas citri

45. Which is incorrectly matched
(1) Explant - Excised plant part used for callus formation
(2) Cytokinins - Root initiation in callus
(3) Somatic embryo - Embryo produced from a vegetative cell
(4) Anther culture - Haploid plants
(5) Callus-Undifferentiated mass of cells

46. An organic fertilizer which improves phosphorus uptake is
(1) Actenomycete fungi (2) Rhizobium (3) Azospirillum (4) Azotobacter

47. Most potential organism for production of insecticide is
(1) Bacillus thuringiensis (2) Xanthomonas oryzae
(3) Helianthus annuus (4) Eramis tillaria

48. Breeding of crops with high level of minerals, vitamins and proteins is called
(1) Biofortication (2) Biomagnification (3) Micropropagation (4) Somatic hybridisation

49. "Jaya" and "Ratna" developed for green revolution in India are the varieties of

(1) Maize (2) Rice (3) Wheat (4) Bajra

50. When two unrelated individuals or lines are crossed, the performance of F_1 hybrid is often superior to both is parents. This phenomenon is called:

(1) Heterosis (2) Transfortnation (3) Splicing (4) Metamorphosis

51. Powdery mildew of wheat is caused by a species of

(1) Puccinia (2) Erysiphe (3) Ustilago (4) Albugo

52. Which one of the following is a case of wrong matching

(1) Somatic hybridization - Fusion of two diverse cells

(2) Vector DNA -Site for t-RNA synthesis.

(3) Micropropagation - In vitro production of plants in large numbers.

(4) Callus - Unorganised mass of cell produced in tissue culture

53. Green revolution in India occurred during :

(1) 1960's (2) 1970's (3) 1980's (4) 1950's

54. Consider the following four statements (a-d) and select the option which includes all the correct ones only.

(a) Single cell Spirulina can produce large quantities of food rich in protein, minerals, vitamins etc.

(b) Body weight-wise the microorganism *Methylophilus methylotrophus* may be able to produce several times more proteins than the cows per day

(c) Common button mushrooms are a very rich source of vitamin C

(d) A rice variety has been developed which is *very* rich in calcium.

Options :

(1) Statements (c), (d) (2) Statements (a), (c) and (d)

(3) Statements (b), (c) and (d) (4) Statements (a), (b)

SECTION-II : ASSERTION AND REASON TYPE

Direction

In each of the following questions a statement of Assertion (1) is given followed by a corresponding staterment of Reason (R) just below it. Of the statements, mark the correct answer as

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

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

(3) If assertion is true but reason is false

(4) If both assertion and reason are false.

55. **Assertion :** Genetic diversity of our crop plants must be conserved.

Reason : Genetic diversity is being or is likely to be used in the improvement of domesticated plants.

56. **Assertion :** In plant tissue culture, somatic embryos can be induced from any plant cell.

Reason : Any viable plant cell can differentiate into somatic embryo.

MICROBES IN HUMAN WELFARE

SECTION-I : STRAIGHT OBJECTIVE TYPE

1. Biotfertilisers include
(1) Blue-gree algae, rhizobia, other nirogen-fixing bacteria and mycorrhizal fungi
(2) Blue-green, algae, rhizobia and other nitrogen-fixing bacteria
(3) Rhizobia, other nitrogen-fixing bacteria and mycorrhizal fungi
(4) Blue-green algae, rhizobia and mycorrhizal fungi

2. Bt gene is
(1) Cry   (2) cry   (3) Trp   (4) None

3. The enzyme extracted from stomach of calf and used in cheese making is
(1) lactase   (2) rennin   (3) Calfine   (4) cheein

4. Name the fungus used for steroid synthesis.
(1) Aspergillus oryzae   (2) Torulopsis utilis   (3) Rhizopus stolonifer   (4) Neurospora crassa

5. Pasteurization makes foodstuffs free from
(1) All living organisms   (2) vegetative forms of milk borne pathogens
(3) All vegetative forms of bacteria   (4) All bacteria.

6. Spirulina is
(1) Biofertilizer   (2) Biopesticide   (3) Edible fungus   (4) Single cell protein

7. Yeast is an important source of
(1) Vitamin C   (2) Riboflavin   (3) Sugars   (4) Proteins

8. Formation of vinergar from alcohol is caused by
(1) Bacillus subtilis   (2) Clostridium   (3) Acetobacter aceti   (4) Azotobacter

9. Group of bacteria used in biogas production is
(1) Eubacteria   (2) organotrophs   (3) Methanotrophs   (4) Methanogens

10. Industrial production of ethanol from starch is brought about by a certain species of
(1) Penicillin   (2) Azotobacter   (3) saccharomyces   (4) Lactobacillus

11. An important objective of biotechnology in agriculture section is to
(1) Increase plant weight   (2) Produce pest resistant varieties of plant
(3) Decrease seed number   (4) None

12. Which organic acid was first produced
(1) Acetic acid   (2) Citric acid   (3) Gluconic acid   (4) Lactic acid

13. Terramycin is obtained from
(1) Streptomyces ramosus   (2) S. venezuelae
(3) S. aureofaciens   (4) S. fradiae

14. Which one of the following is not true about antibiotics
(1) Frist antibiotic was discovered by Alexander Fleming
(2) The term 'antibiotic' was coned by s. Walksman in 1942
(3) Some persons can be allergic to a particular antibiotic
(4) Each antibiotic is effective only against one particular kind of germ

15. From which microorganism is strptomycin prepared
(1) Streptomyces griseus   (2) Streptomyces venezuleae
(3) Streptomyces antibiotics   (4) streptomyces nodosus

16. Which one of the microorganisms is used for production of citric acid in industries
(1) Lactobacillus bulgaricus   (2) Penicillium citrinum
(3) Aspergillus niger   (4) Rhizopus nigricans

17. Bacteria showing loose association with root of certain grasses
(1) Rhizobia   (2) Frankia   (3) Azospirillum   (4) Spirulina

18. Which one is a free living, aerobic, non-photosynthetic nitrogen fixing bacterium
(1) Anabaena   (2) Azospirillium   (3) Azotobacter   (4) Rhizobium

19. Yoghurt is produced with the helps of
(1) Lactobacillus bulgaricus   (2) Lactobacillus thermophilus
(3) Streptococcus thermophilus   (4) Both (1) & 3

20. Besides dung, the weed which can be used in biogas production is
(1) Hydrilla   (2) Solanum nigrum
(3) Eichhornia crassipes   (4) Parthenium hysterophorus

21. Streptomyces venezuelae produce antibiotic
(1) Chloromycetin   (2) Aureomycin   (3) Tetracycline   (4) Streptomycin

22. The two vitamins manufactured biotechnologically are
(1) Vitamin B_{12} and Vitamin B_6 (2) Vitamin B_{12} and vitamin B_2
(3) Vitamin B_6 and Vitamin B_2 (4) Vitamin B_{12} and Vitamin B_9

23. The term antiobitic was coined by
(1) Alexander Flerming   (2) S. Walksman   (3) Louis Pasteur   (4) Edward Jenner

24. Penicillin inhibits bacterial multiplication because it
(1) Checks RNA synthesis   (2) Checks DNA synthesis
(3) Destroys chromatin   (4) Inhibits cell wall formation

25. Mycorrhiza promotes plants growth by
(1) Absorbing inorganic ions from soil   (2) Helping the plants in utilizing atmospheric nitrogen
(3) Protecting the plant from infection   (4) Saving as plant growth regulator.

26. Bacillus thuringiensis (Bt) strains have been used for designing novel
(1) Biofertilizers   (2) Bioi-metallurgical techniques
(3) Bio-mineralization processes   (4) Bio-insecticidal plants

27. Probiotics are
(1) Cancer inducing microbes   (2) New kind of food supplement
(3) Live microbial food supplement   (4) Safe antibiotics

28. A genetically engineered micro-organism used successfully in bioremediation of oil spills is a species of
(1) Trichoderma   (2) Xanthomonas   (3) Bacillus   (4) Pseudomonas

29. Streptomyces aurfaciens produces antibiotic
(1) Chlormoycetin   (2) Aureomycin   (3) Tetracycline   (4) Streptomycin

30. Vinegar is prepared from alcohol with the help of
(1) Lactobacillus   (2) Streptococcus thermophilus
(3) Lactobacillus bulgaricus   (4) Acetobacter aciti

31. Antibiotic cephalosporin is got from
(1) Bacterium   (2) Alga   (3) Fungus   (4) Mycoplasma

32. Broad spectrum antibiotics are the ones which attack
(1) Pathogens as well as hosts   (2) A wide range of pathogens
(3) Only a pathogen   (4) Only host

33. Match the columns

	Column I		Column II
a	Neomycin	p	Streptomyces fradiae
b	Terramycin	q	Penicillium notatum
c	Viridin	r	Streptomyces rimosus
d	Penicillin	s	Gliocladium virens

(1) a–r, b–p,c–s,d–q   (2) a–p, b–r,c–s,d–q   (3) a–r, b–s,c–p,d–q   (4) a–s, b–p,c–q, d–r

34. Streptomyces fradiae produces
(1) Aureomycin   (2) Terramycin   (3) Neomycin   (4) Erythromycin

35. Pasteurisation is
(1) Heating of liquid at 65ºC
(2) Heating of liquid between 65º-80ºC followed by rapid cooling
(3) Heating of solids at 65ºC
(4) None of these

36. An enzyme that stimulates germination of Barley seeds is
(1) Invertase   (2) α - amylase   (3) Lipase   (4) Protease

37. Stirred-tank bioreactors have been designed for
(1) Purification of the product   (2) Ensuring anaerobic conditions in the culture vessel
(3) Availability of oxygen throughout the process   (4) Addition of preservatives to the product

38. Select the correct statement from the following
(1) Methanobacterium is an aerobic bacterium found in rumen of cattle
(2) Biogas, commonly called gobar gas, is pure methane
(3) Activated sludge-sediment in settlement tanks of sewage treatment plant is a rich source of aerobic bacteria
(4) Biogas is produced by the activity of aerobic bacteria on animal waste

39. Which of the following is mainly produced by the activity of anaerobic bacteria on sewage
(1) Laughing gas   (2) Propane   (3) Mustard gas   (4) Marsh gas

40. Ethanol is commercially produced through a particular species of :
(1) Saccharomyces   (2) Clostridium   (3) Trichoderma   (4) Aspergillus

41. Which one of the in absorption of phosphorus from soil by plants?
(1) Glomus   (2) Rhizobium   (3) Frankia   (4) Anabaena

42. Read the following statement having two blanks (A and B):
"A drug used for --------(A)-------- patients is obtained from a species of the organism --------(B)--------."
The one correct option for the two blanks is:

	Blank - A	Blank - B
(1)	Heart	Penicillium
(2)	Organ-transplant	Trichoderma
(3)	Swine flu	Monascus
(4)	AIDS	Pseudomonas

43. Which one of the following is a wrong matching of a microbe and its industrial product, while the remaining three are correct ?
(1) Yeast - statins   (2) Acetobacter aceti - acetic
(3) Clostridium butylicum - lactic acid   (4) Aspergillus niger - citric acid

44. The drug Cyclosporin used for organ transplant patients is obtained from a
(1) Bacterium   (2) Fungus   (3) Virus   (4) Plant

45. A common biocontrol agent for the control of plant diseases caused by fungi is
(1) Agrobacterium   (2) Glomus   (3) Trichoderma   (4) Baculovirus

46. In paddy fields biological nitrogen fixation is chiefly brought by
(1) Cyanobacteria   (2) Green algae   (3) Mycorrhiza   (4) Rhizobium

47. Monascus purpureus is a yeast used commercially in the production of :
(1) ethanol
(2) streptokinase for removing clots from the blood vessels.
(3) Citric acid
(4) blood cholesterol lowering statins

48. Which one of the following microbes forms symbiotic association with plants and helps them in their nutrition
(1) Azotobacter   (2) Aspergillus   (3) Glomus   (4) Trichoderma

49. Which one single organism or the pair of organisms is **correctly** assigned ot its or their named taxonomic group
(1) Paramecium and Plasmodium belong to the same kingdom as that of Penicillium
(2) Lichen is a composite organism formed form the symbiotic association of an algae and a protozoan
(3) yeast used in making bread and beer is a fungus
(4) Nostoc and Anabaena are examples of protista

50. Yeast is used in the production of
(1) Citric acid and lactic acid   (2) Lipase and pectinase
(3) Bread and beer   (4) Cheese and butter

SECTION-II : ASSERTION AND REASON TYPE

Direction
In each of the following questions a statement of Assertion is given followed by a corresponding staterment of Reason just below it. Of the statements, mark the correct answer as
(1) If both assertion and reason are true and reason is the correct explanation of assertion
(2) If both assertion and reason are true but reason is not the correct explanation of assertion
(3) If assertion is true but reason is false
(4) If both assertion and reason are false.

51. **Assertion :** Nitrogen-fixing bacteria in legume root nodules survive in oxygen-depleted cells of nodules.
Reason : Legheamoglobin completely removes oxygen form the nodule cells.

52. **Assertion :** Azolla pinnata is used as biolfertilizer in rice cultivation.
Reason : Azolla performs dinitrogen fixation with the help of symbiotic bacterium Bacillus sp.

BIOTECHNOLOGY PRINCIPLES, PROCESSES & APPLICATION

SECTION : STRAIGHT OBJECTIVE TYPE

1. Taq polymerase enzyme is used in
(1) restriction mapping   (2) gene cloning   (3) PCR   (4) All of these

2. In gel electrophoresis, the separated bands of DNA are cut from the agaros gel & extracted from the gel piece it is called
(1) Separation   (2) Insertional inactivation
(3) Elution   (4) Eluviation

3. The full form of GEAC is -
(1) Government environmental approval committee
(2) Genetic engineering association committee
(3) Geo environmental approval committee
(4) Genetic engineering approval committee

4. An example of gene therapy is
(1) Production of injectable hepatitis B vaccine
(2) Production of vaccines in food crop
(3) Introduction of adenosine deaminase gene in infants affected with SCID
(4) Production of test tube babies through artificial insemination and implantation

5. Genetic engineering would not have been possilble if one of these were absent.
(1) DNA polymerase   (2) Reverse transcriptase
(3) DNA ligase   (4) RNA synthetase

6. The technique for breakage of DNA fragement and inserting it into another DNA molecule, is related to
(1) Gene splicing   (2) Gene cloning   (3) Gene typing   (4) DNA finger printing

7. "Molecular Scissors" used in genetic engineering is
(1) DNA polymerase   (2) DNA ligase
(3) Restriction endonuclease   (4) Helicase

8. Taq polymerase enzyme is used in
(1) restriction mapping   (2) gene cloning   (3) PCR   (4) All of these

9. Which of the following is a method of gene transfer
(1) Microinjection   (2) Particle gun   (3) Electroporation   (4) All of these

10. VNTRs are
(1) Variable number of tendem repeats   (2) Very narrow tandem repeats
(3) Variable noncistronin transposon repeats   (4) Valuable non-cistronic transposonic regions

11. The enzyme TPA (tissue plasminogen activator) is used for
(1) Dissolving blood clots   (2) Maintaining plasma content
(3) Clearing turbidity of juices   (4) Stimulating thromboplastin production

12. Giant Mouse that has been produced through
(1) Tissue culture   (2) Gene differentiation   (3) Gene manipulation   (4) All of the above

13. Hirudin is
(1) A protein produced by Hordeum vulgar, which is rich in lysine
(2) A toxic molecule isolated from Gossypium hirsutum, which reduced fumn fertiltiy
(3) A protein produced from transgenic Brassica napus, which prevent blood clotting
(4) An antibiotic produced by a genetically engineered bacterium Eschrichia coli

14. The southern blot technique is used for the detection of
(1) DNA   (2) RNA   (3) Protein   (4) RNA

15. Recombinant DNA technology can be used to produce quantities of biologically active form of which one of the following products synthesized in E.coli
(1) Luteining hormone   (2) Ecdysone   (3) Rifamycin   (4) Interferon

16. Kohler and Milstein developed biotechnology for production of
(1) Modern vaccines   (2) immobilised enzymes
(3) Monoclonal antibodies   (4) Myelomas

17. The new strain of bacteria produced by biotechnology in alcohol industry is
(1) Escherichia coli   (2) Saccharomyces cerevisiae
(3) Bacillus subtilis   (4) Pseudomonas putida

18. Bt is resistant to
(1) virus   (2) adverse environmental conditions
(3) Bollworm   (4) Herbicide

19. Crystals of Bt-toxin produced by some bacteria do not kill the bacteria themselves because
(1) Bacteria are resistant to the toxin   (2) Toxin is immature
(3) Toxin is inactive   (4) Bacteria encloses toxin in a special sac

20. Two bacteria most useful in genetic engineering are
(1) Rhizobium and Azotobacter   (2) Escherichia and Agrobacterium
(3) Rhizobium and Diplococcus   (4) Nitrosomonas and Klebsiella

21. An abnormal gene is replaced by normal gene. It is called
(1) Gene therapy   (2) Cloning   (3) Mutation   (4) None ofthe above

22. Introduction of genetically modified food is not desirable because
(1) It will affect economy of developing countries
(2) The products are less tasty
(3) They are costly
(4) There is, danger of entry of toxins and virus in food

23. The enzymes which are commonly used in genetic engineering are
(1) Restriction endonuclease and polymerase (2) Endonuclease and ligase
(3) Restriction endonuclease and ligase   (4) Ligase and polymerase

24. Restriction enzymes
(1) Are endonucleases which cleave DNA at specific sites
(2) Make DNA complementary to an existing DNA or RNA
(3) Cut or join DNA fragments
(4) Are required in vectorless direct gene transfer

25. DNA segment cleaved by EcoRI is
(1) ATTCGA, TAAGCT   (2) GAATTC, CTTAAG (3) GCTTAA, CGAATT (4) GTTCAA,CAAGTT

26. Extrachromosomal DNA used as vector in gene cloning is
(1) Transposon   (2) Intron   (3) Exon   (4) Plasmid

27. In transgenics, the expression of transgene in the target tissue is known by
(1) Enhancer   (2) Transgene   (3) Promoter   (4) Reporter.

28. Natural genetic engineer is
(1) Pseudomonas putida   (2) Agrobacterium tumefaciens
(3) Escherichia coli   (4) Bacillus sublilis

29. Ti-plasmid is used for making transgenic plants. It is obtained from
(1) Azotobacter   (2) Agrobacterium
(3) Rhizobium in leguminous root   (4) Yeast.

30. Bt in popular Bt-Cotton stands for
(1) Biotechnology   (2) Bacillus tomentosa
(3) Bacillus thuringiensis   (4) Best type

31. An example of gene therapy is
(1) Production of injectable hepatitis B vaccine
(2) Production of vaccines in food crop
(3) Introduction of adenosine deaminase gene in infants affected with SCID
(4) Production of test tube babies through artificial insemination and implantation

32. Identify the plasmid
(1) EcoRI   (2) pBR 322   (3) AIUI   (4) Hind III

33. Polymerase chain reaction is useful in
(1) DNA synthesis   (2) DNA amplification. (3) Protein synthesis   (4) Amino acid synthesis

34. Flavr Savr variety of Tomato is
(1) High yielding hybrid variety   (2) High yielding new variety
(3) Transgenic vaiety   (4) Polyploid

35. Production of human protein in bacteria genetic engineering is possible because
(1) Human chromosome replicate bacterial cell
(2) Mechanism of gene regulation is identical in humans and bacteria
(3) Bacterial cell can undertake RNA splicing
(4) Genetic code is universal

36. Electroporation is
(1) Making transient pores in cell membranes to introduce gene constructs
(2) Fast passage of nutrients through phloem sieve pores by electric stimulation
(3) Opening of stomata by artificial light during night
(4) Purification of saline water with the help of membrane system

37. Vitamin A rich transgenic plant is
(1) Flavr Savr Tomato   (2) Golden Rice   (3) Bt Cotton   (4) Vaccinated Potato

38. Genomic DNA library is
(1) Packing of donor DNA in a collection of vectors
(2) A collection of gene vectors
(3) Collection of organisms for extracting DNA
(4) A collection of literature about DNA

39. Genetically engineered microorganism used successfully in bioremediation of oil spills is
(1) Trichoderma   (2) Xanthomonas   (3) Bacillus   (4) Pseudomonas putida

40. A transgenic food crop which may help in solving the problem of night blindness in developing countries is
(1) Bt Soyabean   (2) Golden Rice
(3) Flavr Savr Tomatoes   (4) Starlink Maize

41. Main objective of production / use of herbicide resistant GM crops is to
(1) Encourage eco-friendly herbicides
(2) Reduce herbicide accumulation in food articles for health safety
(3) Eliminate weeds from the fields without the use of manual labour
(4) Eliminate weeds from the fields without the use of herbicides.

42. Cultivation of Bt cotton has been much in the news. The prefix Bt means
(1) Barium treated cotton seeds
(2) Carrying an endotoxin gene from Bacillus thruingiensis
(3) Produced by biotechnology using restriction enzymes and ligases
(4) Bigger thread variety of cotton with better tensile strength

43. The genetically-modified (GM) brinjal in india has been developed for
(1) Enhancing shelf life   (2) Enhancing mineral content
(3) Drought-resistance   (4) Insect-resistance

44. Given below is a sample of a portion of DNA strand. What is so special shown in it
5'——GAATTC——3'
3'——CTTAAG——5'
(1) Replication completed   (2) Deletion mutation
(3) Start codon at the 5' end   (4) Palindromic sequence of base pairs

45. There is a restriction endonuclease called EcoRI. What does 'co' part in it stand for ?
(1) colon   (2) coelom   (3) coenzyme   (4) coli

46. Maximum number of existing transgenic animals is of :
(1) Fish   (2) Mice   (3) Cow   (4) Pig

47. Agarose extracted from sea weeds finds use in :
(1) Spectrophotometry   (2) Tissue Culture   (3) PCR   (4) Gel electrophoresis

48. The process of RNA interference ha.been used in the development of plants resistant to
(1) Nematodes   (2) Fungi '   (3) Viruses   (4) Insects

49. Silencing of mRNA has been used in producing transgenic plants resistant to:
(1) Bollworms   (2) Nematodes   (3) White rusts   (4) Bacterial blights

50. Which one of the following techniques made it possible to genetically engineer living organism ?
(1) Recombinant DNA techniques   (2) X-ray diffraction
(3) Heavier isotope labelling   (4) Hybridization

51. Read the following four statements (A-D) about certain mistakes in two of them
(A) The first transgenic buffalo, Rosie produced milk which was human alpha-lactal bumin enriched.
(B) Restriction enzymes are used in isolation of DNA from other macro-molecules.
(C) Downstream processing is one of the steps of R-DNA technology.
(D) Disarmed pathogen vectors are also used in transfer of R-DNA into the host.
Which are the two statements having mistakes ?
(1) Statement (B) and (C)   (2) Statement (C) and (D)
(3) Statement (A) and (C)   (4) Statement (A) and (B)

52. A kind of Biotechnology involving manipulation of DNA is
(1) DNA replication   (2) Genetic engineering   (3) Denaturation   (4) Renaturation

53. What is true of plasmid?
(1) Found in viruses   (2) Contains genes for vital activities
(3) Part of nuclear chromosome   (4) Widely used in gene transfer

54. Nucleic acid segment tagged with a radiactive molecule is called
(1) Clone   (2) Probe   (3) Plasmid   (4) Vector

55. GM brinjal in India has been developed for resistance against
(1) Virus   (2) Bacteria   (3) Fungi   (4) Insects

56. For transformation, micro-particles coated with DNA to be bombarded with gene gun are made up of :
(1) Silver or Platinum   (2) Platinum or Zinc   (3) Silicon or Platinum   (4) Gold or Tungsten

57. Which one is a **true** statement regarding DNA polymerase used in PCR
(1) It is used to ligate introduced DNA in recipient cell
(2) It serves as a selectable marker
(3) It is isolated from a virus
(4) It remains active at high temperature

58. Consumption of which one of the following foods can prevent the kind of blindness associated with vitamin'A' deficiency ?
(1) Flaver Savr' tomato   (2) Canolla   (3) Golden rice   (4) Bt-Brinjal

59. PCR and Restriction Fragment Length Polymorphism are the methods for :
(1) Study of enzymes   (2) Genetic transformation
(3) DNA sequencing   (4) Genetic Fingerprinting

60. The figure below is the diagrammatic representation of the E.Coli vector pBR 322. Which one of the given options correctly identifies its certain component (s) ?
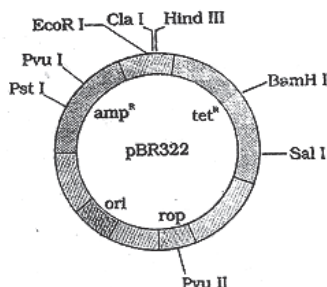
(1) ori - orignal restriction enzyme   (2) rop-reduced osmotic pressure
(3) Hind III, EcoRI - selectable markers   (4) amp^R, tet^R - antibiotic resistance genes

61.   The figure below shows three steps (A,B,C) of Polymerase Chain Reaction (PCR). Select the option giving correct 'identification together with what it represents ?
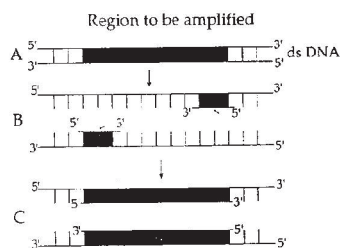
Options :
(1) B - Denaturation at a temperature of about 98°C separating the two DNA strands.
(2) A - Denaturation at a temperature of about 50°C
(3) C - Extension in the presence of heat stable DNA polymerase
(4) A - Annealing with two sets of primers

62.   The first clinical gene therapy was given for treating :
(1) Diabetes mellitus   (2) Chicken pox
(3) Rheumatoid arthritis   (4) Adenosine deaminase deficiency

63.   Which one of the following represents a palindromic sequence in DNA ?
(1)   5' - GAATTC - 3'
        3' - CTTAAG - 5'
(2)   5' - CCAATG - 3'
        3' - GAATCC - 5'
(3)   5' - CATTAG - 3'
        3' - GATAAC - 5'
(4)   5' - GATACC - 3'
        3' - CCTAAG - 5'

64.   Tobacco plants resistant to a nematode have been developed by the introduction of DNA that produced (in the host cells).
(1) both sense and anti-sense RNA   (2) a particular hormone
(3) an antifeedant   (4) a toxic protein

65.   Biolistics (gene-gun) is suitable for :
(1) Disarming pathogen vectors   (2) Transformation of plant cells
(3) Constructing recombinant DNA by joining with vectors
(4) DNA finger printing

66.   In genetic engineering, the antibiotics are used :
(1) as selectable markers   (2) to select healthy vectors
(3) as sequences from where replication starts   (4) to keep the cultures free of infection

SECTION-II : ASSERTION AND REASON TYPE
Direction
        In each of the following questions a statement of **Assertion** is given followed by a corresponding staterment of **Reason** just below it. Of the statements, mark the correct answer as
        (1) If both assertion and resaon are true and reason is the correct explanation of assertion
        (2) If both assertion and reason are true but reason is not the correct explanation of assertion
        (3) If assertion is true but reason is false
        (4) If both assertion and reason are false.

67.   **Assertion :** The cut pieces of DNA are linked with plasmid DNA.
       Reason : Plasmid DNA fails to act as vectors.

68.   **Assertion :** In recombinant DNA technology, human genes are often transferred into bacteria (prokaryotes) or yeast (eukaryote)
       Reason : Both bacteria and yeast multiply very fast to form huge populations which express the desired gene.

DOMESTICATION OF PLANTS & ECONOMIC BOTANY

SECTION-I : STRAIGHT OBJECTIVE TYPE

1. Ginger of commerce is
   (1) Leaves of Zingiber officinale
   (2) Rhizome of Zingiber officinale
   (3) Fruits of Syzygium aromaticum
   (4) Rhizome of Syzygium aromaticum

2. Rubber is collected from
   (1) Crushing the stems of Euphorbia
   (2) Tapping the stem of Carica papaya
   (3) Tapping the stem of Hevea brasiliensis
   (4) Crushing the fruits and collecting the latex of Achras sapota

3. The stimulant present in Tea is
   (1) Tannin   (2) Nicotine   (3) Caffeine   (4) codeine

4. The latex used in preparation of Chewing Gum is got from
   (1) Parthenium argentatum
   (2) Achras sapota
   (3) Hevea brasiliensis
   (4) Ficus elastica

5. Coimbatore has
   (1) Central Drug Research Institute
   (2) Sugarcane Breeding Research Institute
   (3) Potato Research Institute
   (4) Botanical Research Institute

6. Jute is
   (1) Bast Fibres of Corchorus
   (2) Bast fibres of Crotalaria
   (3) Bast fibres of Linum usitatissimum
   (4) Fibres of Coconut fruit.

7. Cotton is obtained from
   (1) Cocos nucifera   (2) Gossypium hirsutum   (3) Taxus baccata   (4) Sesamum indicuim

8. Taxol is got from
   (1) Cocos nucifera   (2) Gossyium hirsutum   (3) Taxus baccata   (4) Sesamum indicum

9. Edible oil rich in poly-unsaturated fats is got from
   (1) Cotton   (2) Sunflower   (3) Coconut   (4) Palm Oil

10. Which one yields nonedible oil
   (1) Mustard   (2) Rape   (3) Sesame   (4) Castor

11. Richest source of vitamin C is
   (1) Emblica officinalis   (2) Orange   (3) Lemon   (4) Capsicum frutescence

12. Potato and Tomato are native of
   (1) Peru   (2) Central America   (3) U.S.A.   (4) Mediterranean

13. Unripe inflorescence is source of vegetable in
   (1) Brassica oleracea var. capitata
   (2) Brassica oleracea var. botryitis
   (3) Brassica napus var. glauca
   (4) Brassica napus var. napus

14. Muscular dystrophy of lower limbs is caused by prolonged intake of apulse called
   (1) Lathyrus sativus   (2) Lathyrus odoratus   (3) Lens culinaris   (4) Cyamopsis tetragonaloba

15. Maize grains are
   (1) Rich in niacin
   (2) Poor in tryptophane and lysine
   (3) Source of zeatin
   (4) All the above

16. Cuttack is famous for
   (1) Central potato Research Indtiture
   (2) Central Drug Research Institute
   (3) Central Sugracane Breeding Research
   (4) Central Rice Research Institiute

17. The three topmost major crops of the world in the order of total production are
(1) Wheat > Rice > Maize
(2) Rice > Wheat < Maize
(3) Wheat > Maize > Rice
(4) Rice > Maize > Wheat

18. Gene banks comprise
(1) Seed banks, orchards, tissue culture and cryopreservation
(2) Seed banks, tissue culture and cryopreservation
(3) seed banks and cryopreservation
(4) Tissue culture and cryopreservation

19. Name the crop which had its birthplace in Tropical america but the centre of production is now midwest U.S.A.
(1) Pineapple   (2) Oil Palm   (3) Cacao   (4) Maize

20. Which one belongs to new World
(1) Red pepper   (2) Black Pepper   (3) Onion   (4) Garlic

21. Peruvain andes are believed to be centre of origin of
(1) Tomato   (2) Potato   (3) Tomato and Potato   (4) Tomato, Potato and chillies

22. Dry farming is
(1) Farming in deserts
(2) Planting drought resistant trees in deserts
(3) Growing crops in unirrigated arid areas
(4) Farming using sprinkler system.

23. Silviculture is cultivation of
(1) Forest trees   (2) Rare plants   (3) Cotton   (4) Flax

24. Cardamoms are ripe dried fruits of
(1) Zingiber officinale
(2) Elettaria cardamomum
(3) Carthamus tinctorius
(4) Cinnamomum zeylanicum

25. Opium is got from the latex of unripe of
(1) Cannabis sativa
(2) Papaver somniferum
(3) Erythroxylon coca
(4) Thea sinensis

26. Bagasse is connected with the manufacture of
(1) Cellulose   (2) Cane Sugar   (3) Chewing gum   (4) Resin

27. A drug from roots which cures mental ' disorders and reduces blood pressure is obtained' from.
(1) Rauvolfia serpentina (2) Atropa beladona   (3) Colchicum luteum   (4) Digitalis purpurea.

28. Clove oil is extracted from
(1) Santalum wood
(2) Floral buds of Syzygium aromaticum
(3) Vetiveria roots
(4) Leaves of Syzyium aromaticum.

29. Substitute milk is prepared from
(1) Grapes   (2) Gram   (3) Barley   (4) Soyabean

30. Theobroma cacao (Sterculiaceae) yields Cocoa from
(1) Seeds   (2) Bark   (3) Leaves   (4) Roots

31. Quinine is extracted from
(1) Bark of Cinnamomum
(2) Leaves of ocimum
(3) Leaves of Cinnamomum
(4) Bark of Cinchona

32. Banana is cultivated by means of
(1) Rhizome
(2) Underground suckers
(3) Stolons
(4) Seeds.

33. Palm oil is obtained from
(1) Elaeis   (2) Olea   (3) Phoenix   (4) Cocos

34. The principal cereal crop of India & Asia is
(1) Sorghum   (2) Barley   (3) Wheat   (4) Rice

35. Wood used for making cricket bats is got from
(1) Tectona grandis
(3) Morus alba / M. nigra
(2) Salix alba / S. purpurea
(4) Cedrus deodara

36. An important product obtained from styles and stigmas is
(1) Saffron   (2) Asafoetida   (3) Fennel   (4) Termeric

37. Cotton fibres are obtained from
(1) Seed epidermis   (2) Seed coat   (3) Fruit wall   (4) Mesocarp

38. Which pair yields both fibres and oil
(1) Cotton and Sunflower
(3) Cotton and Linseed
(2) Linseed and Soyabean
(4) Sunn Hemp and Mustard

39. Marijuana is got from
(1) Cannabis sativa   (2) Papaver somniferum   (3) Clavicveps purpurea   (4) Linnum usitissimum

40. Drug ephedrine is got from part of Ephedra plant
(1) Flowers   (2) Leaves   (3) Root   (4) Stem

41. Which one yields resin, timber and pulp
(1) Dalbergia   (2) Quercus   (3) Pinus   (4) Eucalyptus

42. Vanilla is got from
(1) Fruits   (2) Flowers   (2) Roots   (4) Stem

43. Which one yields oil from seeds and orange dye from petals
(1) Helianthus annuus   (2) Calendula officinalis   (3) Rauvolfia serpentina   (4) Carthamus tinctorius

44. Fiber yielding plant of economic importance are
(1) Gossypium, Hibiscus, Cannabis
(3) Gossypium, Cassi, Lycopersicum
(2) Gossypium, Brassica, Glycyrrhiza
(4) Gossypium, Cannabis, Cassia

45. Lathyrism due to consumption of Khesri dal is characterised by
(1) Skeletal deformation and thinning of collagen fibres
(2) Sketetal defromities, diabetes mellitus and reproductive failure
(3) Retarded growth, precocious puberty and renal dysfunction
(4) Cardiovascular abnormalities, mental retardation and delayed puberty

46. National Botanical Research Institute is located in
(1) Delhi   (2) Calcutta   (3) Lucknow   (4) Dehradun

47. A pseudocereal is
(1) Zea mays   (2) Oryza sativa   (3) Triticum aestivum   (4) Fagopyrum esculentum

48. Which one of the following is not paired correctly
(1) Winged Bean–Wood used for timber purposes
(2) Jojoba–Seeds yield liquid wax
(3) Guayule–Yeilds latex which can be converted into rubber
(4) Leucaena–Wood as a source of timber, paper pulp and rayon

49. The edible dry fruit "Chilgoza" is
(1) Fruit of Pinus gerardiana
(3) Seed of Cycas
(2) Fruit of Pinus gerardiana
(4) Seed of Pinus gerardiana

50. Genetic divesity in agricultural crops is threatened by
(1) Introduction of high yielding varieties
(3) Extensive intercropping
(2) Intensive use of fertilizers
(4) Intensive -use of biopesticides.

BIOENERGY

SECTION-I : STRAIGHT OBJECTIVE TYPE

1. How much fraction of total solar energy reaching earth is conveted into biomass
(1) 2% (2) 0.2% (3) 0.02% (4) 20%

2. Source of latex containing liqud hydrocarbons is
(1) Euphorbiaceae (2) asclepiadaceae
(3) Apocynaceae and compositae (4) All of these

3. Energy crops are
(1) Sugarcane potato, cereals and euphorbia (2) Sugarcane, potato, tapioca and maize
(3) Sugarcane, millets and banana (4) Tapioca, molasses and acacia

4. Maximu alcohol is obtained from which of the following energy crop
(1) Sugarcane (2) wood (3) Tapioca (4) Maize

5. Which of the following is a biodiesel plant.
(1) Jatropha curcas (Ratan Jyot) (2) Jatropha esculaenta (Arand)
(3) Hevea brasilensis (Rubber) (4) All of these

6. In which of the following forms animal energy is available
(1) HMP and DAP (2) Animal wastes (3) Fossil fuels (4) Biofuels

7. Raising of crops for the production of ethanol is known as
(1) Energy cropping (2) Energy plantation (3) Agro-technology (4) Biomass production

8. Scociall forestry is
(1) Planting of different kinds of trees in the same area
(2) Greening of hills with the efforts of common men
(3) Raising trees on common village lands and other vacant areas for fodder, minor timber and afire wood
(4) Planting of trees along river embankments

9. Energy plantation is
(1) Growing starch / sugar rich plants (2) Growing latex rich plants
(3) Growing fuel wood trees (4) Growing fruit plants.

10. Gasohol contains
(1) 50–60% alcohol (2) 10–15% alcohol (3) 30–40% alcohol (4) 80–90% alcohol

11. The process that provides both energy and manure is
(1) Burning of fuel wood (2) Pyrolysis of wood
(3) Gasification of wood and wood shavings (4) Biogas formation

12. Besides dung, the weed which can be used in biogas production is
(1) Hydrilla (2) Solanum nigrum
(3) Eichhornia crassipes (4) Parthenium hysterophorus

13. Petro-crops are plants
(1) Grown near oil fields (2) Used in refining crude oil
(3) Whose fossil remains formed crude oil (4) From which petrol-like fuels can be derived

14. Bacteria utilised in gobar gas plants are
(1) Methanogens (2) Nitrifying (3) Ammonifying (4) Denitrifying

15. Recently government of India has allowed mixing of alcohol in petrol. What is amount of alcohol permitted for mixing in petrol
(1) 25% (2) 10-15% (3) 10% (4) 5%

16. The main energy containing components of biogas is
(1) Methane (2) Hydrogen (3) Hydrogen sulphide (4) Carbon dioxide

17. Pyrolysis of wood occurs in
(1) Presence of air (2) Absence of air (3) Limited supply of air (4) Both 2 and 3

AGRICULTURE CHEMICALS-PESTICIDES

SECTION : STRAIGHT OBJECTIVE TYPE

1. First pesticide used by man was
(1) Rotenone   (2) Pyrethrum   (3) DDT   (4) Not known

2. Brodeaux mixture was first fungicide to be discovered. It has $CuSO_4$ + Lime + Water in ratio of
(1) 4 : 4: 40   (2) 4 ; 4 : 50   (3) 2 : 2 : 40   (4) 2 : 2 : 20

3. The first pesticide to be used commercially was
(1) 2, 4-D   (2) Burugandy mixture   (3) DDT   (4) Bordeaux mixture

4. 2, 4-D a synthetic auxin is used as
(1) insecticide   (2) pesticide   (3) herbicide   (4) fungicide

5. The chemical present in Baygonis
(1) Malathion   (2) Propoxur   (3) Carbofuran   (4) Aldicarb

6. The chemical present in flit is
(1) Malathion   (2) DDT   (3) BHC   (4) Aldicarb

7. The general mode of action of most insecticides is through their attack on
(1) respiratory system   (2) nervous system   (3)muscular system   (4) criculatory system

8. The pesticides having very low biodegradation and strong affinity for fatty tissues are
(1) Organochlorines   (2) Organophosphates   (3) Triazines   (4) Pyrethroids

9. Pesticide ingredient which killed 2500 people in Bhopal gas tragedy in 1984 is
(1) mustard has gas   (2) DDT   (3) Methyl isocyanate   (4) Carbon tetrachloride

10. DDT shows biomagnification (bioconcentration). It is found maximum in milk cream. Its concentration in human fat in india has reached level of
(1) 5–10 ppm   (2) 13–31 ppm   (3) 51 –75 ppm   (4) 0.1 –10 ppm

11. Sporeine is a
(1) herbicide   (2) pesticide   (3) mycoherbicide   (4) Bioinsecticide

12. Organophsophates are safer than chlorinated hydrocarbons (organochlorines–DDT) but are very toxic. The most widely used organophosphate in world is
(1) malathion   (2) parathion
(3) fenitrothion   (4) tetraethyl pyrophosphate (TEPP)

13. An example of pesticidetreadmill is
(1) forty times increase in requirement of pesticide for protecting cotton
(2) development fo resistance in mosquitoes to DDT, BHC, malathion and fenitrothion
(3) decreasing use of pesticides due to in ptroduction of biological control
(4) decreasing use of pesticides due to decrease in the population of pests

14. The most common pesticide used in India is
(1) DDT   (2) Endrin   (3) BHC   (4) Baygon

15. Most effective pesticides are
(1) Carbamates   (2) Organochlorines   (3) Organophosphates   (4) All the above

16. Zinc phosphide is a pesticide used for
(1) spraying   (2) fumigation   (3) killing weevils   (4) killing rodents

17. malathion, parathion and fenitrothion belong to group of pesticides
(1) Triazines   (2) Carbamates   (3) Pyrethroids   (4) Organophosphates

18. Aldrin causes
(1) industrial polluiton   (2) air pollution   (3) soil pollution   (4) all of these

19. Acetyl cholinesterase inhibitor is characteristic of pesticide.

(1) Malathion   (2) Aldrin   (3) Endosulphan   (4) BHC

20. First commercial pesticide was

(1) Burgandy mixture   (2) Bordeaux mixture   (3) DDT   (4) 2 : 4-D

21. Bordeaux mixture was formulated by

(1) Leeuwenhoek   (2) Tillet   (3) De Bary   (4) Millardet

22. Rotenone is

(1) A bioherbicide   (2) A natural herbicide   (3) An insect hormone   (4) A natural insecticide.

23. Fungicide Bordeaux mixture is

(1) Magnesium hydroxide   (2) Copper sulphate + Sodium hydroxide

(3) Copper sulphate + Calcium hydroxide   (4) Magnesium sulphate + Calcium hydroxide

24. Ethylene dibromide is

(1) Stomach poison   (2) Contact poison

(3) Fumigant   (4) Biological control

25. Methyl isocyanate of Bhopal Gas Tragedy was

(1) Carbamate   (2) Organophosphate   (3) Organochlorine   (4) None of the above

26. From which one of the following plants, the insecticide pyrethrum is prepared

(1) Cymbopogon   (2) Tephrosia   (3) Chrysanthemum   (4) Vetivera

27. Which one of the following statements pertaining to pollutant is correct ?

(1) DDT is nondegradable pollutant

(2) Excess fluoride in drinking water cause black foot disease

(3) Excess Cd in drinking water cause osteoporosis

(4) Methyl mercury in water may cause "itai itai" disease.

28. Which one of the following is not used fa disinfection of drinking water ?

(1) Chlorine   (2) Ozone   (3) Chloramine   (4) Phenyl

GENETIC CONSERVATION & NEW CROPS

SECTION-I : STRAIGHT OBJECTIVE TYPE

1. A gift from New World to old World is

(1) Barley   (2) Rice   (3) Wheat   (4) Maize

2. Dwarf wheat varieties brought into india from Mexico were

(1) Sonnora -64 and Sonalika   (2) Sharbati Sonora and pusa lerma

(3) Sonalika an Shrbati sonora   (4) Sonora-64and Lerma Roja-64

3. Liquid wax is got from

(1) Jojoba   (2) Winged Bean   (3) 4600   (4) 260

4. Hevea Rubber belongs to

(1) Somatic cells   (2) Peruvian andes   (3) Brazil   (4) South east Asia.

5. Dwarf Wheats were evolved by
(1) Swaminathan   (2) Vavilov   (3) Khush   (4) Borlaug

6. Exchange of germplasm is carried mostly through shoot because it is
(1) Cheap   (2) Small and handy   (3) Virus free   (4) Gentically stable

7. Triticale of man-made cereal obtained through hybridisdation between
(1) Wheat and Rice   (2) Wheat and Rye   (3) Wheat and Maize   (4) Wheat and Gram

8. Which one is not correctly matched
(1) Simnondsia chinensis-Liquid Wax   (2) Leucaena leucocephala-Nitrogen Fixation
(3) Psophocarpus tetragonolobus -Nutritive seeds (4) Parthenium argentatum-Timber

9. Offsite collections are part of
(1) Ex situ conservation   (2) In situ conservation   (3) Both 1 and 3   (4) Neither 1 nor 2

10. An or orthodox seed is one which can
(1) Tolerate dehydration and low temperature   (2) Tolerate low temperature but not dehydration
(3) tolerate dehyration but not low temperature   (4) None of the above.

11. Preserving germplasm in frozen state is
(1) Cryopreservation   (2) Cold storage   (3) In stiu preservation   (4) vernalisation

12. Which of the following countries is the centre of orgin of Rice
(1) India   (2) China   (3) Indo-Malyan region   (4) Russia

13. A New World spice that has become an essential part of Indian cuisine is
(1) Red Pepper   (2) Black Pepper   (3) Cardamom   (4) Ginger

14. Jojoba is
(1) Crotalaria   (2) Leucaena   (3) Simmondsia   (4) Parthenium

15. A place where endangered genetic materials of plants are kept is
(1) Gene library   (2) Gene bank   (3) Gene pool   (4) Herbarium

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