AIPMT - 2015

BIOLOGY

Q 1. Leaves become modified into spines in :

(1) Silk Cotton
(2) Opuntia
(3) Pea
(4) Onion

Ans. 2

Q 2. Vertical distribution of different species occupying different levels in a biotic community is known as :

(1) Pyramid
(2) Divergence
(3) Stratification
(4) Zonation

Ans. 3

Q 3. Transpiration and root pressure cause water to rise in plants by :

(1) pushing and pulling it, respectively
(2) pulling it upward
(3) pulling and pushing it, respectively
(4) pushing it upward

Ans. 3

Q 4. Gene regulation governing lactose operon of E.coli that involves the lac I gene product is :

(1) Feedback inhibition because excess of β–galactosidase can switch off transcription
(2) Positive and inducible because it can be induced by lactose
(3) negative and inducible because repressor protein prevents transcription
(4) negative and repressible because repressor protein prevents transcription

Ans. 2

Q 5. High value of BOD (Biochemical Oxygen Demand) indicates that :

(1) consumption of organic matter in the water is higher by the microbes
(2) water is pure
(3) water is highly polluted
(4) water is less polluted

Ans. 3

Q 6. Which of these is not an important component of initiation of parturition in humans?

(1) Release of prolactin
(2) Increase in estrogen and progesterone ratio
(3) Synthesis of prostaglandins
(4) Release of oxytocin

Ans. 1

Q 8. A chemical signal that has both endocrine and neural roles is :

(1) Cortisol
(2) Melatonin
(3) Calcitonin
(4) Epinephrine

Ans. 4

9. Match each disease with its correct type of vaccine :

(a) tuberculosis (i) harmless virus
(b) Whooping cough (ii) inactivated toxin
(c) diphtheria (iii) killed bacteria
(d) polio (iv) harmless bacteria

(a) (b) (c) (d)

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

Ans. 4

Q 10. Nuclear envelope is a derivative of :

(1) Rough endoplasmic reticulum
(2) Smooth endoplasmic reticulum
(3) Membrane of Golgi complex
(4) Microtubules

Ans. 2

Q 11. The crops engineered for glyphosate are resistant/tolerant to:

(1) Herbicides
(2) Fungi
(3) Bacteria
(4) Insects

Ans. 1

12. Vascular bundles in monocotyledons are considered closed because :

(1) Xylem is surrounded all around by phloem
(2) A bundle sheath surrounds each bundle
(3) Cambium is absent
(4) There are no vessels with perforations

Ans. 3

13. Read the following five statements (A to E) and select the option with all correct statements :

(A) Mosses and Lichens are the first organisms to colonise a bare rock.
(B) Selaginella is a homosporous pteridophyte.
(C) Coralloid roots in Cycas have VAM.
(D) Main plant body in bryophytes is gametophytic, whereas in pteridophytes it is sporophytic.
(E) In gymnosperms, male and female gametophytes are present within sporangia located on sporophyte

(1) (B), (C) and (E) (2) (A), (C) and (D) (3) (B), (C) and (D) (4) (A), (D) and (E)

Ans. 3

Q 14. True nucleus is absent in :

(1) Volvox
(2) Anabaena
(3) Mucor
(4) Vaucheria

Ans. 2

Q 15. Which one of the following statements in not true?

(1) Honey is made by bees by digesting pollen collected from flowers
(2) Pollen grains are rich in nutrients, and they are used in the form of tablets and syrups
(3) Pollen grains of some plants cause severe allergies and bronchial afflictions in some people
(4) The flowers pollinated by flies and bats secrete foul odour to attract them

Ans. 1

Q 16. Removal of proximal convoluted tubule from the nephron will result in :

(1) No urine formation
(2) More diluted urine
(3) More concentrated urine
(4) No change in quality and quantity of urine

Ans. 3

Q 17. A gymnast is able to balance his body upside down even in the total darkness because of :

(1) Organ of corti
(2) Cochlea
(3) Vestibular apparatus
(4) Tectorial membrane

Ans. 3

Q 18. The hilum is a scar on the :

(1) Seed, where micropyle was present
(2) Seed, where funicle was attached
(3) Fruit, where it was attached to pedicel
(4) Fruit, where style was present

Ans. 2

Q 19. Which one of the following is correct?

(1) Blood = Plasma + RBC + WBC + Platelets
(2) Plasma = Blood – Lymphocytes
(3) Serum = Blood + Fibrinogen
(4) Lymph = Plasma + RBC + WBC

Ans. 1

Q 20. The guts of cow and buffalo possess :

(1) Cyanobacteria
(2) Fucus spp.
(3) Chlorella spp.
(4) Methanogens

Ans. 4

Q 21. Which one of the following may require pollinators, but is genetically similar to autogamy?

(1) Cleistogamy
(2) Geitonogamy
(3) Xenogamy
(4) Apogamy

Ans. 2

Q 22. In sea urchin DNA, which is double stranded, 17 % of the bases were shown to be cytosine. The percentages of the other three bases expected to be present in this DNA are :

(1) G 8.5%, A 50%, T 24.5%
(2) G 34%, A 24.5%, T 24.5%
(3) G 17%, A 16.5%, T 32.5%
(4) G 17%, A 33%, T 33%

ans. 4

Q 23. Capacitation refers to changes in the :

(1) sperm after fertilization
(2) sperm before fertilization
(3) ovum before fertilization
(4) ovum after fertilization

Ans. 2

Q 24. Which of the following had the smallest brain capacity?

(1) Homo habilis
(2) Homo erectus
(3) Homo sapiens
(4) Homo neanderthalensis

Ans. 1

Q 25. Which of the following viruses is not transferred through semen of an infected male?

(1) Ebola virus
(2) Hepatitis B virus
(3) Human immunodeficiency virus
(4) Chikungunya virus

Ans. 4

Q 26. A major characteristic of the monocot root is the presence of :

(1) Cambium sandwiched between phloem and xylem along the radius
(2) Open vascular bundles
(3) Scattered vascular bundles
(4) Vasculature without cambium

Ans. 4

Q 27. Blood pressure in the mammalian aorta is maximum during:

(1) Diastole of the right atrium
(2) Systole of the left atrium
(3) Diastole of the right ventricle
(4) Systole of the left ventricle

Ans. 4

Q 28. In Bt cotton, the Bt toxin present in plant tissue as pro–toxin is converted into active toxin due to :

(1) presence of conversion factors in insect gut
(2) alkaline pH of the insect gut
(3) acidic pH of the insect gut
(4) action of gut micro–organisms

Ans. 2

Q 29. In an ecosystem the rate of production of organic matter during photosynthesis is termed as :

(1) Net productivity
(2) Net primary productivity
(3) Gross primary productivity
(4) Secondary productivity

Ans. 3

Q 30. In a ring girdled plant :

(1) Neither root nor shoot will die
(2) The shoot dies first
(3) The root dies first
(4) The shoot and root die together

Ans. 3

Q 31. Erythropoiesis starts in :

(1) Red bone marrow
(2) Kidney
(3) Liver
(4) Spleen

Ans. 1

Q 32. Keel is the characteristics feature of flower of :

(1) Tomato
(2) Tulip
(3) Indigofera
(4) Aloe

Ans. 3

Q 33. In which of the following gametophyte is not independent free living?

(1) Pinus
(2) Funaria
(3) Marchantia
(4) Pteris

Ans. 1

Q 34. The structures that are formed by stacking of organized flattened membranous sacs in the chloroplasts are:

(1) Stroma
(2) Cristae
(3) Grana
(4) Stroma lamellae

Ans. 3

Q 35. Which of the following does not favour the formation of large quantities of dilute urine ?

(1) Atrial-natriuretic factor
(2) Alcohol
(3) Caffeine
(4) Renin

Ans. 4

Q 36. DNA is not present in:

(1) Mitochondria
(2) Chloroplast
(3) Ribosomes
(4) Nucleus

Ans. 3

Q 37. Which of the following are the important flora rewards to the animal pollinators?

(1) Protein pellicle and stigmatic exudates
(2) Colour and large size of flower
(3) Nectar and pollen grains
(4) Floral fragrance and calcium crystals

Ans. 3

Q 39. Alleles are:

(1) heterozygotes
(2) different phenotype
(3) true breeding homozygotes
(4) different molecular forms of a gene

Ans. 4

Q 40. Hysterectomy is surgical removal of:

(1) Mammary glands
(2) Uterus
(3) Prostate gland
(4) Vas-deference

Ans. 2

Q 41. The UN Conference of Parties on climate change in the year 2011 was held in :

(1) Qatar
(2) Poland
(3) South Africa
(4) Peru

Ans. 3

Q 42. HIV that causes AIDS, first starts destroying:

(1) Thrombocytes
(2) B – Lymphocytes
(3) Leucocytes
(4) Helper T – Lymphocytes

Ans. 4

Q 43. Which one of the following statements is wrong?

(1) Mannitol is stored food in Rhodophyceae
(2) Algin and carragen are products of algae
(3) Agar–agar is obtained from Gelidium and Gracilaria
(4) Chlorella and Spirulina are used as space food

Ans. 1

Q 44. Cryopreservation of gametes of threatened species in viable and fertile condition can be referred to as:

(1) In situ cryo–conservation of biodiversity
(2) In situ conservation of biodiversity
(3) Advanced ex–situ conservation of biodiversity
(4) In situ conservation by sacred groves

Ans. 3

Q 45. Select the correct matching in the following pairs:

(1) Rough ER — Oxidation of fatty acids
(2) Smooth ER — Oxidation of phospholipids
(3) Smooth ER — Synthesis of lipids
(4) Rough ER — Synthesis of glycogen

Ans. 3

Q 46. Secondary Succession takes place on/in :

(1) Newly cooled lava
(2) Bare rock
(3) Degraded forest
(4) Newly created pond

Ans. 3

Q 47. Which of the following is not a sexually transmitted disease ?

(1) Encephalitis
(2) Syphilis
(3) Acquired Immuno Deficiency Syndrome (AIDS)
(4) Trichomoniasis

Ans. 1

Q 48. The movement of a gene from one linkage group to another is called:

(1) Crossing over
(2) Inversion
(3) Duplication
(4) Translocation

Ans. 1

Q 50. Typical growth curve in plants is :

(1) Parabolic
(2) Sigmoid
(3) Linear
(4) Stair-steps shaped

Ans. 2

Q 51. Which one gives the most valid and recent explanation for stomatal movements ?

(1) Guard cell photosynthesis
(2) Transpiration
(3) Potassium influx and efflux
(4) Starch hydrolysis

Ans. 3

Q 52. Cytochromes are found in:

(1) Lysosomes
(2) Matrix of mitochondria
(3) Outer wall of mitochondria
(4) Cristae of mitochondria

Ans. 4

Q 53. Rachel Carson's famous book "Silent Spring" is related to:

(1) Ecosystem management
(2) Pesticide pollution
(3) Noise pollution
(4) Population explosion

Ans. 2

Q 54. Which of the following regions of the brain is incorrectly paired with its function ?

(1) Cerebrum - calculation and contemplation
(2) Medulla oblongata - homeostatic control
(3) Cerebellum - language comprehension
(4) Corpus callosum - communication between the left and right cerebral cortices

Ans. 3

Q 55. Which of the following characteristics is mainly responsible for diversification of insects on land?

(1) Eyes
(2) Segmentation
(3) Bilateral symmetry
(4) Exoskeleton

Ans. 4

Q 56. Sliding filament theory can be best explained as :

(1) When myofilaments slide pass each other, Myosin filaments shorten while Actin filaments do not shorten
(2) When myofilaments slide pass each other Actin filaments shorten while Myosin filament do not shorten
(3) Actin and Myosin filaments shorten and slide pass each other
(4) Actin and Myosin filaments do not shorten but rather slide pass each other

Ans. 4

Q 57. Which one of the following is not an inclusion body found in prokaryotes?

(1) Polysome
(2) Phosphate granule
(3) Cyanophycean granule
(4) Glycogen granule

Ans. 1

Q 58. The mass of living material at a trophic level at a particular time is called :

(1) Standing crop
(2) Gross primary productivity
(3) Standing state
(4) Net primary productivity

Ans. 1

Q 60. Multiple alleles are present:

(1) On non-sister chromatids
(2) On different chromosomes
(3) At different loci on the same chromosome
(4) At the same locus of the chromosome

Ans. 4

Q 61. Which of the following is not one of the prime health risks associated with greater UV radiation through the atmosphere due to depletion of stratospheric ozone ?

(1) (l) Increased liver cancer
(2) Increased skin cancer
(3) Reduced Immune System
(4) Damage to eyes

Ans. 1

Q 62. Which is the most common mechanism of genetic variation in the population of a sexually-reproducing organism?

(1) Recombination
(2) Transduction
(3) Chromosomal aberrations
(4) Genetic drift

Ans. 1

Q 63. Minerals known to be required in large amounts for plant growth include:

(1) magnesium, sulphur, iron, zinc
(2) phosphorus, potassium, sulphur, calcium
(3) calcium, magnesium, manganese, copper
(4) potassium, phosphorus, selenium, boron

Ans. 2

Q 64. Transmission tissue is characteristic feature of

(1) Wet stigma
(2) Hollow style
(3) Solid style
(4) Dry stigma

Ans. 3

Q 65. A man with blood group ‗A' marries a woman with blood group ‗B'. What are all the possible blood groups of their offsprings?

(1) O only
(2) A and B only
(3) A, B and AB only
(4) A, B, AB and O

Ans. 4

Q 66. Which of the following statements is not correct ?

(1) Acini are present in the pancreas and secrete carboxypeptidase
(2) Brunner's glands are present in the submucosa of stomach and secrete pepsinogen
(3) Goblet cells are present in the mucosa of intestine and secrete mucus
(4) Oxyntic cells are present in the mucosa of stomach and secrete HCl.

Ans. 2

Q 67. Perigynous flowers are found in :

(1) Rose
(2) Guava
(3) Cucumber
(4) China rose

Ans. 1

Q 68. An abnormal human baby with 'XXX' sex chromosomes was born due to:

(1) fusion of two sperms and one ovum
(2) formation of abnormal sperms in the father
(3) formation of abnormal ova in the mother
(4) fusion of two ova and one sperm

Ans. 3

Q 69. What causes a green plant exposed to the light on only one side, to bend toward the source of light as it grows ?

(1) Auxin accumulates on the shaded side, stimulating greater cell elongation there.
(2) Green plants need light to perform photosynthesis.
(3) Green plants seek light because they are phototropic.
(4) Light stimulates plant cells on the lighted side to grow faster.

Ans. 1

Q 70. The chromosomes in which centromere is situated close to one end are :

(1) Sub-metacentric
(2) Metacentric
(3) Acrocentric
(4) Telocentric

Ans. 3

Q 71. A technique of micropropagation is:

(1) Embryo rescue
(2) Somatic hybridization
(3) Somatic embryogenesis
(4) Protoplast fusion

Ans. 3

Q 72. A somatic cell that has just completed the S phase of its cell cycle, as compared to gamete of the same species, has:

(1) four times the number of chromosomes and twice the amount of DNA
(2) twice the number of chromosomes and twice the amount of DNA
(3) same number of chromosomes but twice the amount of DNA
(4) twice the number of chromosomes and four times the amount of DNA

Ans. 4

Q 73. Gastric juice of infants contains :

(1) amylase, rennin, pepsinogen
(2) maltase, pepsinogen, rennin
(3) nuclease, pepsinogen, lipase
(4) pepsinogen, lipase, rennin

Ans. 4

Q 74. Which of the following animals is not viviparous ?

(1) Whale
(2) Flying fox (Bat)
(3) Elephant
(4) Platypus

Ans. 4

Q 76. In which of the following both pairs have correct combination?

(1) In situ conservation: Tissue culture Ex situ conservation: Sacred groves
(2) In situ conservation: National Park Ex situ conservation: Botanical Garden
(3) In situ conservation: Cryopreservation Ex situ conservation: Wildlife Sanctuary
(4) In situ conservation: Seed Bank Ex situ conservation: National Park

Ans. 2

Q 77. Which body of the Government of India regulates GM research and safety of introducing GM organisms for public services ?

(1) Research Committee on Genetic Manipulation
(2) Bio - safety committee
(3) Indian Council of Agricultural Research
(4) Genetic Engineering Approval Committee

Ans. 4

78. Which of the following endoparasites of humans does show viviparity ?

(1) Ascaris lumbricoides
(2) Ancylostoma duodenale
(3) Enterobius vermicularis
(4) Trichinella spiralis

Ans. 4

Q 79. The terga, sterna and pleura of cockroach body are joined by:

(1) Cartilage
(2) Cementing glue
(3) Muscular tissue
(4) Arthrodial membrane

Ans. 4

Q 80. Most animals are tree dwellers in a:

(1) tropical rain forest
(2) coniferous forest
(3) thorn woodland
(4) temperate deciduous forest

Ans. 1

Q 81. Which of the following enhances or induces fusion of protoplasts ?

(1) IAA and gibberellins
(2) Sodium chloride and potassium chloride
(3) Polyethylene glycol and sodium nitrate
(4) IAA and kinetin

Ans. 3

Q 82. Glenoid cavity articulates :

(1) humerus with scapula
(2) clavicle with acromion
(3) scapula with acromion
(4) clavicle with scapula

Ans. 1

Q 83. A population will not exist in Hardy–Weinberg equilibrium if :

(1) the population is large
(2) individuals mate selectively
(3) there are no mutations
(4) there is no migration

Ans. 2

Q 84. Male gametes are flagellated in :

(1) Spirogyra
(2) Polysiphonia
(3) Anabaena
(4) Ectocarpus

Ans. 4

Q 85. When you hold your breath, which of the following gas changes in blood would first lead to the urge to breathe?

(1) rising CO_2 and falling O_2 concentration
(2) falling O_2 concentration
(3) rising CO_2 concentration
(4) falling CO_2 concentration

Ans. 3

Q 86. Which of the following cells during gametogenesis is normally diploid?

(1) Secondary polar body
(2) Primary polar body
(3) Spermatid
(4) Spermatogonia

Ans. 4

Q 87. In ginger vegetative propagation occurs through :

(1) Runners
(2) Rhizome
(3) Offsets
(4) Bulbils

Ans. 2

Q 88. Which one of the following statements is incorrect?

(1) The presence of the competitive inhibitor decreases the Km of the enzyme for the substrate.
(2) A competitive inhibitor reacts reversibly with the enzyme to form an enzyme–inhibitor complex.
(3) In competitive inhibition, the inhibitor molecule is not chemically changed by the enzyme.
(4) The competitive inhibitor does not affect the rate of breakdown of the enzyme–substrate complex.

Ans. 1

Q 89. The active form of Entamoeba histolytica feeds upon:

(1) blood only
(2) erythrocytes; mucosa and submucosa of colon
(3) mucosa and submucosa of colon only
(4) food in intestine

Ans. 2

90. How many pairs of contrasting characters in pea plants were studied by Mendel in his experiments?

(1) Seven
(2) Five
(3) Six
(4) Eight

Ans. 1

AIPMT - 2015

PHYSICS

Q1. A radiation of energy _E' falls normally on a perfectly reflecting surface. The momentum transferred to the surface is (C = Velocity of light) :

(1) E/C^2
(2) E/C
(3) 2E/C
(4) $2E/C^2$

Ans. 3

Q2. A ship A is moving Westwards with a speed of 10 km h^{-1} and a ship B 100 km South of A, is moving Northwards with a speed of 10 km h^{-1} . The time after which the distance between them becomes shortest, is :

(1) 10 √2 h
(2) 0 h
(3) 5h
(4) 5 √2 h

Ans. 3

Q3. The electric field in a certain region is acting radially outward and is given by E = Ar . A charge contained in a sphere of radius _a' centred at the origin of the field, will be given by :

(1) $\in_0 Aa^3$
(2) $4\pi\in_0 Aa^2$
(3) $A\in_0 a^2$
(4) $4\pi\in_0 Aa^3$

Ans. 4

Q4. In a double slit experiment, the two slits are 1 mm apart and the screen is placed 1 m away. A monochromatic light of wavelength 500 nm is used. What will be the width of each slit for obtaining ten maxima of double slit within the central maxima of single slit pattern ?

(1) 0.02 mm
(2) 0.2 mm
(3) 0.1 mm
(4) 0.5 mm

Ans. 2

Q 5. A rod of weight W is supported by two parallel knife edges A and B and is in equilibrium in a horizontal position. The knives are at a distance d from each other. The centre of mass of the rod is at distance x from A. The normal reaction on A is :

(1) W(d-x)/d
(2) Wx/d
(3) Wd/x
(4) W(d-x)/x

Ans.1

Q 6. Kepler's third law states that square of period of revolution (T) of a planet around the sun, is proportional to third power of average distance r between sun and planet i.e. $T^2 = Kr^3$ here K is constant. If the masses of sun and planet are M and m respectively then as per Newton's law of gravitation force of attraction between them is $F = GMm/ r^2$, here G is gravitational constant ,The relation between G and K is described as :

(1) K = 1 G
(2) $GK = 4\pi^2$
(3) $GMK = 4\pi^2$
(4) K = G

Ans. 3

Q 7. The approximate depth of an ocean is 2700 m. The compressibility of water is 45.4×10^{-11} Pa^{-1} and density of water is 103 kg/m^3 . What fractional compression of water will be obtained at the bottom of the ocean?

(1) 1.4×10^{-2}
(2) 0.8×10^{-2}
(3) 1.0×10^{-2}
(4) 1.2×10^{-2}

Ans. 4

Q 8. The two ends of a metal rod are maintained at temperatures 100°C and 110°C. the rate of heat flow in the rod is found to be 4.0 J/s. If the ends are maintained at temperatures 200°C and 210°C, the rate of heat flow will be :

(1) 4.0 J/s
(2) 44.0 J/s
(3) 16.8 J/s
(4) 8.0 J/s

Ans. 1

Q 9. Two similar springs P and Q have spring constants K_P and K_Q, such that $K_P > K_Q$. They are stretched, first by the same amount (case a), then by the same force (case b). The work done by the springs W_P and W_Q are related as, in case (a) and case (b), respectively :

(1) $W_P < W_Q$; $W_Q < W_P$
(2) $W_P = W_Q$; $W_P > W_Q$
(3) $W_P = W_Q$; $W_P = W_Q$
(4) $W_P > W_Q$; $W_Q > W_P$

Ans. 4

Q 10. Consider 3rd orbit of He^+ (Helium), using non-relativistic approach, the speed of electron in this orbit will be [given $K = 9 \times 10^9$ constant, Z = 2 and h(Planck's Constant) = 6.6×10^{-34} J s]

(1) 3.0×10^8 m/s
(2) 2.92×10^6 m/s
(3) 1.46×10^6 m/s
(4) 0.73×10^6 m/s

Ans. 3

Q 11. A particle of mass m is driven by a machine that delivers a constant power k watts. If the particle starts from rest the force on the particle at time t is :

(1) $1/2\sqrt{mk}\, t^{-1/2}$
(2) $\sqrt{mk}/2\, t^{-1/2}$
(3) $\sqrt{mk}\, t^{-1/2}$
(4) $\sqrt{2mk}\, t^{-1/2}$

Ans. 3

Q 11. The fundamental frequency of a closed organ pipe of length 20 cm is equal to the second overtone of an organ pipe open at both the ends. The length of organ pipe open at both the ends is :

(1) 140 cm
(2) 80 cm
(3) 100 cm
(4) 120 cm

Ans. 4

Q 12. An electron moving in a circular orbit of radius r makes n rotations per second. The magnetic field produced at the centre has magnitude :

(1) $\mu_0 ne/2r$
(2) $\mu_0 ne/2\pi r$
(3) Zero
(4) $\mu_0 n^2 e/r$

Ans. 1

Q 13. Two identical thin plano-convex glass lenses (refractive index 1.5) each having radius of curvature of 20 cm are placed with their convex surfaces in contact at the centre. The intervening space is filled with oil of refractive index 1.7. The focal length of the combination is :

(1) 50 cm
(2) –20 cm
(3) –25 cm
(4) –50 cm

Ans. 4

Q 14. On observing light from three different stars P, Q and R, it was found that intensity of violet colour is maximum in the spectrum of P, the intensity of green colour is maximum in the spectrum of R and the intensity of red colour is maximum in the spectrum of Q. If T_P, T_Q and T_R are the respective absolute temperatures of P, Q and R, then it can be concluded from the above observations that :

$T_P < T_Q < T_R$

$T_P > T_Q > T_R$

$T_P > T_R > T_Q$

$T_P < T_R < T_Q$

Ans. 2

Q 15. If energy (E), velocity (V) and time (T) are chosen as the fundamental quantities, the dimensional formula of surface tension will be :

$[E^{-2} V^{-1} T^{-3}]$

$[E V^{-2} T^{-1}]$

$[E V^{-1} T^{-2}]$

$[E V^{-2} T^{-2}]$

Ans. 4

Q 16. A Carnot engine, having an efficiency of $\eta = 1/10$ as heat engine, is used as a refrigerator. If the work done on the system is 10 J, the amount of energy absorbed from the reservoir at lower temperature is :

(1) 1 J
(2) 100 J
(3) 99 J
(4) 90 J

Ans. 4

Q 17. For a parallel beam of monochromatic light of wavelength ‗λ', diffraction is produced by a single slit whose width ‗a' is of the order of the wavelength of the light. If ‗D' is the distance of the screen from the slit, the width of the central maxima will be :

(1) $2Da/\lambda$
(2) $2Da/\lambda$
(3) $D\lambda/a$
(4) Da/λ

Ans. 2

Solution:- For a parallel beam of monochromatic light of wavelength λ, diffraction is produced by a single slit whose width 'a' is of the order of the wavelength we have

$\sin\theta = \lambda/a$ ..... (1)

where θ is the angle subtended by the first minima and the central maxima at the slit

$\therefore\ 2\sin\theta = 2\lambda / a$ ..... (2)

If x is the width of the central maxima, we have

$x/D = 2\lambda/a$

$\therefore\ x = 2D\lambda/a$ ..... (3)

Q 18. A wind with speed 40 m/s blows parallel to the roof of a house. The area of the roof is 250 m^2 . Assuming that the pressure inside the house is atmospheric pressure, the force exerted by the wind on the roof and the direction of the force will be : (P_{air} = 1.2 kg/m^3)

(1) 2.4×10^5 N, downwards
(2) 4.8×10^5 N, downwards
(3) 4.8×10^5 N, upwards
(4) 2.4×10^5 N, upwards

Ans. 4

Q 19. The ratio of the specific heats CP/CV = γ in terms of degrees of freedom (n) is given by :

1. (1+n/2)
2. (1+1/n)
3. (1+n/3)
4. (1+2/n)

Ans. 4

Q 20. A block of mass 10 kg, moving in x direction with a constant speed of 10 ms^{-1} , is subjected to a retarding force F = 0.1 x J/m during its travel from x = 20 m to 30 m. Its final KE will be :

(1) 250 J
(2) (2) 475 J
(3) (3) 450 J
(4) (4) 275 J

Ans. 2

Q 21. A block A of mass m1 rests on a horizontal table. A lights string connected to it passes over a frictionless pulley at the edge of table and from its other end another block B of mass m2 is suspended. The coefficient of kinetic friction between the block and the table is μk. When the block A is sliding on the table, the tension in the string is :

(1) $m_1 m_2 (1- \mu)g/ (m_1+ m_2)$
(2) $(m_2 + \mu_k m_1)g /(m_1+ m_2)$
(3) $(m_2 - \mu_k m_1)g / (m_1+ m_2)$
(4) $m_1 m_2 (1+ \mu_k) g/(m_1+ m_2)$

Ans, 4

Q 22. A certain metallic surface is illuminated with monochromatic light of wavelength, λ. The stopping potential for photo-electric current for this light is $3V_0$. If the same surface is illuminated with light of wavelength 2 λ, the stopping potential is V_0. The threshold wavelength for this surface for photoelectric effect is :

(1) $\lambda/6$
(2) 6λ
(3) 4λ
(4) $\lambda/4$

Ans. 3

Q 23. When two displacements represented by $y_1 = a\sin(\omega t)$ and $y_2 = b\cos(\omega t)$ are superimposed the motion is :

simple harmonic with amplitude(a+b)/2

not a simple harmonic

simple harmonic with amplitude a/b

simple harmonic with amplitude $\sqrt{a^1 + b^2}$

Ans. 4

Q 24. A potentiometer wire has length 4 m and resistance 8 Ω. The resistance that must be connected in series with the wire and an accumulator of e.m.f. 2V, so as to get a potential gradient 1 mV per cm on the wire is :

1. 48 Ω
2. 32 Ω
3. 40 Ω
4. 44 Ω

Ans. 2

Q 25. Two spherical bodies of mass M and 5 M and radii R and 2 R are released in free space with initial separation between their centres equal to 12 R. If they attract each other due to gravitational force only, then the distance covered by the smaller body before collision is :

(1) 1.5 R

(2)2.5 R

(3)4.5 R

(4)7.5 R

Ans. 4

Q 26. A resistance ‗R' draws power ‗P' when connected to an AC source. If an inductance is now placed in series with the resistance, such that the impedance of the circuit becomes ‗Z', the power drawn will be :

1. P
2. $P(R/Z)^2$
3. P √R/ Z
4. P(R/Z)

Ans. 2

Q 27. Across a metallic conductor of non-uniform cross section a constant potential difference is applied. The quantity which remains constant along the conductor is :

(1) electric filed
(2) current density
(3) current
(4) drift velocity

Ans. 3

Q 28. A parallel plate air capacitor of capacitance C is connected to a cell of emf V and then disconnected from it. A dielectric slab of dielectric constant K, which can just fill the air gap of the capacitor, is now inserted in it. Which of the following is incorrect ?

(1) The charge on the capacitor is not conserved.
(2) The potential difference between the plates decreases K times.
(3) The energy stored in the capacitor decreases K times.
(4) the change in energy stored is $1/2CV^2(1/K -1)$.

Ans. 1

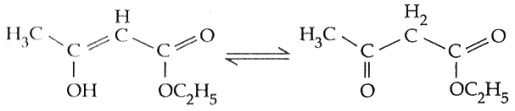
CHEMISTRY

Q 29. Biodegradable polymer which can be produced from glycine and aminocaproic acid is :

(1) Nylon 6, 6
(2) Nylon 2 – nylon 6
(3) PHBV
(4) Buna – N

Ans. 2

Q 30. The enolic form of ethyl acetoacetate as below has :



(1) 9 sigma bonds and 1 pi – bond
(2) 18 sigma bonds and 2 pi – bonds
(3) 16 sigma bonds and 1 pi-bond
(4) 9 sigma bonds and 2 pi – bonds

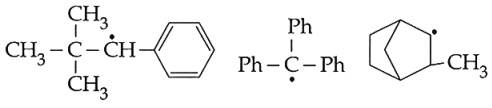
Ans. 2

Q 31. Biodegradable polymer which can be produced from glycine and aminocaproic acid is :

(1) Nylon 6, 6
(2) Nylon 2 – nylon 6
(3) PHBV
(4) Buna – N

Ans. 2

Q 32. Consider the following compounds



(I) (II) (III)

Hyperconjugation occurs in :

(1) I and III

(2) I only
(3) II only
(4) III only

Ans. 4

Q 33. Which of the following species contain equal number of σ - and π - bonds ?

$CH_2(CN)_2$

HCO_3^-

XeO_4

$(CN)_2$

Ans. 3

Q 34. The function of ―Sodium pump‖ is a biological process operating in each and every cell of all animals.Which of the following biologically important ions is also a constituent of this pump ?
(1) Fe^{2+}
(2) Ca^{2+}
(3) Mg^{2+}
(4) K^+

Ans. 4

Q 35. Which of these statements about $[Co(CN)_6]^{3-}$ is **true** ?

(1) $[Co(CN)_6]^{3-}$ has no unpaired electrons and will be in a high-spin configuration.
(2) $[Co(CN)_6]^{3-}$ has no unpaired electrons and will be in a low-spin configuration
(3) $[Co(CN)_6]^{3-}$ has four unpaired electrons and will be in a low-spin configuration.
(4) $[Co(CN)_6]^{3-}$ has four unpaired electrons and will be in a high-spin configuration.

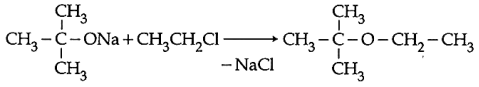
Ans. 2

Q 36. The activation energy of a reaction can be determined from the slope of which of the following graphs ?

(1) T/ln K vs. 1/T
(2) ln K vs. T
(3) ln K/ T vs. T

(4) ln K vs.1/T

Ans. 4

Q 37. The reaction  is called :

(1) Gatterman – Koch reaction
(2) Williamson Synthesis
(3) Williamson continuous etherification process
(4) Etard reaction

Ans. 2

Q 38. Which one is not equal to zero for an ideal solution ?

(1) $\Delta P = P_{observed} - P_{Raoult}$
(2) ΔH_{mix}
(3) ΔS_{mix}
(4) ΔV_{mix}

Ans. 3

Q 39. "Metals are usually not found as nitrates in their ores"
Out of the following two (a and b) reasons which is / are true for the above observation ?
(a) Metal nitrates are highly unstable
(b) Metal nitrates are highly soluble in water.

(1) a is true but b is false
(2) a and b are true
(3) a and b are false
(4) a is false but b is true

Ans. 4

Solution:- Metal nitrates are usually not found as nitrates in their ores because they are highly soluble in water.

Q 40. An organic compound ‗X' having molecular formula $C_5H_{10}O$ yields phenyl hydrazone and gives negative response to the Iodoform test and Tollen's test. It produces n-pentane on reduction. ‗X' could be :

(1) n-amyl alcohol
(2) pentanal
(3) 2-pentanone
(4) 3-pentanone

Ans. 4

Solution:- Pentanal gives negative response to the Iodoform test and Tollen's test.

Q 41. Cobalt(III) chloride forms several octahedral complexes with ammonia. Which of the following will not give test for chloride ions with silver nitrate at 25°C ?

(1) $CoCl_3.6NH_3$
(2) $CoCl_3.3NH_3$
(3) $CoCl_3.4NH_3$
(4) $CoCl_3.5NH_3$

Ans. 2

Q 42. A mixture of gases contains H_2 and O_2 gases in the ratio of 1 : 4 (w/w). What is the molar ratio of the two gases in the mixture ?

(1) 2 : 1
(2) 1 : 4
(3) 4 : 1
(4) 16 : 1

Ans. 3

Q 43. Nitrogen dioxide and sulphur dioxide have some properties in common. Which property is shown by one of these compounds, but not by the other ?

(1) is used as a food–preservative
(2) forms ‗acid–rain'
(3) is a reducing agent
(4) is soluble in water

Ans. 1

Q 44. Which of the following statements is correct for a reversible process in a state of equilibrium ?

(1) $\Delta G^\circ = 2.30\ RT \log K$
(2) $\Delta G = -2.30\ RT \log K$
(3) $\Delta G = 2.30\ RT \log K$
(4) $\Delta G^\circ = -2.30\ RT \log K$

Ans. 4

Q 45. Magnetic moment 2.84 B.M. is given by : (At. Nos., N= 28, Ti = 22, Cr = 24, Co = 27)

(1) Co^{2+}
(2) Ni^{2+}
(3) Ti^{3+}
(4) Cr^{2+}

Ans. 2

Q 46. The Ksp of Ag_2CrO_4, AgCl, AgBr and AgI are respectively, 1.1×10^{-12}, 1.8×10^{-10}, 5.0×10^{-13}, 8.3×10^{-17}. Which one of the following salts will precipitate last if AgNO3 solution is added to the solution containing equal moles of NaCl, NaBr, NaI and Na_2CrO_4 ?

(1) Ag_2CrO_4
(2) AgI
(3) AgCl
(4) AgBr

Ans. 1

Q 47. When initial concentration of a reactant is doubled in a reaction, its half–life period is not affected. The order of the reaction is :

(1) More than zero but less than first
(2) Zero
(3) First
(4) Second

Ans. 3

Q 48. Which of the following processes does not involve oxidation of iron ?

(1) Liberation of H_2 from steam by iron at high temperature
(2) Rusting of iron sheets
(3) Decolourization of blue $CuSO_4$ solution by iron.
(4) Formation of $Fe(CO)_5$ from Fe.

Ans. 4

Q 49. Bithional is generally added to the soaps as an additive to function as a/an :

(1) Antiseptic
(2) Softener
(3) Dryer
(4) Buffering agent

Ans. 1

Q 50. A given metal crystallizes out with a cubic structure having edge length of 361 pm. If there are four metal atoms in one unit cell, what is the radius of one atom ?

(1) 108 pm
(2) 40 pm
(3) 127 pm
(4) 80 pm

Ans. 3

Q 51. The boiling point of 0.2 mol kg^{-1} solution of X in water is greater than equimolal solution of Y in water. Which one of the following statements is true in this case ?

(1) Y is undergoing dissociation in water while X undergoes no change.
(2) X is undergoing dissociation in water.
(3) Molecular mass of X is greater than the molecular mass of Y.
(4) Molecular mass of X is less than the molecular mass of Y.

Ans. 2

Q 52. In Duma's method for estimation of nitrogen, 0.25 g of an organic compound gave 40 mL of nitrogen collected at 300 K temperature and 725 mm pressure. If the aqueous tension at 300K is 25mm, the percentage of nitrogen in the compound is :

(1) 15.76
(2) (2) 17.36
(3) (3) 18.20
(4) (4) 16.76

Ans. 4

Q 53.The species Ar, K^+ and Ca^{2+} contain the same number of electrons. In which order do their radii increase ?

(1) $K^+ < Ar < Ca^{2+}$
(2) $Ar < K^+ < Ca^{2+}$
(3) $Ca^{2+} < Ar < K^+$
(4) $Ca^{2+} < K^+ < Ar$

Ans. 4

Q 54.Because of lanthanoid contraction, which of the following pairs of elements have nearly same atomic radii ? (Numbers in the parenthesis are atomic numbers).

(1) Zr (40) and Ta (73)
(2) Ti (22) and Zr (40)
(3) Zr (40) and Nb (41)
(4) Zr (40) and Hf (72)

Ans. 4

Q 55. The number of d–electrons in Fe^{2+} (Z = 26) is not equal to the number of electrons in which one of the following ?

(1) p – electrons in Ne (Z = 10)
(2) s – electrons in Mg (Z = 12)
(3) p – electrons in Cl (Z = 17)
(4) d – electrons in Fe (Z = 26)

Ans. 3

Q 56. Which one of the following electrolytes has the same value of van't Hoff's factor (i) as that of $Al_2(SO_4)_3$ (if all are 100% ionised)

(1) $K_4[Fe(CN)_6]$

(2) K_2SO_4

(3) $K_3[Fe(CN)_6]$

(4) $Al(NO_3)_3$

Ans. 1

Q 57. Which property of colloidal solution is independent of charge on the colloidal particles ?

(1) Tyndall effect
(2) Coagulation
(3) Electrophoresis
(4) Electro–osmosis

Ans. 1

Solution:- Tyndall effect is the scattering of light by sol particles, it depends on size and not on charge.

Q 58. Solubility of the alkaline earth's metal sulphates in water decreases in the sequence :

(1) Ba > Mg > Sr > Ca
(2) Mg > Ca > Sr > Ba
(3) Ca > Sr > Ba > Mg
(4) Sr > Ca > Mg > Ba

Ans. 2

Q 59. A device that converts energy of combustion of fuels like hydrogen and methane, directly into electrical energy is known as :

(1) Ni–Cd cell
(2) Fuel Cell
(3) Electrolytic Cell
(4) Dynamo

Ans. 2

Q 60.If the value of an equilibrium constant for a particular reaction is 1.6×10^{12}, then at equilibrium the system will contain :

(1) similar amounts of reactants and products
(2) all reactants
(3) mostly reactants
(4) mostly products

Ans. 4