TBJEE

Question Paper - 2022



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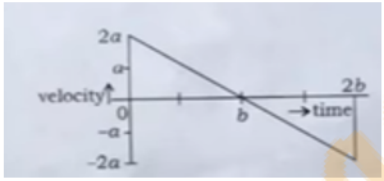
This question paper has been compiled on the basis of question paper shared by students after the exam.

PHYSICS

Qs 1. If velocity (V), acceleration (A) and force (F) are considered as fundamental units, then the dimension of Young's modulus will be

A) FA^2V^{-5}
B) FA^2V^{-4}
C) FA^2V^{-3}
D) FA^2V^{-2}

Qs 2. When a small object of mass is thrown vertically upward, the graphical representation of its velocity versus time is shown below:

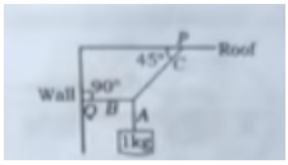


With reference to this graph, maximum height attained by the object will be

A) 2a
B) 2b
C) ab
D) 2ab

Qs 3. As shown in the figure below, a block of mass 1 kg is hung by three lightweight wires A, B and C from point P on the roof and point O on the wall. Tension produced in the wire B is

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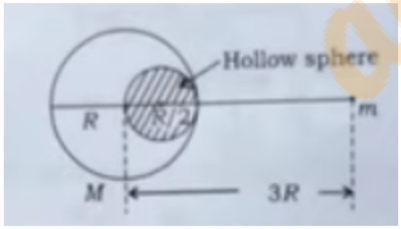


A) 0 N
B) $\frac{1}{\sqrt{2}}N$
C) 1 N
D) $\sqrt{2}N$

Qs 4. Two uniform circular discs A and B have radii of 10 cm and 30 cm respectively and have the same material and the same thickness. The ratio of their moment of inertia about their axes $\frac{I_A}{I_B}$ will be

A) 1:81
B) 1:27
C) 1:9
D) 1:3

Qs 5. A solid sphere of radius R gravitationally attracts a particle of mass m at a distance 3R from its center such that the force is F_1. Now a spherical cavity of radius R/2 is extracted (as shown in the figure below) from the sphere and the force becomes F_2. The value of $\frac{F_1}{F_2}$ is



A) 41/50
B) 50/41
C) 25/30
D) 36/25

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Qs 6. The spring constant of a toy pistol is k. If the spring is compressed by a distance x and a bullet of mass m is thrown vertically upward, what will be the maximum height attained by the bullet?

A) kx/mg
B) $\frac{k x^2}{mg}$
C) kx/2mg
D) $\frac{2kx^2}{mg}$

Qs 7. Two soap bubbles of radii 4 cm and 5 cm touch each other and produce a common surface as shown below. The radius of curvature of the common surface is



A) 4 - 5 cm
B) 20/9 cm
C) 9 cm
D) 20 cm

Qs 8. When a bob is thrown from earth's surface vertically upward with half the escape velocity, what will be the maximum height attained by this bob?

A) R/6
B) R/3
C) 2R/3
D) R

Qs 9. A bucket full of water is rotated in a vertical circular path of radius 1.6 m. For what expected maximum time period of revolution, water will not spill out from the bucket?

A) 1.5 s
B) 2.5 s
C) 3.5 s
D) 4.5 s

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Qs 10. The rate of radiation of energy from high temperature black body at T k is EW/ m^2. What will be the rate of radiation, if temperature decreases to (2T/3)K?

A) 8E/27
B) 16E/27
C) 16E/81
D) 32E/81

Qs 11. Two gases having equal temperature T, equal pressure P and equal volume V are mixed together. If temperature of the mixture is T and volume is V, then its pressure will be

A) P
B) P/2
C) 2P
D) 4P

Qs 12. The ratio of densities of a solid at 0^oC and 500^oC is 1.027:1, the coefficient of linear expansion of the solid is

A) 1.2 x $10^{-5}/^oC$
B) 1.8 x $10^{-5}/^oC$
C) 2.4 x $10^{-5}/^oC$
D) 3.0 x $10^{-5}/^oC$

Qs 13. The time period of oscillation of a simple pendulum in a stationary lift is 2 s. When the lift ascends with a constant acceleration of g/4, the time period of oscillation will become

A) $2/\sqrt{5}$ s
B) $\sqrt{5}/2$ s
C) $4/\sqrt{5}$ s
D) $\sqrt{5}/4$ s

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Qs 14. The velocity of a traveling wave of frequency 500 Hz is 360 m/s. The minimum distance between two points having a phase difference of 60^o is

A) 10 cm
B) 12 cm
C) 36 cm
D) 18 cm

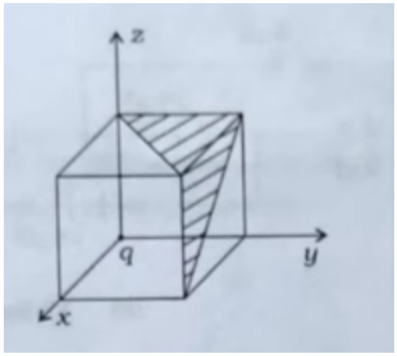
Qs 15. $y_1 = 0.25\ sin(kx - 316t)\ and\ y_2 = 0.25\ sin(kx - 310t)$ are two traveling waves moving in the same direction. What they superpose, the number of beats produced will be

A) $3/\pi$
B) 3
C) 3π
D) 6

Qs 16. When a uniform electric field E is applied on an electron of charge -e and mass m_e, magnitude of acceleration will be

A) mE/e
B) eE/m
C) e^2/m
D) em/E

Qs 17. A charge q is placed at one corner (here at the origin) of a cube as shown below. The outgoing electric flux through the shaded area is



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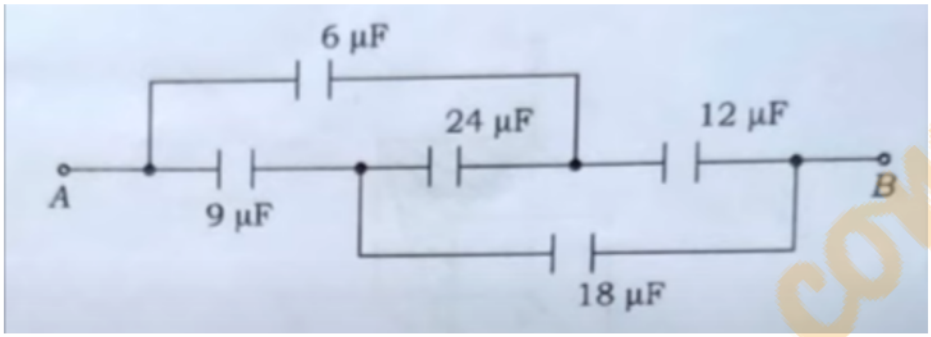
A) $\frac{q}{48\epsilon_0}$

B) $\frac{q}{6\epsilon_0}$

C) $\frac{q}{12\epsilon_0}$

D) $\frac{q}{24\epsilon_0}$

Qs 18. The equivalent capacitance C_{AB} for the points A and B of the given combination of capacitance is



A) $10\mu F$

B) $12.5\mu F$

C) $15\mu F$

D) $32\mu F$

Qs 19. A thin metallic wire of length l carrying current I is bent to form a circle. The induced magnetic moment of the system is

A) $\frac{4\pi I}{l^2}$

B) $\frac{\pi I}{l}$

C) $\frac{Il^2}{4\pi}$

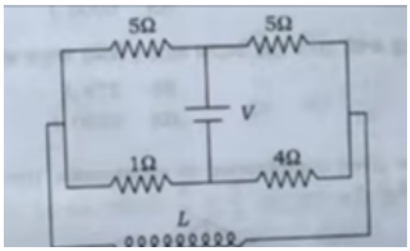
D) $\frac{Il}{2\pi}$

Qs 20. A charged particle having charge q and mass m moving at a constant velocity v enters a transverse uniform magnetic field of strength B. It will move in a circular path of radius

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A) mqB/v
B) mq/Bv
C) mv/Bq
D) mB/vq

Qs 21. The expected value of current (I) at t = 0 and t = ∞ respectively for the given circuit (t is time) will be



A) 18V/55, 5V/18
B) 4V/18, 18V/55
C) 5V/18, 10V/33
D) 10V/33, 5V/18

Qs 22. The power of two electric bulbs are P_1 and P_2 respectively. If they are connected in series, then power of the combination will be

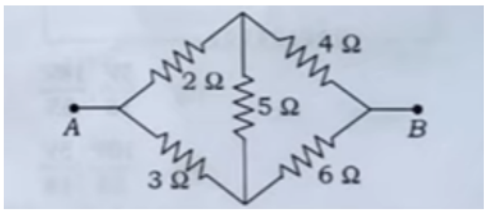
A) $P_1 + P_2$
B) $\sqrt{P_1 P_2}$
C) $\frac{P_1^2+P_2^2}{\sqrt{P_1 P_2}}$
D) $\frac{P_1 P_2}{P_1+P_2}$

Qs 23. A heater of 9 ohm resistance is connected to 30 V DC supply for 1 minute. Energy produced by the heater is

A) 100 J
B) 270 J
C) 600 J
D) 6000 J

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Qs 24. With reference to the given combination of resistances, the equivalent resistance R_{AB} between points A and B is



A) 18/5 ohm
B) 16/3 ohm
C) 3 ohm
D) 5 ohm

Qs 25. The distance traveled by a light ray in 1 ns in a glass of refractive index $\mu = 1.5$ is

A) 45 cm
B) 40 cm
C) 30 cm
D) 20 cm

Qs 26. If the refractive indices of water and glass are 4/3 and 5/3 respectively, then critical angle for light rays during during its passage from glass to water will be

A) $sin^{-1}\frac{4}{5}$
B) $sin^{-1}\frac{3}{5}$
C) $sin^{-1}\frac{9}{20}$
D) $sin^{-1}\frac{7}{16}$

Qs 27. Two thin lenses of powers +12D and -2D respectively are kept side by side. The focal length of the combination is

A) 10 cm
B) 12 cm
C) 14 cm
D) 20 cm

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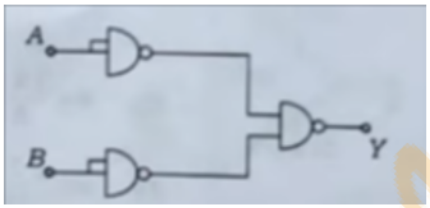
Qs 28. The minimum wavelength of X -ray emitted from an X - ray tube is 4.125 x 10^{-2} nm, then voltage applied to the X - ray tube is

A) 80 kV
B) 30 kV
C) 50 kV
D) 60 kV

Qs 29. The wavelength of photon emitted by a hydrogen atom when an electron makes a transition from n = 2 to n = 1 orbital is

A) 121.8 nm
B) 194.8 nm
C) 490.7 nm
D) 913.3 nm

Qs 30. The equivalent logic gate of the given logic circuit is



A) NOR
B) OR
C) AND
D) NAND

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CHEMISTRY

Qs 31. The degree of dissociation (α) of an electrolyte A_xB_y is related to the Van't Hoff factor (i) via which relation?

A) $\alpha = \frac{x+y+1}{i-1}$
B) $\alpha = \frac{x+y-1}{i-1}$
C) $\alpha = \frac{i-1}{x+y+1}$
D) $\alpha = \frac{i-1}{x+y-1}$

Qs 32. If an electrolyte solution has specific resistance x and y is the molarity of that solution, then molar conductance (λ_m) of that solution will be

A) 100y/x
B) 1000x/y
C) 1000/xy
D) xy/1000

Qs 33. Molal ebullioscopic constant (k_b) of H_2O becomes 1.86 when glucose is used as the solute. Predict the value of k_b of H_2O if potassium ferricyanide replaces glucose

A) 1.86
B) 7.44
C) 3.72
D) 5.58

Qs 34. To coagulate $Fe(OH)_3$ sol., which one of the following is least effective?

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

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

C) K_2SO_4

D) KBr

Qs 35. Which of the following compounds is the hardest material?

A) Be_2C

B) SiC

C) B_4C

D) Graphite

Qs 36. Which of the following acids contains P - O - P bond?

A) Hypophosphorous acid

B) Phosphorous acid

C) Pyrophosphoric acid

D) Orthophosphoric acid

Qs 37. Mention the compound resulting from the reaction of XeF_4 and H_2O?

A) $XeOF_2$

B) $XeOF_3$

C) XeO_2

D) XeO_3

Qs 38. Chemical structure/composition of gangue being generated in the smelting process during Cu(metal) extraction is

A) $Cu_2O + FeS$

B) $FeSiO_3$

C) $CuFeS_2$

D) $Cu_2S + FeO$

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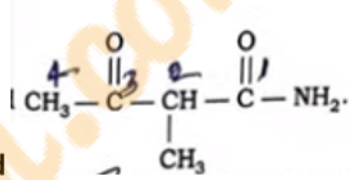
Qs 39. Mention the name of the minerals that do not contain Al(metal)?

A) Cryolite
B) Mica
C) Fluorspar
D) Feldspar

Qs 40. If one or more odd electron(s) is/are present in a complex compound, than it is designated as

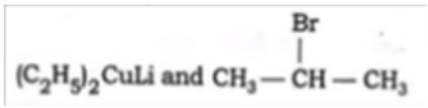
A) Diamagnetic
B) Ferromagnetic
C) Ferrimagnetic
D) Paramagnetic

Qs 41. Mention the IUPAC name of the compound

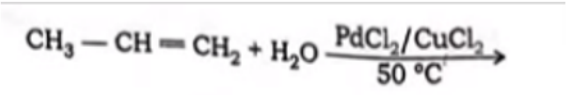


A) 1 - Amino - 2 - methyl bhutan - 1, 3 - dione
B) 2 - Methyl - 3- oxobutanamide
C) 3 - methyl - 2 - oxobutanamide
D) 2 - oxo - 3 - aminobutane

Qs 42. To achieve the synthesis of $C_2H_5 - CH_2 - C_2H_5$ applying Corey - House method; the reactants will be

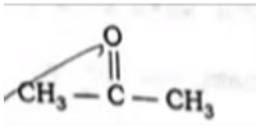
A) C_2H_5CuLi and $C_2H_5 - CH_2 - Br$
B) C_2H_5Li and $C_2H_5 - CH_2 - Br$
C) 
D) $(CH_3)_2CuLi\ and\ CH_3CH_2CH_2Br$

Qs 43. Write the final product of the following reaction :



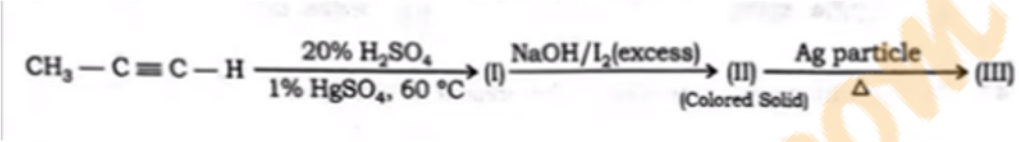
A) CH_3CH_2CHO

B) $CH_3CH_2CH_2 - OH$

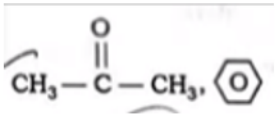
C) 

D) $CHO - CH = CH_2$

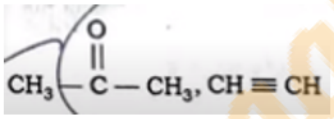
Qs 44. Identify the products (I) and (III) observing the following sequence of reactions :



A) 

B) 

C) 

D) 

Qs 45. Acetone is distilled with conc.H_2SO_4 at high temperature, the resulting distillate will be

A) Dry acetone (free from water)
B) Mesityl oxide
C) Mesitylene
D) Phoron

Qs 46. Which of the following acids requires foreign acid catalyst during esterification with ethanol?

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A) Oxalic acid
B) Benzoic acid
C) Acetic acid
D) Formic acid

Qs 47. Mention the name of pentose sugar present in RNA.

A) 2 - Deoxyribose
B) Glucose
C) Ribose
D) Fructose

Qs 48. Mention the structural formula of the ring compound generated during detection of nitrate radical.

A) $[Fe(H_2O)_5NO]SO_4$
B) $[Fe(H_2O)_5(NO)_2]SO_4$
C) $[Fe(H_2O)(NO)_5]SO_4$
D) $[Fe(NO)]SO_4$

Qs 49. 0.79 gm of a metal oxide is obtained from 0.5 gm of the same metal upon oxidation. Equivalent weight of the metal will be which of the following?

A) 10
B) 13.8
C) 20
D) 40

Qs 50. Which set of quantum is not possible?

A) 3,2,-2,½
B) 3,2,-3,½
C) 4,0,0,½
D) 5,3,0,½

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Qs 51. Proper decreasing order of first ionization potential of the elements Be, B, C and Li will be which one of the following?

A) C > B > Be > Li
B) C > Be > B > Li
C) B > C > Be > Li
D) Be > Li > B > C

Qs 52. Increasing order of the bond angle of the compounds $NH_3, BF_3, H_2O \text{ and } CH_4$ obeys which one of the following serieses?

A) $H_2O < NH_3 < CH_4 < BF_3$
B) $H_2O < CH_4 < NH_3 < BF_3$
C) $CH_4 < NH_3 < H_2O < BF_3$
D) $CH_4 < BF_3 < NH_3 < H_2O$

Qs 53. Work done by 1 mol of an ideal gas for its adiabatic reversible change when temperature attains T_2 $from$ T_1 is :

A) $(C_p - C_v)(T_2 - T_1)$
B) $C_p(T_2 - T_1)$
C) $C_v(T_2 - T_1)$
D) $(C_p - C_v)(T_1 + T_2)$

Qs 54. A first - order reaction has K = 5.48 x $10^{-14} sec^{-1}$. Determine its two - third life.($t_{2/3}$)

A) 2.005 x 10^{13} sec
B) 5.002 x 10^{14} sec
C) 2.005 x 10^{14} sec
D) 5.002 x 10^{13} sec

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Qs 55. Density of an unknown gas at 273 k temperature and 76 cm of Hg pressure is 1.964 gm dcm^{-3}. Identify the unknown gas.

A) CH_4
B) Xe
C) C_2H_6
D) CO_2

Qs 56. At 0^oC, a balloon is expanded with an ideal gas up to 490 ml which is the 7/8th of its maximum expansion volume. Now, if the temperature is being gradually raised, predict at what temperature it will burst.

A) 29^oC
B) 30^oC
C) 39^oC
D) 312^oC

Qs 57. Al(g) + 3B(g) ⇔ 4C(g) is a reversible reaction where all the reactants and products are in gaseous state.
Conditions :
(i) Concentrations of both A and B are equal at the initiation.
(ii) Concentration of both A and C are equal at the equilibrium.
Considering the imposed condition, find the value of K_c of this reversible reaction.

A) 0.08
B) 0.8
C) 8.0
D) 80.0

Qs 58. Consider the following reversible reaction:
$PCl_5(g) \Leftrightarrow PCl_3(g) + Cl_2(g)$
Which of the following factors will increase the rate of the forward reaction?

A) Inert gas is introduced at constant volume
B) Chlorine gas is passed at constant volume

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C) By reducing the volume of reaction vessel
D) Inert gas is introduced at constant pressure

Qs 59. If a small amount of In(metal) is added to Ge - crystal, then the composite will turn into which one of the following substances?

A) Insulator
B) p-type semiconductor
C) n-type semiconductor
D) Rectifier

Qs 60. Balance the following redox - reaction :

$aI_2 + bNO + 4H_2O = cHNo_3 + dHI$

Hence, find the values of a,b,c and d.

A) 3,2,2,6
B) 6,2,3,2
C) 2,6,3,2
D) 3,6,2,2

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BIOLOGY

Qs 1. The fruticose lichen Cladonia Rangiferina is commonly known as

A) Peat moss
B) Bog moss
C) Reindeer moss
D) Rock moss

Qs 2. Viroids were discovered for the first time in 1971 by

A) Ernst haeckel
B) Theodor Diener
C) Louis Pasteur
D) Von Baer

Qs 3. The aquatic fern commonly used as biofertilizer is

A) Marsilea
B) Selaginella
C) Riccia
D) Azolla

Qs 4. Which one of the following is not an example of in situ conservation?

A) National parks
B) Biosphere reserves
C) Gene banks
D) Wildlife sanctuaries

Qs 5. The poison gland found in the skin of all frogs is called

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A) Thymus gland
B) Adrenal gland
C) Parotoid gland
D) Pituitary gland

Qs 6. The composite fruit of pineapple is known as

A) legume
B) Sorosis
C) Drupe
D) Pome

Qs 7. The tube - shaped heart of the cockroach is divided into ... compartments.

A) 12
B) 14
C) 13
D) 15

Qs 8. Chitin is found in the cell walls of

A) Fungi
B) Bacteria
C) Protozoa
D) Blue - green algae

Qs 9. Which one of the following is not found in a nucleotide?

A) Nitrogenous base
B) Hexose sugar
C) Pentose sugar
D) Phosphate group

Qs 10. Enzymes which hydrolyze peptide bonds are called

A) Transferase
B) Lyase
C) Peptidase

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D) Ligase

Qs 11. In photosynthesis phosphorylation, ATP is synthesized using

A) Chemical energy
B) Light energy
C) Thermal power
D) Atomic energy

Qs 12. Which one of the following is a gaseous plant hormone?

A) Auxin
B) Polyamine
C) Cytokinin
D) Ethylene

Qs 13. The respiratory pathway is considered as an amphibolic pathway because

A) It is a degradation process
B) It involves both anabolic and catabolic processes
C) It involves solely catabolic process
D) It involves only anabolic process

Qs 14. The cultivation of plants without the use of soil is called

A) Aquaculture
B) Urban farming
C) Sericulture
D) Hydroponics

Qs 15. Which of the following is not a lung disorder?

A) Asthma
B) Bronchitis
C) Tuberculosis
D) Typhoid

Qs 16. Hormone called secretin is secreted from which part of the body?

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A) Liver
B) Gallbladder
C) Pancreas
D) Duodenum

Qs 17. The process of elimination of urea from an organism is called

A) Ureotelism
B) Ammonotelism
C) Nephritis
D) Uremia

Qs 18. The ossicular chain formed by three tiny bones malleus, incus and stapes is

A) Eye
B) Ear
C) Nose
D) Throat

Qs 19. The red muscles are red in color as they contain the pigment

A) Haemoglobin
B) Immunoglobulin
C) Myoglobin
D) Legghaemoglobin

Qs 20. The bulbourethral gland of the male reproductive system is also called

A) Lacrimal gland
B) Prostate gland
C) Cowper's gland
D) Pineal gland

Qs 21. All fig trees are pollinated by

A) Air
B) Bats

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C) Birds
D) Wasps

Qs 22. Budding, a type of asexual reproduction, is formed in which of the following organisms?

A) Saccharomyces
B) Bacillus
C) Chlamydomonas
D) Amanita

Qs 23. The process of release of mature spermatids from sertoli cells into the seminiferous tubule lumen is called

A) Spermatogenesis
B) Spermiogenesis
C) Spermiation
D) Spermatogonium

Qs 24. The term used to describe the painful menstrual periods is

A) Amenorrhoea
B) Dysmenorrhoea
C) Premenstrual syndrome
D) Menorrhagia

Qs 25. Down's syndrome in humans is caused due to trisomy of which of the following chromosomes ?

A) Chromosome 21
B) Chromosome 13
C) Chromosome 18
D) Chromosome 10

Qs 26. Which one of the following antibody classes provides some degree of immune protection to the fetus?

A) IgM

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B) IgE
C) IgD
D) IgG

Qs 27. The genome of HIV consists of

A) One double stranded DNA
B) Two identical single stranded RNA
C) One single stranded RNA
D) Two identical single stranded DNA

Qs 28. The bacterium commonly used as a bioinsecticide is

A) Treponema pallidum
B) Bacillus Thuringiensis
C) Acetobacter Aceti
D) Lactobacillus lactis

Qs 29. Which one of the following is not a restriction endonuclease?

A) EcoRI
B) BamHI
C) HindIII
D) RY13

Qs 30. Kyoto Protocol was adopted in the year

A) 2001
B) 1997
C) 2010
D) 1967

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