CUSAT 2022 : Shift 2

Solved Paper

Question 1

Galvanometer is used to

Options:

A. measure amount of current flowing

B. measure direction of current flow

C. check whether current is flowing or not

D. measure potential difference

Answer: A

Solution:

Solution:

Question 2

Which one is true for super conducting behavior?

Options:

A. Large conductivity

B. Paramagnetism

C. Ferromagnetism

D. Perfect conduction and perfect diamagnetism

Answer: D

Solution:

Solution:

Question 3

What is the critical angle of incidence for water?

Options:

A. 49.75°

B. 47.75°

C. 48.75°

D. 46.75°

Answer: C

Solution:

Solution:

Question 4

Sunlight incident on prism is split into several colours due to

Options:

A. diffraction

B. reflection

C. incident

D. dispersion

Answer: D

Solution:

Solution:

Question 5

10 cm is a wavelength corresponding to the spectrum of

Options:

A. Radio waves

B. Infrared waves

C. Microwaves

D. X-rays

Answer: C

Solution:

Solution:

Question 6

The particle nature of light is proved by which of the following?

Options:

A. Polarization

B. Diffraction

C. Photoelectric effect

D. Interference

Answer: C

Solution:

Solution:

Question 7

A doped semiconductor is also known as

Options:

A. intrinsic semiconductor

B. extrinsic semiconductor

C. diffused semiconductor

D. compound semiconductor

Answer: B

Solution:

Solution:

Question 8

Which one of the following has highest mobility?

Options:

A. Neutron

B. Electron

C. Positive ions

D. Holes

Answer: B

Solution:

Solution:

Question 9

Photoelectric effect is based on the law of conservation of

Options:

A. Mass

B. Energy

C. Momentum

D. Angular velocity

Answer: B

Solution:

Solution:

Question 10

The main origin of the magnetism is based on the

Options:

A. polar nature of the materials

B. Pauli’s exclusion principle

C. intrinsic spin of the electron

D. charge of the electron

Answer: C

Solution:

Solution:

Question 11

Electromagnetic waves are produced due to

Options:

A. uniformly moving charge

B. constantly circulating charge

C. rest charge

D. accelerated charge

Answer: D

Solution:

Solution:

Question 12

An equivalent representation for the Boolean expression A′ + 1 is

Options:

A. A

B. A'

C. 1

D. 0

Answer: C

Solution:

Solution:

Question 13

Ohms law says

Options:

A. $R = V I$

B. $V = I R$

C. $V = I^2 R$

D. $R = V^2 I$

Answer: B

Solution:

Solution:

Question 14

The reason why metals are so shiny is

Options:

A. their hardness makes them easy to polish

B. the electric field of the photon is forced to go to zero at the surface of the metal, generating a wave in the opposite direction

C. because metals are so hard, photons undergo completely elastic collisions which gives them an equal and opposite momentum

D. metals carry a large static charge at their surface that repels the photons

Answer: B

Solution:

Solution:

Question 15

Two identical objects having mass ‘m’ are released from rest and they move towards each other under the influence of mutual gravitational force. Gravitational potential energy of the two particle system

Options:

A. is zero

B. is constant ($\neq 0$)

C. decreases as the separation decreases

D. increases as the separation decreases

Answer: C

Solution:

Solution:

Question 16

Expression of Brewster's law is

Options:

A. $\mu = \tan i_p$

B. $\mu = \tan r$

C. $\mu = \cos r$

D. $\mu = \sin r$

Answer: B

Solution:

Solution:

Question 17

What is the focal length of the combination of the two lens having power +14D and −4D respectively are placed in contact coaxially?

Options:

A. 100 cm

B. 10 cm

C. 10m

D. 100m

Answer: B

Solution:

Solution:

Question 18

Two electric bulbs having resistance in the ratio of 1 : 3 are connected in parallel to a constant voltage source. The power dissipated in them has the ratio of

Options:

A. 1 : 6

B. 1 : 3

C. 3 : 1

D. 6 : 1

Answer: C

Solution:

Solution:

Question 19

The value of Young's modulus for a perfect rigid body is

Options:

A. zero

B. infinity

C. one

D. less than one

Answer: B

Solution:

Solution:

Question 20

A body of mass of 10 kg is placed at the centre of the earth. Now, the weight of the body will be

Options:

A. Infinite

B. 10 kg

C. Zero

D. 20 kg

Answer: C

Solution:

Solution:

Question 21

At a given temperature, the pressure of an ideal gas is

Options:

A. directly proportional to its density

B. inversely proportional to its density

C. inversely proportional to square of its density

D. independent of its density

Answer: A

Solution:

Solution:

Question 22

Which one of the below given frequency is audible to human ears?

Options:

A. 2 Hz

B. 25 kHz

C. 2000 Hz

D. 200 kHz

Answer: C

Solution:

Solution:

Question 23

Which of these crystal defects occurs due to the interstitial position of atoms?

Options:

A. Schottky defect

B. Frenkel defect

C. Metal ion defect

D. Screw dislocation

Answer: B

Solution:

Solution:

Question 24

As the accelerating potential used in a Coolidge tube to produce X-rays is increased, the cut-off wavelength

Options:

A. increases

B. decreases

C. first increases, then decreases

D. remain unchanged

Answer: B

Solution:

Solution:

Question 25

For a P-N junction diode

Options:

A. forward current is in mA and reverse current is in μA

B. forward current is in A and reverse current is in mA

C. both forward and reverse currents are in μA

D. both forward and reverse currents are in mA

Answer: A

Solution:

Solution:

Question 26

When a light frequency n is shined on the metal surface, the maximum velocity of the photoelectrons emitted from the surface is v. If the incident frequency is increased to 4n, the maximum velocity of the ejected photoelectrons will be

Options:

A. 4v

B. 2v

C. v

D. 3v

Answer: B

Solution:

Solution:

Question 27

A time dependent force $F = 8t$ acts on a particle of mass $1\,kg$. If the particle starts from rest, the work done by the force during the first 2 second will be

Options:

A. 16J

B. 256J

C. 128J

D. 64J

Answer: C

Solution:

Solution:

Question 28

Copper of fixed volume V is drawn into wire of length l. When this wire is subjected to a constant force F, the extension produced in the wire is Δl. Which of the following graph is a straight line?

Options:

A. Δl versus $\frac{1}{l}$

B. Δl versus l^2

C. Δl versus $\frac{1}{l^2}$

D. Δl versus l

Answer: B

Solution:

Solution:

Question 29

Seven capacitors each of capacitance $4\mu F$ are to be connected to obtain a capacitance of $\frac{20}{11}\mu F$, which of the following combination is possible?

Options:

A. 4 in parallel 3 in series

B. 5 in parallel 2 in series

C. 3 in parallel 4 in series

D. 2 in parallel 5 in series

Answer: B

Solution:

Solution:

Question 30

If the source of light used in a Young's double slit experiment is changed from red to violet,

Options:

A. the fringes will become brighter

B. the intensity of minima will increase

C. consecutive fringes will come closer

D. the consecutive fringes moves apart

Answer: C

Solution:

Solution:

Question 31

The SI unit of $\frac{1}{\sqrt{\varepsilon_0 \mu_0}}$ is

Options:

A. F / m

B. m / sec

C. H-F

D. m / HF

Answer: B

Solution:

Solution:

Question 32

The permanent magnetic moment of the atoms of a material is zero. The material

Options:

A. must be paramagnetic

B. must be diamagnetic

C. must be ferromagnetic

D. must be ferrimagnetic

Answer: B

Solution:

Solution:

Question 33

A coil of inductance 300 mH and resistance 2 Ω is connected to a 2 V voltage source. The current reaches half of its steady state value in

Options:

A. 0.05 sec

B. 0.1 sec

C. 0.15 sec

D. 0.3 sec

Answer: B

Solution:

Solution:

Question 34

A stone of mass m tied to a string of length l is rotated in a circle with the other end of the string as the centre. The speed of the stone is v. If the string breaks, the stone will

Options:

A. move towards the centre

B. move away from the centre

C. move along the tangent

D. stop

Answer: C

Solution:

Solution:

Question 35

A sphere, a cube and a thin circular plate all of same material having same mass are initially heated to 200°C. Which of these will cool faster?

Options:

A. Circular plate

B. Sphere

C. Cube

D. Both the circular plate and sphere

Answer: A

Solution:

Solution:

Question 36

The image formed by an objective of a compound microscope is

Options:

A. Virtual and diminished

B. Real and diminished

C. Real and enlarged

D. Virtual and enlarged

Answer: C

Solution:

Solution:

Question 37

The shortest height of a vertical mirror required to see the entire image of a man will be

Options:

A. one third of man’s height

B. half of the man’s height

C. two third of man’s height

D. one fourth of the man’s height

Answer: B

Solution:

Solution:

Question 38

A cell supplies a current of 0.9A through a 2Ω resistor and a current of 0.3A through a 7Ω resistor. What is the internal resistance of the cell?

Options:

A. 0.5Ω

B. 1Ω

C. 1.2Ω

D. 2Ω

Answer: A

Solution:

Solution:

Question 39

A spring of force constant k is cut into two pieces such that one piece is double the length of the other. Then the longer piece will have a force constant of

Options:

A. 2k / 3

B. 3k / 2

C. 3k

D. 6k

Answer: B

Solution:

Solution:

Question 40

A body of mass 10 kg is moving on a horizontal surface by applying a force of 10N in forward direction. If body moves with constant velocity, the work done by applied force for a displacement of 2m is

Options:

A. 20J

B. 10J

C. 30J

D. 40J

Answer: A

Solution:

Solution:

Question 41

Out of gravitational, electromagnetic, van der Waal's, electrostatic and nuclear forces, which of the following provides an attractive force between neutrons?

Options:

A. gravitational and van der Waal's

B. electrostatic and gravitational

C. electrostatic and nuclear

D. nuclear

Answer: D

Solution:

Solution:

Question 42

A condenser of capacity 10μF is charged to a potential difference of 100V. It is now connected in parallel to another uncharged condenser. The common potential now is 40V. The capacitance of the other condenser is

Options:

A. 25μF

B. 20μF

C. 15μF

D. 10μF

Answer: C

Solution:

Solution:

Question 43

For ferromagnetic substances the permeability is and susceptibility is

Options:

A. very large; positive and large

B. very large; negative and small

C. very small; positive and large

D. very low; negative and small

Answer: A

Solution:

Solution:

Question 44

The magnetic flux linked with a coil changes from 1 Weber to 0.1 Weber in 0.1 sec. The induced e.m.f is

Options:

A. 9 Volts

B. 10 Volts

C. 0.009 Volts

D. 0.1 Volts

Answer: A

Solution:

Solution:

Question 45

A step down transformer transforms supply line voltage of 2200V into 220V. The primary coil has 5000 turns. The efficiency and power

transmitted by the transformer are 90% and 8 kW respectively. Then the number of turns in the secondary and the power supplied are

Options:

A. 50 turns, 9.89 kW

B. 500 turns, 9.89 kW

C. 500 turns, 8.89 kW

D. 100 turns, 8.89 kW

Answer: C

Solution:

Solution:

Question 46

On a glass plate a light ray is incident at an angle of 60˚. If the reflected and refracted rays are mutually perpendicular, the refractive index of the material is

Options:

A. $\sqrt{3}$ / 2

B. $\sqrt{3}$

C. 3 / 2

D. 1 / $\sqrt{3}$

Answer: B

Solution:

Solution:

Question 47

If the least distance for clear vision is 25 cm, power of objective and the eyepiece are 25 dioptre and 5 dioptre lenses respectively, with separation between them is 30 cm, the maximum magnifying power of the compound microscope is

Options:

A. 8.4

B. 7.4

C. 9.4

D. 10.4

Answer: C

Solution:

Solution:

Question 48

A proton and an α particle are accelerated by the same potential difference Their ratio of the de Broglie wavelengths (λ_p, λ_α) is

Options:

A. 1

B. 2

C. $\sqrt{8}$

D. 1 / $\sqrt{8}$

Answer: C

Solution:

Solution:

Question 49

A photon and an electron have same kinetic energy. If λ_p and λ_e are the wavelengths of them respectively, then

Options:

A. $\lambda_p < \lambda_e$

B. $\lambda_p > \lambda_e$

C. $\lambda_p = \lambda_e$

D. $\lambda_p = \lambda_e = 0$

Answer: A

Solution:

Solution:

Question 50

Ratio of wavelengths of first line of Lyman series and the first line of Balmer series is

Options:

A. 1 : 3

B. 27 : 5

C. 5 : 27

D. 4 : 9

Answer: C

Solution:

Solution:

Question 51

If Avogadro's number is 6×10^{23} then the number of protons, neutrons and electrons in 14 gm of ${}_{6}C^{14}$ are respectively

Options:

A. 36×10^{23}, 48×10^{23}, 36×10^{23}

B. 36×10^{23}, 36×10^{23}, 36×10^{23}

C. 48×10^{23}, 36×10^{23}, 48×10^{23}

D. 48×10^{23}, 48×10^{23}, 36×10^{23}

Answer: A

Solution:

Solution:

Question 52

The binding energy per nucleus of deuteron (${}_{1}H^{2}$) and helium nucleus

($_2He^4$) is 1.1 MeV and 7 MeV respectively. If two deuteron nuclei react to form a single helium nucleus, then the energy released is

Options:

A. 13.9 MeV

B. 25.8 MeV

C. 23.6 MeV

D. 19.2 MeV

Answer: C

Solution:

Solution:

Question 53

An aluminium rod of length 3.14m is of square cross-section $3.14 \times 3.14mm^2$. What should be the radius of 1m length of another rod of same material to have equal (same) resistance?

Options:

A. 2 mm

B. 4 mm

C. 1 mm

D. 6 mm

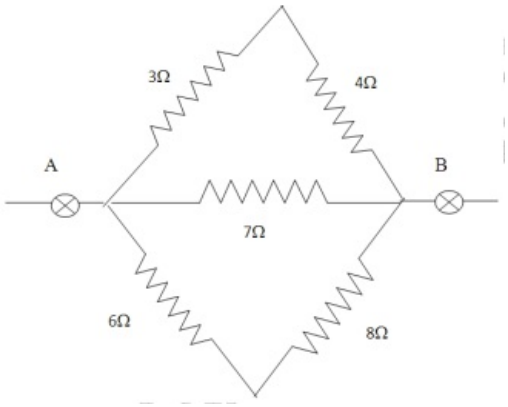
Answer: C

Solution:

Solution:

Question 54

The resistance across AB in the circuit is



Options:

A. 2.8Ω

B. 14 / 3Ω

C. 3 / 14Ω

D. 5 / 14Ω

Answer: A

Solution:

Solution:

Question 55

The energy band gap in conductors, semiconductors and insulators are EG_1, EG_2 and EG_3 respectively. Then the relation among them is

Options:

A. $EG_1 = EG_2 = EG_3$

B. $EG_1 > EG_2 > EG_3$

C. $EG_1 < EG_2 < EG_3$

D. $EG_1 < EG_2 > EG_3$

Answer: C

Solution:

Solution:

Question 56

The magnitude of average velocity is equal to the average speed when a

particle moves

Options:

A. on a curved path

B. in a straight line

C. with the constant acceleration

D. with constant retardation

Answer: B

Solution:

Solution:

Question 57

If F is the force between two point charges submerged in a medium of dielectric constant K, then on withdrawing the medium, the force between the charges becomes

Options:

A. $F\sqrt{K}$

B. FK

C. $F / \sqrt{K}$

D. F / K

Answer: B

Solution:

Solution:

Question 58

Resistances n, each of r ohm, when connected in parallel give an equivalent resistance of R ohm. If these resistances were connected in series, the combination would have resistance in ohm, equal to

Options:

A. R / n^2

B. R / n

C. nR

D. n^2R

Answer: D

Solution:

Solution:

Question 59

A stationary particle explodes into two particles of masses m_1 and m_2 which move in opposite directions with velocities v_1 and v_2. The ratio of their kinetic energies E_1 / E_2 is

Options:

A. m_2 / m_1

B. m_1 / m_2

C. 1

D. m_1v_2 / m_2v_1

Answer: A

Solution:

Solution:

Question 60

A ray of light is incident normally on one of the faces of a prism of angle 30° and refractive index $\sqrt{2}$. The angle of deviation of the ray is

Options:

A. 0°

B. 12.5°

C. 15°

D. 22.5°

Answer: C

Solution:

Solution:

Question 61

Matter wave duality is associated with

Options:

A. Pauli's principle

B. De Broglie relation

C. Schrodinger wave equation

D. Plank's equation

Answer: B

Solution:

Solution:

Question 62

If energy of a photon of 3 eV strikes a metal surface and resulting work function on the metal is 2 eV, calculate the kinetic energy of the emitted photon.

Options:

A. 5 eV

B. 2.5 eV

C. 1.5 eV

D. 1 eV

Answer: D

Solution:

Solution:

Question 63

According to Graham’s law of diffusion, the rate of diffusion of a gas at constant pressure is

Options:

A. directly proportional to density of the gas

B. inversely proportional to density of the gas

C. directly proportional to square root of density of the gas

D. inversely proportional to square root of density of the gas

Answer: D

Solution:

Solution:

Question 64

In a cyclic process

Options:

A. work done is zero

B. work done by the system is equal to the quantity of heat given to the system

C. work done does not depend on the quantity of heat given to the system

D. the internal energy of the system increases

Answer: B

Solution:

Solution:

Question 65

If solute-solvent interaction are weaker than those between solute-solute and solvent-solvent interactions, then

Options:

A. $\Delta H_{mix} = 0$

B. $\Delta H_{mix} = +ve$

C. $\Delta H_{mix} = -ve$

D. $\Delta H_{mix} = T\ \Delta S$

Answer: B

Solution:

Solution:

Question 66

When a catalyst is added to a reversible reaction in equilibrium state, the value of the equilibrium constant

Options:

A. increases

B. decreases

C. does not change

D. becomes zero

Answer: C

Solution:

Solution:

Question 67

What is the relation between K_p and K_c ?

Options:

A. $K_p = \Delta n K_c RT$

B. $K_p = -\Delta n K_c RT$

C. $K_p = K_c (RT)^{\Delta n}$

D. $K_p = K_c (RT)^{-\Delta n}$

Answer: C

Solution:

Solution:

Question 68

Henderson-Hasselbalch equation for a buffer solution is

Options:

A. $pH = pK_a + \log\left(\frac{[\text{ Salt }]}{[\text{ Acid }]}\right)$

B. $pH = pK_a - \log\left(\frac{[\text{ Salt }]}{[\text{ Acid }]}\right)$

C. $pH = pK_b + \log\left(\frac{[\text{ Salt }]}{[\text{ Acid }]}\right)$

D. $pH = pK_b - \log\left(\frac{[\text{ Salt }]}{[\text{ Acid }]}\right)$

Answer: A

Solution:

Solution:

Question 69

Solubility product for a M_2S salt having solubility ' s ' $\text{mol}\,\text{lit}^{-1}$ is

Options:

A. $K_{sp} = 2\ s^2$

B. $K_{sp} = 4\ s^2$

C. $K_{sp} = 2\ s^3$

D. $K_{sp} = 4\ s^3$

Answer: D

Solution:

Solution:

Question 70

If half life time of a reaction is independent of initial concentration of reactant, what is the order of reaction?

Options:

A. Zero order

B. $\frac{1}{2}$ order

C. First order

D. Second order

Answer: C

Solution:

Solution:

Question 71

For the reaction, $4NH_3 + 5O_2 \rightarrow 4\,NO + 6H_2O$

Options:

A. Rate $= 0.25\,\frac{d\,[NH_3]}{d\,t}$

B. Rate $= -0.25\,\frac{d\,[NH_3]}{d\,t}$

C. Rate $= 4\,\frac{d\,[NH_3]}{d\,t}$

D. Rate $= -4\,\frac{d\,[NH_3]}{d\,t}$

Answer: B

Solution:

Solution:

Question 72

The reaction $Zn^{2+} + Cu \rightarrow Zn + Cu^{2+}$ is (The reduction potentials of Zn and Cu are $-0.76V$ and $+0.34V$ respectively)

Options:

A. non-spontaneous process

B. spontaneous process

C. spontaneous at high temperature

D. spontaneous at lower temperature

Answer: A

Solution:

Solution:

Question 73

Considering the formation, breaking and strength of hydrogen bond, predict which of the following mixtures will show a negative deviation from Raoult’s law?

Options:

A. Methanol and acetone

B. Chloroform and acetone

C. Nitric acid and water

D. Phenol and aniline

Answer: B

Solution:

Solution:

Question 74

The physical adsorption of gases on the solid is due to

Options:

A. Covalent bond

B. Hydrogen bond

C. Ionic bond

D. van der Waal’s forces

Answer: D

Solution:

Solution:

Question 75

Which among the following is NOT a facile reaction for primary amides ($RCONH_2$)?

Options:

A. Dehydration to give the corresponding nitriles

B. Reaction with bromine in the presence of sodium hydroxide to give primary amines with one carbon less

C. Reaction with alkyl halides to give the corresponding secondary and tertiary amides

D. Reaction with lithium aluminum hydride to give primary amines having the same number of carbon atoms

Answer: C

Solution:

Solution:

Question 76

In amylopectin, branching occurs by

Options:

A. C1-C4 glycosidic linkage

B. C6-C6 linkage

C. C1-C3 glycosidic linkage

D. C1-C6 glycosidic linkage

Answer: D

Solution:

Solution:

Question 77

Which among the following name reactions is suitable for the conversion of ethanoic acid to 2-bromoethanoic acid?

Options:

A. Hell-Volhard-Zelinsky reaction

B. Hunsdiecker reaction

C. Reformatsky reaction

D. Favorskii reaction

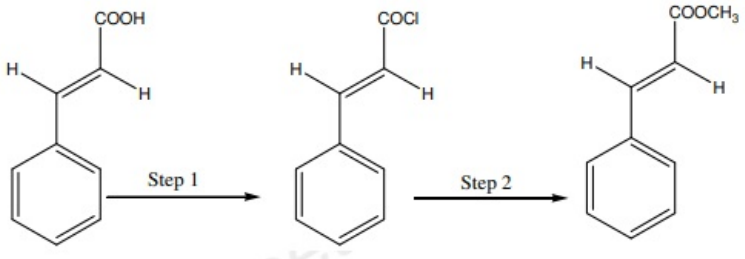
Answer: A

Solution:

Solution:

Question 78

Methyl cinnamate can be prepared as shown



Which reagents should be used?

Options:

A. Step 1 - HCl, Step 2 − CH_3OH

B. Step 1 − HCl, Step 2 − CH_3CO_2H

C. Step 1 − PCl_5, Step 2 − CH_3OH

D. Step 1 − PCl_5, Step 2 − CH_3CO_2H

Answer: C

Solution:

Solution:

Question 79

C60 (Fullerene) also known as buckminsterfullerene has

Options:

A. 14 pentagons and 18 hexagons

B. 12 pentagons and 20 hexagons

C. 10 pentagons and 20 hexagons

D. 20 pentagons and 12 hexagons

Answer: B

Solution:

Solution:

Question 80

Among formaldehyde, trichloroacetaldehyde (CCl_3CHO) and benzaldehyde, the aldehydes that undergo Cannizzaro reaction are

Options:

A. all the three aldehydes

B. formaldehyde and trichloroacetaldehyde

C. trichloroacetaldehyde and benzaldehyde

D. formaldehyde and benzaldehyde

Answer: D

Solution:

Solution:

Question 81

Which nitrogenous base is NOT present in Ribonucleic Acids (RNA)?

Options:

A. Adenine

B. Thymine

C. Guanine

D. Cytosine

Answer: B

Solution:

Solution:

Question 82

Which among the following is NOT a reducing sugar?

Options:

A. 2-deoxyribose

B. fructose

C. glucose

D. sucrose

Answer: D

Solution:

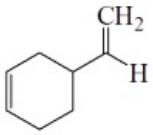
Solution:

Question 83

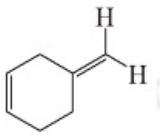
Which of the following is formed by the dimerization of 1,3-butadiene by Diels Alder reaction?

Options:

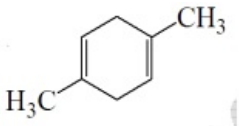
A.



B.



C.



D.

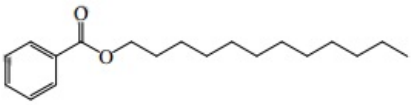
Answer: A

Solution:

Solution:

Question 84

IUPAC name of the following compound is



Options:

A. Dodecyl benzoate

B. Benzyl dodeconate

C. Benzoyl oxy dodecane

D. Phenyl dodeconate

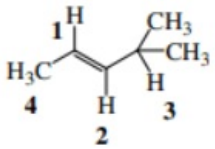
Answer: A

Solution:

Solution:

Question 85

Which hydrogen is most easily abstracted from the below mentioned compound to give the corresponding radical intermediate?



Options:

A. 1

B. 2

C. 3

D. 4

Answer: C

Solution:

Solution:

Question 86

Which among the following aromatic compounds is most reactive towards sulfonation reaction?

Options:

A. Benzene

B. Toluene

C. Ethylbenzane

D. t-Butylbenzene

Answer: B

Solution:

Solution:

Question 87

Pick the statement that is NOT true for S_N1 substitutions.

Options:

A. Carbocation intermediate is involved

B. EI elimination is a possible side reaction

C. Reaction rate is doubled when the concentration of nucleophile is doubled

D. Primary alkyl halides seldom undergo S_N1 substitutions

Answer: C

Solution:

Solution:

Question 88

Arrange the elements in the order of increase in ionization energy?

Options:

A. H, Li, Na, K, Rb, Cs

B. K, Rb, Cs, H, Li, Na

C. Cs, H, Li, K, Rb, Na

D. Cs, Rb, K, Na, Li, H

Answer: D

Solution:

Solution:

Question 89

Cobalt and Nickel are

Options:

A. diamagnetic

B. paramagnetic

C. ferromagnetic

D. antiferromagnetic

Answer: C

Solution:

Solution:

Question 90

Chlorine exists in two isotopic forms Cl-37 and Cl-35, but its atomic mass is 35.5. What would be the approximate ratio of $Cl-37$ and $Cl-35$?

Options:

A. 1 : 2

B. 1 : 1

C. 3 : 1

D. 1 : 3

Answer: D

Solution:

Solution:

Question 91

Which one is the example for linkage isomerism?

Options:

A. $[Co(NH_3)_5(NO_2)]^{2+}$

B. $[Pd(NH_3)_4]$

C. $[Co(NH_3)_4\,ClBr]\,Br$

D. $[Cr(NH_3)_5\,CN]$

Answer: A

Solution:

Solution:

Question 92

The packing fraction (%) of simple cubic unit cell is

Options:

A. 74

B. 68

C. 52

D. 39

Answer: C

Solution:

Solution:

Question 93

Calculate de Broglie wavelength for an electron moving at the speed of 6.0×10^{6}m / s . (m = 9.1×10^{-31} Kg, h = 6.627×10^{-34} Js)

Options:

A. 1.46×10^{-10}m

B. 1.21×10^{-9}m

C. 1.46×10^{-9}m

D. 1.21×10^{-10}m

Answer: D

Solution:

Solution:

Question 94

Physical properties of the elements in the periodic table depends upon the

Options:

A. size of atom

B. size of proton

C. number of electrons

D. size of neutron

Answer: A

Solution:

Solution:

Question 95

is a polar molecule.

Options:

A. BF_6

B. XeF_4

C. SF_4

D. SiF_4

Answer: C

Solution:

Solution:

Question 96

Which type of radioactive decay causes the atomic number of a nucleus to increase by one unit?

Options:

A. Electron capture

B. α-particle emission

C. β-particle emission

D. γ-ray emission

Answer: C

Solution:

Solution:

Question 97

The maximum temperature that can be achieved in blast furnace i

Options:

A. up to 1200K

B. up to 2200K

C. up to 1900K

D. up to 5000K

Answer: B

Solution:

Solution:

Question 98

The structures of beryllium chloride in solid state and vapour phase are

Options:

A. chain and dimer, respectively

B. linear in both phases

C. dimer and linear, respectively

D. chain in both phases

Answer: A

Solution:

Solution:

Question 99

Match the following.

List I	List II
(a) PCl_5	(i) Square pyramidal
(b) SF_6	(ii) Trigonal planar
(c) BrF_5	(iii) Octahedral
(d) BF_3	(iv) Trigonal bipyramidal

Options:

A. (a)-(iv), (b)-(iii), (c)-(i), (d)-(ii)

B. (a)-(ii), (b)-(iii), (c)-(iv), (d)-(i)

C. (a)-(iii), (b)-(i), (c)-(iv), (d)-(ii)

D. (a)-(iv), (b)-(iii), (c)-(ii), (d)-(i)

Answer: A

Solution:

Solution:

Question 100

What is the correct electronic configuration of the central atom in $K_4[Fe(CN)_6]$ based on crystal field theory?

Options:

A. $_2g^4eg^2$

B. $_2^{66}e^0$

C. $_2g^3eg^3$

D. $e^4t_2^2$

Answer: B

Solution:

Solution:

Question 101

If the non-zero numbers x, y, z are in A.P, and $\tan^{-1}x$, $\tan^{-1}y$, $\tan^{-1}z$ are also in A.P, then

Options:

A. x = y = z

B. xy = yz

C. $x^2 = yz$

D. $z^2 = xy$

Answer: A

Solution:

Solution:

Question 102

Let f(x) be a polynomial of second degree. If f(1) = f(−1) and a, b, c are in A.P, then f′(a), f′(b) and f′(c) are

Options:

A. in A.P

B. in G.P

C. in H.P

D. equal

Answer: A

Solution:

Solution:

Question 103

How many 5 letter words, with or without meaning can be formed out of the letters of the word 'EQUATIONS' if repetition of letters is not allowed?

Options:

A. 126

B. 5^9

C. 9^5

D. 15120

Answer: D

Solution:

Solution:

Question 104

If $\lim_{x \to 0}(\cos x + a\sin bx)^{\frac{1}{x}} = e^2$, then

Options:

A. $a = 1, b = -2$

B. $a = 2\sqrt{2}, b = \sqrt{2}$

C. $a = 2\sqrt{2}, b = \frac{1}{\sqrt{2}}$

D. $a = -2, b = 1$

Answer: C

Solution:

Solution:

Question 105

If $\lim_{x \to 0}(\cos x + a\sin bx)^{\frac{1}{x}} = e^2$, then

Options:

A. $a = 1, b = -2$

B. $a = 2\sqrt{2}, b = \sqrt{2}$

C. $a = 2\sqrt{2}, b = \frac{1}{\sqrt{2}}$

D. $a = -2, b = 1$

Answer: A

Solution:

Solution:

Question 106

If $(n-1)C_r = (k^2-3)nC_{r+1}$, then k lies in the interval

Options:

A. $[-\sqrt{3}, \sqrt{3}]$

B. $(-\infty, -2)$

C. $(2, \infty)$

D. $(\sqrt{3}, 2]$

Answer: D

Solution:

Solution:

Question 107

The remainder when 1! + 2! + 3! + ... + 100 ! is divided by 240 , is

Options:

A. 187

B. 33

C. 73

D. 153

Answer: D

Solution:

Solution:

Question 108

The solution set of $f'(x) > g'(x)$ where $f(x) = \frac{1}{2}5^{2x+1}$ and

$g(x) = 5^x + 4x\log_e 5$ is

Options:

A. $(1, \infty)$

B. $(0, 1)$

C. $(-1, \infty)$

D. $(0, \infty)$

Answer: D

Solution:

Solution:

Question 109

Let f be the greatest integer function defined by $f(x) = [x]$ and g be the modulus function defined by $g(x) = |x|$. Then the value of $(g \circ f)\left(\frac{-1}{3}\right)$ is

Options:

A. 1

B. -1

C. 0

D. $\frac{1}{3}$

Answer: A

Solution:

Solution:

Question 110

The probability of obtaining an even prime number on each die, when a pair of dice is rolled, is

Options:

A. 0

B. $\frac{1}{6}$

C. $\frac{1}{12}$

D. $\frac{1}{36}$

Answer: D

Solution:

Solution:

Question 111

The product of three consecutive numbers is always divisible by

Options:

A. 6

B. 10

C. 15

D. 8

Answer: A

Solution:

Solution:

Question 112

In the group of quarternions $Q_8 = \{\pm 1, \pm i, \pm j, \pm k\}$, the order of $-j$ is

Options:

A. 2

B. 4

C. 8

D. 6

Answer: B

Solution:

Solution:

Question 113

If P + $\frac{1}{Q}$ = 1 and Q + $\frac{1}{R}$ = 1, then the product of P, Q and R is

Options:

A. -1

B. 2

C. -2

D. 3

Answer: A

Solution:

Solution:

Question 114

The sum of mean and variance of a binomial distribution of 5 trails is 4.8. Then the probability of success is

Options:

A. 0.2

B. 1.2

C. 0.8

D. 0.5

Answer: C

Solution:

Solution:

Question 115

The set of all points of discontinuity of the greatest integer function f (x) = [x] is

Options:

A. the set of all integers

B. the set of all real numbers

C. the set of all natural numbers

D. the set of all rational numbers

Answer: A

Solution:

Solution:

Question 116

If $\vec{a}$ and $\vec{b}$ are two non-zero vectors such that $\left|\vec{a} \times \vec{b}\right| = \vec{a} \cdot \vec{b}$, then the angle between $\vec{a}$ and $\vec{b}$ is

Options:

A. $\frac{\pi}{3}$

B. $\frac{\pi}{4}$

C. $\frac{\pi}{6}$

D. $\frac{\pi}{2}$

Answer: B

Solution:

Solution:

Question 117

Let the roots of $bt^2 + ct + a = 0$ be imaginary. For all real values of t, the expression $3b^2t^2 + 6bct + 2c^2$ is

Options:

A. less than $-4ab$

B. greater than $-4ab$

C. less than $4ab$

D. greater than $4ab$

Answer: B

Solution:

Solution:

Question 118

In a triangle ABC, if sin Asin B = $\frac{ab}{c^2}$, then the triangle is

Options:

A. equilateral

B. isosceles

C. right angled

D. obtuse angled

Answer: C

Solution:

Solution:

Question 119

Let $f(t) = 2t^2 + 5t + 1$. If $f(t) = a(t + 1)(t - 2) + b(t - 2)(t - 1) + c(t - 1)(t + 1)$ for real numbers a, b, c, then

Options:

A. there are infinite number of choices for a, b, c

B. only one choice for a but infinite number of choices for b and c

C. exactly one choice for each of a, b, c

D. more than one but finite number of choices for a, b, c

Answer: C

Solution:

Solution:

Question 120

Let M = $\begin{pmatrix} \cos\frac{\pi}{4} & -\sin\frac{\pi}{4} \\ \sin\frac{\pi}{4} & \cos\frac{\pi}{4} \end{pmatrix}$ and Y = $\begin{pmatrix} \frac{1}{\sqrt{2}} \\ \frac{1}{\sqrt{2}} \end{pmatrix}$. Then M^3Y =

Options:

A. $\begin{pmatrix} -1 \\ 0 \end{pmatrix}$

B. $\begin{pmatrix} 1 \\ 0 \end{pmatrix}$

C. $\begin{pmatrix} \frac{-1}{\sqrt{2}} \\ \frac{1}{\sqrt{2}} \end{pmatrix}$

D. $\begin{pmatrix} \frac{-1}{\sqrt{2}} \\ \frac{-1}{\sqrt{2}} \end{pmatrix}$

Answer: A

Solution:

Solution:

Question 121

The number of real solutions of the equation $x^7 + 14x^5 + 16x^3 + 30x - 560 = 0$ is

Options:

A. 7

B. 1

C. 3

D. 5

Answer: B

Solution:

Solution:

Question 122

The vector $\vec{a} = \alpha\vec{i} + 2\vec{j} + \beta\vec{k}$ lies in the plane of the vectors $\vec{b} = \vec{i} + \vec{j}$ and $\vec{c} = \vec{j} + \vec{k}$ and bisects the angle between $\vec{b}$ and $\vec{c}$. Then

Options:

A. $\alpha = 1, \beta = 1$

B. $\alpha = 2, \beta = 2$

C. $\alpha = 1, \beta = 2$

D. $\alpha = 2, \beta = 1$

Answer: A

Solution:

Solution:

Question 123

Which of the following function is not one to one?

Options:

A. g : □→□, g(x) = 2x + 5

B. $g : [0, \pi] \to [-1, 1], g(x) = \cos x$

C. $g : \left[\frac{-\pi}{2}, \frac{\pi}{2}\right] \to [1, 7], g(x) = 3\sin x + 4$

D. g : □→[−1, 1], g(x) = sin x

Answer: D

Solution:

Solution:

Question 124

The number of real solutions of the equation $\frac{6-x}{x^2-4} = 2 + \frac{x}{x+2}$ is

Options:

A. 0

B. 1

C. 2

D. 4

Answer: B

Solution:

Solution:

Question 125

If $x_n > x_{n-1} > \ldots > x_2 > x_1$, then the value of $\log_{x_1}\log_{x_2}\log_{x_3}\ldots\log_{x_n} x_n^{x_{n-1}^{x_1}}$ is equal to

Options:

A. 0

B. 1

C. 2

D. n

Answer: B

Solution:

Solution:

Question 126

If $\tan x = \frac{3}{4}$ and $\tan y = \frac{1}{7}$, then x + y is equal to

Options:

A. π

B. 2π

C. $\frac{\pi}{4}$

D. $\frac{\pi}{2}$

Answer: C

Solution:

Solution:

Question 127

If α and β are roots of both the equations $\cos^2 x + a\cos x + b = 0$ and $\sin^2 x + p\sin x + q = 0$, then

Options:

A. $1 + b + a^2 = p^2 - q$

B. $a^2 + b^2 = p^2 + q^2$

C. $b + q = a^2 + p^2 - 2$

D. $b + q = a^2 + p^2 + 2$

Answer: C

Solution:

Solution:

Question 128

If z_1 and z_2 are complex numbers satisfying $\left|\frac{z_1}{z_2}\right| = 1$ and $\arg(z_1 z_2) = 0$, then

Options:

A. $z_1 = z_2$

B. $|z_2^2| = z_1 z_2$

C. $z_1 z_2 = 1$

D. $z_1 \cdot z_2 = 1$

Answer: B

Solution:

Solution:

Question 129

$\sqrt{2+\sqrt{2+\sqrt{2+\ldots\infty}}}$ is equal to

Options:

A. 2i

B. i

C. $-i$

D. -1

Answer: D

Solution:

Solution:

Question 130

The complex numbers $\sin x + i\cos 2x$ and $\cos x - i\sin 2x$ are conjugate to each other for

Options:

A. $x = n\pi$

B. $x = \left(n + \frac{1}{2}\right)\pi$

C. all values of x

D. no value of x

Answer: D

Solution:

Solution:

Question 131

Let a, b, c be in Harmonic Progression. Then $\frac{a}{b+c}$, $\frac{b}{a+c}$, $\frac{c}{a+b}$ are

Options:

A. in Harmonic Progression

B. in Geometric Progression

C. in Arithmetic Progression

D. equal

Answer: A

Solution:

Solution:

Question 132

The sum of all two digit odd numbers is

Options:

A. 2475

B. 2530

C. 4095

D. 5049

Answer: A

Solution:

Solution:

Question 133

If $H_n = 1 + \frac{1}{2} + \ldots + \frac{1}{n}$, then the value of $1 + \frac{3}{2} + \frac{5}{3} + \ldots \frac{2n-1}{n}$ is

Options:

A. $n + H_n$

B. $2n + H_n$

C. $2n - H_n$

D. $n - H_n$

Answer: C

Solution:

Solution:

Question 134

A person read common difference of an Arithmetic Progression as -4 instead of 4 and obtained the sum of first eight terms as 48 . The correct sum of first eight terms is

Options:

A. 212

B. 272

C. 312

D. 342

Answer: B

Solution:

Solution:

Question 135

Let y = $\left(1+x^{\frac{1}{4}}\right)\left(1+x^{\frac{1}{2}}\right)\left(1-x^{\frac{1}{4}}\right)$. Then $\frac{dy}{dx}$ is equal to

Options:

A. 1

B. -1

C. x

D. $\sqrt{x}$

Answer: B

Solution:

Solution:

Question 136

Let f (x) be a polynomial in x. Then, the second order derivative of f (e^x) with respect to x is

Options:

A. $f''(e^x)\cdot e^x + f'(e^x)$

B. $f''(e^x)\cdot e^{2x} + f'(e^{2x})\cdot e^{2x}$

C. $f''(e^x) \cdot e^{2x}$

D. $f''(e^x) \cdot e^{2x} + f'(e^x) \cdot e^x$

Answer: D

Solution:

Solution:

Question 137

Let $y = x^{\sin x}$. Then the value of $\frac{dy}{dx}$ at $x = \frac{\pi}{2}$ is

Options:

A. $1 + \frac{1}{\sqrt{2\pi}}$

B. 1

C. $\frac{1}{\sqrt{2\pi}}$

D. $-\frac{1}{\sqrt{2\pi}}$

Answer: B

Solution:

Solution:

Question 138

If $f(x) = e^x \sin x$, then $f^{(6)}(x)$ is equal to

Options:

A. $e^{6x} \sin 6x$

B. $-8e^x \cos x$

C. $8e^x \sin x$

D. $8e^x \cos x$

Answer: B

Solution:

Solution:

Question 139

Let P(−1, 0), Q(0, 0) and R(3, $3\sqrt{3}$) be three points. Then the equation of the bisector of the ∠PQR is

Options:

A. $\frac{\sqrt{3}}{2}x + y = 0$

B. $x - \sqrt{3}y = 0$

C. $\sqrt{3x} + y = 0$

D. $x + \frac{\sqrt{3}}{2}y = 0$

Answer: C

Solution:

Solution:

Question 140

The circles $x^2 + y^2 - 12x + 20 = 0$ and $x^2 + y^2 = k^2$ intersect at two distinct points, if

Options:

A. $k < 2$

B. $2 < k < 10$

C. $k > 8$

D. $k = 2$

Answer: B

Solution:

Solution:

Question 141

Given $f_1(x) = x_1$, $f_2(x) = -x$, $f_3(x) = \frac{1}{x}$ and $f_4(x) = -\frac{1}{x}$ and ∘ stands for composition of function. Then $(f_4 \circ f_2)(x)$ is

Options:

A. $f_1(x)$

B. $f_2(x)$

C. $f_3(x)$

D. $f_4(x)$

Answer: C

Solution:

Solution:

Question 142

Locus of the midpoint of any focal chord of $y^2 = 4ax$ is

Options:

A. $y^2 = a(x - 2a)$

B. $y^2 = 2a(x - 2a)$

C. $y^2 = 2a(x - a)$

D. $y^2 = a(x - a)$

Answer: C

Solution:

Solution:

Question 143

The latus rectum of the parabola $y^2 = 4ax$ whose focal chord is PSQ such that SP = 3 and SQ = 2 is given by

Options:

A. $\frac{24}{5}$

B. $\frac{12}{5}$

C. $\frac{6}{5}$

D. $\frac{1}{5}$

Answer: A

Solution:

Solution:

Question 144

The number of values of c such that the line y = 4x + c touches the curve $\frac{x^2}{4} + y^2 = 1$, is

Options:

A. 1

B. 2

C. ∞

D. 0

Answer: B

Solution:

Solution:

Question 145

The diameter of $16x^2 - 9y^2 = 144$ which is conjugate to x = 2y, is

Options:

A. y = $\frac{16x}{9}$

B. y = $\frac{32x}{9}$

C. y = $\frac{16y}{9}$

D. y = $\frac{32y}{9}$

Answer: B

Solution:

Solution:

Question 146

The value of $n \in I$, for which the function $f(x) = \frac{\sin nx}{\sin\left(\frac{x}{n}\right)}$ has 4π as its period, is

Options:

A. 2

B. 3

C. 4

D. 5

Answer: A

Solution:

Solution:

Question 147

$\lim_{x \to \infty} \left(\frac{x+6}{x+1}\right)^{x+4}$ is equal to

Options:

A. e^{-5}

B. e^{5}

C. 0

D. e^{-1}

Answer: B

Solution:

Solution:

Question 148

The points of discontinuity of the function given below is/are

$$f(x) = \begin{cases} \frac{1}{5}(2x^2+3) & x \le 1 \\ 6-5x & 1 < x < 3 \\ x-3 & x \ge 3 \end{cases}$$

Options:

A. x = 1

B. x = 3

C. x = 1, 3

D. x = 4

Answer: B

Solution:

Solution:

Question 149

If f (x) = $\sqrt{\frac{x - \sin x}{x + \cos^2 x}}$, then $\lim_{x \to \infty} f(x)$ is

Options:

A. 0

B. ∞

C. 1

D. -1

Answer: C

Solution:

Solution:

Question 150

The point of the curve $y^2 = 2(x - 3)$ at which the normal is parallel to the line $y - 2x + 1 = 0$ is

Options:

A. (5, 2)

B. $\left(-\frac{1}{2}, -2\right)$

C. $(5, -2)$

D. $\left(\frac{3}{2}, 2\right)$

Answer: C

Solution:

Solution:

Question 151

$\int e^x \left(\frac{1-\sin x}{1-\cos x} \right)$ dx is equal to

Options:

A. $-e^x \tan\left(\frac{x}{2}\right) + c$

B. $-e^x \cot\left(\frac{x}{2}\right) + c$

C. $-\frac{1}{2}e^x \tan\left(\frac{x}{2}\right) + c$

D. $\frac{1}{2}e^x \cot\left(\frac{x}{2}\right) + c$

Answer: B

Solution:

Solution:

Question 152

The differential equation $\frac{dy}{dx} = \frac{x(1+y^2)}{y(1+x^2)}$ represents a family of

Options:

A. parabola

B. hyperbola

C. circle

D. ellipse

Answer: B

Solution:

Solution:

Question 153

The solution of $\frac{dy}{dx} + 1 = e^{x+y}$ is

Options:

A. $e^{-(x+y)} + x + c = 0$

B. $e^{-(x+y)} - x + c = 0$

C. $e^{(x+y)} + x + c = 0$

D. $e^{(x+y)} - x + c = 0$

Answer: A

Solution:

Solution:

Question 154

The value of $\frac{(\vec{a} \times \vec{b})^2 + (\vec{a} \cdot \vec{b})^2}{2\vec{a}^2 \cdot \vec{b}^2}$ is

Options:

A. $\vec{a} \cdot \vec{b}$

B. 1

C. 0

D. $\frac{1}{2}$

Answer: D

Solution:

Solution:

Question 155

The points (5, −4, 2), (4, −3, 1), (7, −6, 4) and (8, −7, 5) are the vertices of a

Options:

A. rectangle

B. square

C. parallelogram

D. trapezium

Answer: C

Solution:

Solution:

Question 156

The inverse of the mapping f : R → R defined by f (x) = 7x − 8 for all x ∈ R, is

Options:

A. g(y) = $\frac{y-7}{8}$ for all y ∈ R

B. g(y) = $\frac{y+7}{8}$ for all y ∈ R

C. g(y) = $\frac{y+8}{7}$ for all y ∈ R

D. g(y) = $\frac{y-8}{7}$ for all y ∈ R

Answer: C

Solution:

Solution:

Question 157

If $\begin{bmatrix} 2 & -2 & x \\ 2 & x & 2 \\ x & -2 & 2 \end{bmatrix}$ ha has no inverse, then the real value of x is

Options:

A. 0

B. 1

C. 2

D. 3

Answer: C

Solution:

Solution:

Question 158

If the sum of two unit vectors is a unit vector then the magnitude of their difference is

Options:

A. $\sqrt{2}$

B. $\sqrt{3}$

C. $\frac{1}{2}$

D. 1

Answer: B

Solution:

Solution:

Question 159

If $\frac{1-i}{1+i}$ is a root of the equation $ax^2 + bx + 1 = 0$, where a, b are real, then (a, b) is

Options:

A. (1, 1)

B. $(1, -1)$

C. (0, 1)

D. (1, 0)

Answer: D

Solution:

Solution:

Question 160

Pipe A can fill a cistern in 36 minutes and pipe B in 48 minutes. If both the pipes are opened together, when should pipe B be closed so that the cistern may be just full in 24 minutes?

Options:

A. 8 minutes

B. 9 minutes

C. 12 minutes

D. 16 minutes

Answer: D

Solution:

Solution:

Question 161

If f : R → R is defined by f (x) = cos x and g : R → R is defined by g(x) = x^2, then f ∘ g is

Options:

A. $x^2 \cos x$

B. $(\cos x)^2$

C. $\cos x^2$

D. $\frac{\cos x}{x^2}$

Answer: C

Solution:

Solution:

Question 162

The order and degree of the differential equation

$$\left(3 + \left(\frac{dy}{dx}\right)^2\right)^{\frac{1}{4}} = \left(\frac{d^3y}{dx^3}\right)^{\frac{1}{3}}$$ **are**

Options:

A. 2,6

B. 2,3

C. 3,4

D. 4,3

Answer: C

Solution:

Solution:

Question 163

The value of $\int_{e}^{} e^2 \log_e x \, dx$ is

Options:

A. $2e^2$

B. $2e^2 - e$

C. e

D. e^2

Answer: D

Solution:

Solution:

Question 164

The values of x for which the graph of $f(x) = \frac{x^3}{3} - x^2 + 3$ has a horizontal tangent, are

Options:

A. 0

B. 0 and 2

C. 0 and 3

D. 3

Answer: B

Solution:

Solution:

Question 165

The value of $\sum_{n=1}^{100} (i^n + i^{n+2})$ is

Options:

A. i

B. 1 + i

C. 0

D. −i

Answer: C

Solution:

Solution:

Question 166

If $Z = \sqrt[7]{-1}$ and Z is non-real, then $Z^{86} + Z^{175} + Z^{289}$ equals

Options:

A. Z

B. -1

C. Z^2

D. $(2Z - 3)^3$

Answer: B

Solution:

Solution:

Question 167

The area of the region satisfying $\frac{1}{\sqrt{2}} < \left|(1+i)z + i\right| < \sqrt{2}$ is

Options:

A. 3π

B. $\frac{3\pi}{2}$

C. $\frac{3\pi}{4}$

D. $-\frac{1}{\sqrt{3}}$

Answer: C

Solution:

Solution:

Question 168

A man from the top of a 100 meter high tower sees a car moving towards the tower at an angle of depression of 30˚. After some time, the angle of depression becomes 60˚. The distance (in meters) travelled by the car during this time is

Options:

A. $\frac{200\sqrt{3}}{3}$

B. $100\sqrt{3}$

C. $\frac{100\sqrt{3}}{3}$

D. $200\sqrt{3}$

Answer: A

Solution:

Solution:

Question 169

On the interval [0, 1], the function $x^{25}(1-x)^{75}$ takes its maximum value at the point

Options:

A. 0

B. $\frac{1}{4}$

C. $\frac{1}{2}$

D. $\frac{1}{3}$

Answer: B

Solution:

Solution:

Question 170

The solution set of $|x^2 - 5x| < 6$ is

Options:

A. $(-1, 2) \cup (3, 6)$

B. $0 \leq x \leq 5$

C. $x \geq 6$

D. $-5 \leq x \leq 5$

Answer: A

Solution:

Solution:

Question 171

A balloon which always remains spherical is being inflated by pumping in 1000 cubic centimetres of gas per second. Then the rate at which the radius of the balloon is increasing when its radius is 5 cm, is

Options:

A. $\frac{10}{\pi} cm^2 /\ sec$

B. $\frac{10}{3\pi} cm /\ sec$

C. $\frac{\pi}{10} cm /\ sec$

D. $\frac{10}{\pi} cm /\ sec$

Answer: D

Solution:

Solution:

Question 172

The function $f(x) = \frac{x^3 + x^2 - 16x + 20}{x - 2}$ is not defined at x = 2. In order to make f (x) continuous at x = 2, f (2) should be

Options:

A. 1

B. 4

C. 0

D. -4

Answer: C

Solution:

Solution:

Question 173

Let $\frac{d}{dx} f(x) = \left(\frac{e^{\sin x}}{x} \right)$, x > 0. If $\int_1^4 \frac{3}{x} e^{\sin x^3} dx = f(k) - f(1)$, then one of the possible values of k, is

Options:

A. 15

B. 16

C. 63

D. 64

Answer: D

Solution:

Solution:

Question 174

For a value of k, the area bounded by the curve $y = -x^5 + 8x^2$, the straight lines x = 1 and x = k and the x-axis is equal to $\frac{16}{3}$. Such a value of k is

Options:

A. $\sqrt[3]{8-\sqrt{17}}$

B. -1

C. 2

D. 3

Answer: A

Solution:

Solution:

Question 175

The value of $\int 7^{7^x}7^{7^x}7^x dx$ is equal to

Options:

A. $\frac{7^{7^x}}{(\log 7)^3}+c$

B. $\frac{7^{7^{7x}}}{(\log 7)^2}+c$

C. $7^{7^{7x}}(\log 7)^3+c$

D. $7^{7^7}+c$

Answer: A

Solution:

Solution:

Question 176

If * is a binary operation defined by $a*b = 3a+4b-2$, then $4*5$ is

Options:

A. $\sqrt{48}$

B. 31

C. 29

D. 30

Answer: D

Solution:

Solution:

Question 177

If R = {(x, y) : x + 2y = 8} is a relation on the set of all natural numbers N , then the range of R is

Options:

A. {1, 2, 3}

B. {1}

C. {2, 5}

D. {4, 3, 1}

Answer: A

Solution:

Solution:

Question 178

If b, k are intercepts of a focal chord of the parabola $y^2 = 4ax$, then k is equal to

Options:

A. $\frac{ab}{b-a}$

B. $\frac{b}{b-a}$

C. $\frac{a}{b-a}$

D. $\frac{ab}{a-b}$

Answer: A

Solution:

Solution:

Question 179

The equation of the tangent to the hyperbola $\frac{x^2}{4} - \frac{y^2}{3} = 1$, parallel to the line y = x + 2, is

Options:

A. $y = -x + 1$

B. $y = x + 1$

C. $y = -x - 1$

D. $y = x - 2$

Answer: B

Solution:

Solution:

Question 180

If θ is the angle between the asymptotes of the hyperbola $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$ with eccentricity e, then $\sec\left(\frac{\theta}{2}\right)$ is

Options:

A. e

B. $\frac{e}{2}$

C. $\frac{e}{3}$

D. $\sqrt{3}$

Answer: A

Solution:

Solution:

Question 181

If X follows binomial distribution with parameters n = 8 and p = $\frac{1}{2}$, then P(|X − 4| ≤ 2) is

Options:

A. $\frac{117}{128}$

B. $\frac{116}{128}$

C. $\frac{29}{128}$

D. $\frac{119}{128}$

Answer: D

Solution:

Solution:

Question 182

A monoid becomes a group if it also satisfies the

Options:

A. closure axiom

B. associative axiom

C. identity axiom

D. inverse axiom

Answer: D

Solution:

Solution:

Question 183

An example for a tautology is

Options:

A. p ∨ q

B. p ∧ q

C. p ∨ ~p

D. p ∧ ~p

Answer: C

Solution:

Solution:

Question 184

The Arithmetic Mean of n observations is M . If the sum of n − 4 observations is a, then the mean of remaining 4 observations is

Options:

A. $\frac{nM - a}{4}$

B. $\frac{nM + a}{4}$

C. $nM - a$

D. $\frac{nM - a}{2}$

Answer: A

Solution:

Solution:

Question 185

If the equation hxy + gx + f y + c = 0, h ≠ 0 represents two straight lines, then

Options:

A. $2f\,gh = c^2$

B. $2f\,g = ch$

C. $f\,gh = c^2$

D. $f\,g = ch$

Answer: D

Solution:

Solution:

Question 186

If the absolute term in the expansion of $\left(\sqrt{x}-\frac{k}{x^2}\right)^{10}$ is 405 , then ' k ' is equal to

Options:

A. ± 2

B. ± 1

C. ± 3

D. 0

Answer: C

Solution:

Solution:

Question 187

The range of the function $f(x) = \log_e(3x^2 - 4x + 5)$ is

Options:

A. $\left(-\infty, \log_e \frac{11}{3}\right]$

B. $\left[\log_e \frac{11}{3}, \infty\right)$

C. $\left[-\log_e \frac{11}{3}, \log_e \frac{11}{3}\right]$

D. $\left(-\infty, -\log_e \frac{11}{3}\right]$

Answer: B

Solution:

Solution:

Question 188

The value of the sum $\sum_{n=1}^{13}(i^n + i^{n+1})$, where $i = \sqrt{-1}$, equals

Options:

A. $1 - i$

B. $i - 1$

C. $-i$

D. 0

Answer: B

Solution:

Solution:

Question 189

The locus represented by $|z - 1| = |z + i|$ is

Options:

A. a circle of radius 1

B. an ellipse with foci at 1 and $-i$

C. a line through the origin

D. a circle on the join of 1 and $-i$ as diameter

Answer: C

Solution:

Solution:

Question 190

Let A = $\begin{bmatrix} 0 & 2b & c \\ a & b & -c \\ a & -b & c \end{bmatrix}$ **be an orthogonal matrix. Then**

Options:

A. $b = \pm \frac{1}{\sqrt{6}}, c = \pm \frac{1}{\sqrt{3}}$

B. $a = \pm \frac{1}{\sqrt{2}}, c = \pm \frac{1}{\sqrt{6}}$

C. $a = \pm \frac{1}{\sqrt{2}}, b = \pm \frac{1}{\sqrt{6}}$

D. $a = \pm \frac{1}{\sqrt{2}}, b = \pm \frac{1}{\sqrt{6}}, c = \pm \frac{1}{\sqrt{3}}$

Answer: D

Solution:

Solution:

Question 191

If $\begin{vmatrix} \alpha & -\beta & 0 \\ 0 & \alpha & \beta \\ \beta & 0 & \alpha \end{vmatrix}$ **= 0 then**

Options:

A. α / β is one of the cube roots of unity

B. α is one of the cube roots of unity

C. β is one of the cube roots of unity

D. α + β is one of the cube roots of unity

Answer: A

Solution:

Solution:

Question 192

The value of λ for which the equations $x + y - 3 = 0, (1 + \lambda)x + (2 + \lambda)y - 8 = 0, x - (1 + \lambda)y + (2 + \lambda) = 0$ are consistent is

Options:

A. -1

B. $\frac{5}{3}$

C. $-5 / 3$

D. $\frac{3}{5}$

Answer: C

Solution:

Solution:

Question 193

The sum to n terms of the sequence $\log a$, $\log a r$, $\log a r^2$, ... is

Options:

A. $\frac{n}{2}\log a^2 r^{n-1}$

B. $n \log a^2 r^{n-1}$

C. $\frac{3n}{2}\log a^2 r^{n-1}$

D. $3n \log a r^{n-1}$

Answer: A

Solution:

Solution:

Question 194

If a, b, c are positive, then the minimum value of $a^{\log b - \log c} + b^{\log c - \log a} + c^{\log a - \log b}$ is

Options:

A. 1

B. 3

C. 9

D. 16

Answer: B

Solution:

Solution:

Question 195

Let f (x) and g(x) be two differentiable functions and f (1) = g(1) = 2. Then

$$\lim_{x \to 1} \frac{f(1)g(x) - f(x)g(1) - f(1) + g(1)}{g(x) - f(x)}$$

is equal to

Options:

A. 0

B. 1

C. 2

D. -1

Answer: C

Solution:

Solution:

Question 196

If $g(x) = (x^2 + 2x + 3)f(x)$, $f(0) = 5$ and $\lim_{x \to 0} \frac{f(x) - 5}{x} = 4$, then $g'(0)$ is equal to

Options:

A. 22

B. 20

C. 18

D. 12

Answer: A

Solution:

Solution:

Question 197

If the sum of distances of a point from two perpendicular lines in a plane is 1 , then its locus is

Options:

A. square

B. circle

C. straight line

D. two intersecting lines

Answer: A

Solution:

Solution:

Question 198

The distance between the planes $3x + 2y - 6z - 14 = 0$ and $3x + 2y - 6z + 21 = 0$ is

Options:

A. 1

B. 5

C. 7

D. 35

Answer: B

Solution:

Solution:

Question 199

If A and B are two events such that P(A) = 0.7, P(B) = 0.3 and $P\left(\frac{A}{B}\right) = 0.5$, then $P\left(\frac{A'}{B'}\right)$ is

Options:

A. $\frac{3}{8}$

B. $\frac{3}{12}$

C. $\frac{3}{14}$

D. $\frac{3}{16}$

Answer: C

Solution:

Solution:

Question 200

Two cards are drawn from a well shuffled pack of 52 cards with replacement. The probability that both cards are aces is

Options:

A. $\frac{1}{13} \times \frac{1}{13}$

B. $\frac{1}{13} + \frac{1}{13}$

C. $\frac{1}{13} \times \frac{1}{17}$

D. $\frac{1}{13} \times \frac{4}{51}$

Answer: A

Solution:

Solution:
