CUSAT 2022 : Shift 3

Solved Paper

Question 1

When there is an electric current through a conducting wire along its length, then an electric field must exist

Options:

A. outside the wire but normal to it

B. outside the wire but parallel to it

C. inside the wire but normal to it

D. inside the wire but parallel to it

Answer: D

Solution:

Solution:

Question 2

A moving charge produces electric field along x-direction and magnetic field along y-direction. Then what is the direction of its velocity?

Options:

A. x direction

B. y direction

C. z direction

D. Can be in any direction

Answer: C

Solution:

Solution:

Question 3

Phase difference between voltage and current of a purely inductive circuit is

Options:

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

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

C. $\frac{\pi}{8}$

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

Answer: D

Solution:

Solution:

Question 4

When two coherent sources of same intensity interfere, the resultant intensity will be

Options:

A. 4 times of the initial intensity

B. 8 times of the initial intensity

C. 2 times of the initial intensity

D. Equal to initial intensity

Answer: C

Solution:

Solution:

Question 5

Wavelength of source is 6000Å and the diameter of object is 100 inch, so the limit of resolution is

Options:

A. 2.9×10^{-7} radians

B. 2.8×10^{-7} radians

C. 2.5×10^{-7} radians

D. 2.8×10^{-5} radians

Answer: A

Solution:

Solution:

Question 6

The SI units of radioactivity is

Options:

A. Curie

B. Fermi

C. Becquerel

D. Joule

Answer: C

Solution:

Solution:

Question 7

The mean life for particle decay is

Options:

A. 1.145 times greater than half life

B. 1.445 times greater than half life

C. 1.465 times greater than half life

D. 1.345 times greater than half life

Answer: B

Solution:

Solution:

Question 8

Which of the following electromagnetic waves have lowest wavelength?

Options:

A. Green light

B. X-rays

C. Gamma rays

D. Ultraviolet rays

Answer: C

Solution:

Solution:

Question 9

Fermi energy level of the intrinsic semiconductor is located

Options:

A. just below the valence band

B. just above the conduction band

C. either below or above the conduction band

D. half way between the valence and conduction band

Answer: D

Solution:

Solution:

Question 10

Zener diode is always used in the

Options:

A. Forward bias condition

B. Reverse bias condition

C. Zero bias condition

D. All the above

Answer: B

Solution:

Solution:

Question 11

At room temperature, the n-type semiconductor will have

Options:

A. more of electrons

B. more of ions

C. more of holes

D. equal number of electrons and holes

Answer: A

Solution:

Solution:

Question 12

The SI base unit for forces is

Options:

A. $mkgs^{-2}$

B. N

C. $mkgs^{2}$

D. $m^{2}kgs^{-2}$

Answer: A

Solution:

Solution:

Question 13

When light rays enter into a medium having different optical density, there will be change in

Options:

A. its speed and frequency

B. its speed and wavelength

C. its frequency and wavelength

D. its speed, frequency and wavelength

Answer: B

Solution:

Solution:

Question 14

An electric dipole placed in a non uniform electric field experiences

Options:

A. no force and no torque

B. a force and a torque

C. no force but a torque

D. a force but no torque

Answer: B

Solution:

Solution:

Question 15

Which of this experiment proves that particle has wave nature?

Options:

A. Davisson-Germer experiment

B. Millikan experiment

C. Faraday's experiment

D. Newton rings experiment

Answer: A

Solution:

Solution:

Question 16

A proton and an alpha particle are accelerated by a constant electric field. Their acceleration will be in the ratio of

Options:

A. 2 : 1

B. 3 : 1

C. 1 : 1

D. 1 : 2

Answer: A

Solution:

Solution:

Question 17

Superconductor exhibits

Options:

A. paramagnetism

B. ferromagnetism

C. diamagnetism

D. ferrimagnetism

Answer: C

Solution:

Solution:

Question 18

At what distance from the point of equilibrium, the kinetic energy equals the potential energy for a simple harmonic oscillator of amplitude A ?

Options:

A. $\frac{A}{4}$

B. $\frac{A^2}{4}$

C. $\frac{A}{\sqrt{2}}$

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

Answer: C

Solution:

Solution:

Question 19

For a given material, the Young's modulus is 6 times its rigidity modulus. Its Poisson's ratio is

Options:

A. 0.2

B. 2

C. 4

D. 0.4

Answer: B

Solution:

Solution:

Question 20

The gravitational potential of a solid sphere is minimum

Options:

A. at the surface of the sphere

B. at a point outside the sphere

C. at midpoint between the centre and surface of the sphere

D. at the centre of the sphere

Answer: D

Solution:

Solution:

Question 21

Adding detergent to the water, increases its

Options:

A. surface tension

B. viscosity

C. wetting action

D. angle of contact

Answer: C

Solution:

Solution:

Question 22

A 2 kg box sits on a 3 kg box which sits on a 5 kg box. The 5 kg box rests on a table top. What is the normal force exerted on the 5 kg box by the table top?

Options:

A. 29.4N

B. 49N

C. 98N

D. 19.6N

Answer: C

Solution:

Solution:

Question 23

A Decoration of mass M is suspended by a string from the ceiling inside an elevator. The elevator is travelling upward with a constant speed. The tension in the string is

Options:

A. equal to Mg

B. less than Mg

C. greater than Mg

D. impossible to tell without knowing the speed

Answer: A

Solution:

Solution:

Question 24

If the pressure of an ideal gas in a closed chamber is doubled, then the volume of the gas

Options:

A. become two times

B. becomes half

C. remain constant

D. become four times

Answer: B

Solution:

Solution:

Question 25

The work done by pseudo forces is

Options:

A. Positive

B. Negative

C. Zero

D. Infinite

Answer: C

Solution:

Solution:

Question 26

In an isothermal process, the specific heat of the gas is

Options:

A. finite

B. one

C. zero

D. infinite

Answer: D

Solution:

Solution:

Question 27

Which theory explains that every point on a wave front may be considered as a source of secondary spherical wavelets?

Options:

A. Huygen's wave theory

B. Corpuscular theory

C. Electromagnetic theory

D. Quantum theory

Answer: A

Solution:

Solution:

Question 28

Which light source is used in long distance optical fiber communication?

Options:

A. Metal Halide light

B. Incandescent light

C. LED source

D. Laser

Answer: D

Solution:

Solution:

Question 29

The NAND gate output will be low if the two inputs are

Options:

A. 01

B. 00

C. 10

D. 11

Answer: D

Solution:

Solution:

Question 30

Cp and Cv are specific heats at constant pressure and constant volume respectively. It is observed that Cp − Cv = a for oxygen gas and Cp − Cv = b for nitrogen gas. The correct relation between a and b is

Options:

A. 8a = 7b

B. 7a = 8b

C. a = b

D. a = −b

Answer: A

Solution:

Solution:

Question 31

The temperature of a body falls from 40˚C to 36˚C in 5 minutes when placed in a surrounding of constant temperature 16˚C. The time taken by the body temperature to fall from 36˚C to 32˚C is

Options:

A. 8 min

B. 6.1 min

C. 4.2 min

D. 5 min

Answer: B

Solution:

Solution:

Question 32

2 kg ice at −20˚C is mixed with 5 kg water at 20˚C, then final amount of water in the mixture will be (specific heat of ice is = 0.5 cal / gm˚C; specific heat of water is = 1 cal / gm˚C; latent heat of fusion is 80 cal / gm)

Options:

A. 6 kg

B. 7 kg

C. 3.5 kg

D. 5 kg

Answer: A

Solution:

Solution:

Question 33

The minimum orbital angular momentum of an electron in hydrogen atom is

Options:

A. h

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

C. $\frac{h}{2\pi}$

D. $\frac{h}{\lambda}$

Answer: C

Solution:

Solution:

Question 34

Cooking gas containers are kept in a lorry moving with uniform speed. The temperature of the gas molecules inside will be

Options:

A. increase

B. decrease

C. remain same

D. increases for some while decreases for others

Answer: C

Solution:

Solution:

Question 35

An electric dipole is placed at an angle of 30˚ in a non-uniform electric field. The dipole will experience

Options:

A. a translational force only in the direction of the field

B. a translational force only in a direction normal to the direction of the field

C. a torque as well as a translational force

D. a torque only

Answer: C

Solution:

Solution:

Question 36

Which of the following phenomena is NOT common to sound and light waves?

Options:

A. Interference

B. Diffraction

C. Coherence

D. Polarization

Answer: D

Solution:

Solution:

Question 37

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

Options:

A. 30.6 eV

B. 13.6 eV

C. 3.4 eV

D. 122.4 eV

Answer: A

Solution:

Solution:

Question 38

Heat transfer in air occurs mainly due to

Options:

A. Conduction

B. Convection

C. Radiation

D. Radiation and Conduction

Answer: B

Solution:

Solution:

Question 39

A body weighs 40g in air. If its volume is 10 cc, then in water it will weigh

Options:

A. 30g

B. 40g

C. 50g

D. 33g

Answer: A

Solution:

Solution:

Question 40

The strength of the magnetic field around a straight wire is

Options:

A. Same everywhere around the wire

B. Obeys inverse square law

C. Directly proportional to square of the distance from the wire

D. Directly proportional to the distance from the wire

Answer: A

Solution:

Solution:

Question 41

The electrostatic pressure on a charged surface having a surface charge density σ is

Options:

A. $\sigma / 2\varepsilon_0$

B. $\sigma^2 / 2\varepsilon_0$

C. σ / ε_0

D. σ^2 / ε_0

Answer: B

Solution:

Solution:

Question 42

According to Joule's law, if the potential difference across a conductor having a material of specific resistance ' ρ ' remains constant, then heat produced in the conductor is directly proportional to

Options:

A. ρ

B. ρ^2

C. 1 / ρ

D. 1 / $\sqrt{\sigma}$

Answer: C

Solution:

Solution:

Question 43

A circular coil of radius R carries a current I , for which the magnetic field at its centre is B. At what distance x from the centre on the axis of the coil, the magnetic field will be B / 8

Options:

A. $\sqrt{2}$R

B. $\sqrt{3}$R

C. 2R

D. 3R

Answer: B

Solution:

Solution:

Question 44

If a magnet is enclosed in a box made up of iron, then the magnetic field outside the box will be

Options:

A. very high but finite

B. infinity

C. low value but finite

D. zero

Answer: D

Solution:

Solution:

Question 45

A bar magnet is dropped vertically down through a wire loop held horizontally. The magnet will fall

Options:

A. with acceleration ' g '

B. with acceleration greater than ' g '

C. with uniform acceleration less than ' g '

D. with non-uniform acceleration less than ' g '

Answer: D

Solution:

Solution:

Question 46

The mutual inductance between a pair of coils does not depend on

Options:

A. number of turns in the coil

B. separation between the coils

C. relative orientation of the coil

D. rate of change of current with coils

Answer: D

Solution:

Solution:

Question 47

Which of the following statement is NOT correct?

Options:

A. The magnification produced by a convex mirror is always less than one

B. A virtual, erect, same-sized image can be obtained using a plane mirror

C. A virtual, erect, magnified image can be formed using a concave mirror

D. A real, inverted, same-sized image can be formed using a convex mirror

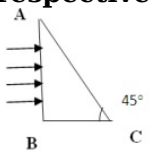
Answer: D

Solution:

Solution:

Question 48

A beam of light consisting of red, green and blue colours is incident on AB of a right angled prism. The refractive index of the material of the prism for red, green and blue are 1.39, 1.44 and 1.47 respectively. The prism will



Options:

A. separate red colour from the green and blue colour

B. separate blue colour from the red and green colour

C. separate all the colours from one another

D. all colours propagate along same path

Answer: A

Solution:

Solution:

Question 49

Light from the constellation Virgo is observed to increase in wavelength by 0.4%. With respect to the earth the constellation is

Options:

A. moving away with velocity 1.2×10^6m / s

B. coming close with velocity 1.2×10^6m / s

C. moving away with velocity 4×10^6m / s

D. coming close with velocity 4×10^6m / s

Answer: A

Solution:

Solution:

Question 50

When light passes from one medium into another medium, which of the physical property does not change?

Options:

A. Velocity

B. Wavelength

C. Frequency

D. Refractive index

Answer: C

Solution:

Solution:

Question 51

In hydrogen atom, if the difference in the energy of the electron in n = 2 and n = 3 orbits is E, the ionization energy of hydrogen atom is

Options:

A. 13.2E

B. 7.2E

C. 5.6E

D. 3.2E

Answer: B

Solution:

Solution:

Question 52

Nucleus with same neutron number but different atomic number is called as

Options:

A. isobars

B. isotones

C. isotopes

D. isotherm

Answer: B

Solution:

Solution:

Question 53

The mass of one Curie of U^{234} is

Options:

A. 3.7×10^{10} gm

B. 2.348×10^{23} gm

C. 1.48×10^{-11} gm

D. 6.25×10^{-24} gm

Answer: C

Solution:

Solution:

Question 54

A voltmeter with resistance 150Ω is connected across a 150V source having an internal resistance of 0.8Ω, then the voltmeter will read

Options:

A. 100.4

B. 149.2

C. 120

D. 178.6

Answer: B

Solution:

Solution:

Question 55

Electrical conductivity of a semiconductor

Options:

A. decreases with the rise in its temperature

B. increases with the rise in its temperature

C. does not change with the rise in its temperature

D. first increases and then decreases with the rise in its temperature

Answer: B

Solution:

Solution:

Question 56

In an insulator, the energy gap between the valance band and conduction band is of the order of

Options:

A. >5 eV

B. 2 eV

C. 3.6 eV

D. 4.1 eV

Answer: A

Solution:

Solution:

Question 57

Three small spheres, each carrying a positive charge Q, are placed on the circumference of a circle of radius ' r ' to form an equilateral triangle. The electric field intensity at the center of the circle will be

Options:

A. $3Q / r$

B. $3Q / r^2$

C. $Q / 2r^2$

D. zero

Answer: D

Solution:

Solution:

Question 58

In an LCR series a.c circuit, the voltage across each of the components, L, C, and R is 50V. The voltage across the LC combination will be

Options:

A. 100V

B. $50\sqrt{2}V$

C. 50V

D. 0V((zero)

Answer: D

Solution:

Solution:

Question 59

A telescope has a magnifying power of 10 . If one looks at a tree of height 15 meters through the telescope, then the tree appears

Options:

A. 10 times taller

B. 10 times farther

C. 10 times nearer

D. 15 times nearer

Answer: C

Solution:

Solution:

Question 60

If the radius of the Earth's orbit is made one-fourth, the duration of one year will become

Options:

A. 8 times

B. 4 times

C. $\frac{1}{4}$ times

D. $\frac{1}{0}$ times

Answer: D

Solution:

Solution:

Question 61

In which of the following thermodynamic processes, there is no flow of heat between the system and the surroundings?

Options:

A. Isobaric

B. Isochoric

C. Adiabatic

D. Isothermal

Answer: C

Solution:

Solution:

Question 62

Entropy remains constant in

Options:

A. isothermal process

B. adiabatic process

C. cyclic process

D. isobaric process

Answer: B

Solution:

Solution:

Question 63

While charging the lead storage battery

Options:

A. $PbSO_4$ at cathode is reduced to Pb

B. $PbSO_4$ at anode is reduced to Pb

C. $PbSO_4$ at cathode is oxidised to Pb

D. $PbSO_4$ at anode is oxidised to Pb

Answer: A

Solution:

Solution:

Question 64

Axial ratios of hexagonal will be

Options:

A. a = b = c

B. a = b ≠ c

C. a ≠ b ≠ c

D. a = 2b = 3c

Answer: B

Solution:

Solution:

Question 65

Structure of cesium chloride crystal is

Options:

A. face centred cubic

B. body centred cubic

C. simple cubic

D. hexagonal close packing

Answer: B

Solution:

Solution:

Question 66

What type of stoichiometric defect is shown by ZnS ?

Options:

A. Schottky defect

B. Frenkel defect

C. Both Frenkel and Schottky defects

D. Plane defect

Answer: B

Solution:

Solution:

Question 67

Which one of the following is NOT applicable to catalytic action?

Options:

A. Catalyst reduces energy of activation

B. Catalyst will be most effective in the finely divided state

C. Catalyst can alter the position of equilibrium of reversible react

D. Catalyst cannot initiate a reaction

Answer: C

Solution:

Solution:

Question 68

If dispersed phase and dispersion medium are gas and liquid, respectively, then the name of the colloidal system is

Options:

A. aerosol

B. solid foam

C. foam

D. emulsion

Answer: C

Solution:

Solution:

Question 69

The electric charge on a colloidal particle is observed by

Options:

A. Brownian movement

B. Electrolysis

C. Electrodialysis

D. Electrophoresis

Answer: D

Solution:

Solution:

Question 70

'All four quantum numbers cannot be the same for any two electrons in an atom'. This principle is known as

Options:

A. Aufbau principle

B. Hund's rule

C. Pauli's Exclusion principle

D. Plank's rule

Answer: C

Solution:

Solution:

Question 71

50 ml of 0.1M acetic acid is mixed with 50 ml 0.1 M sodium acetate. The pH of the solution is (pK_a. of acetic acid is 4.26)

Options:

A. 13.0

B. 7.0

C. 4.26

D. 1.0

Answer: C

Solution:

Solution:

Question 72

One mole of an ideal gas undergoes expansion from 24.6l to 246.0l against a constant pressure of 1 atmosphere at 300K. The work done is

Options:

A. 221.4l atm

B. 24.6 latm

C. 9.0l atm

D. 0.082l atm

Answer: A

Solution:

Solution:

Question 73

Aqueous solution of $CuSO_4$ is electrolyzed between the Pt electrodes. At anode

Options:

A. Cu is oxidized to Cu^{2+}

B. Cu^{2+} is reduced to Cu

C. H_2 gas is evolved

D. O_2 gas is evolved

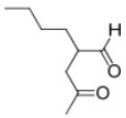
Answer: D

Solution:

Solution:

Question 74

Aqueous solution of $CuSO_4$ is electrolyzed between the Pt electrodes. At anode



Options:

A. Cu is oxidized to Cu^{2+}

B. Cu^{2+} is reduced to Cu

C. H_2 gas is evolved

D. O_2 gas is evolved

Answer: B

Solution:

Solution:

Question 75

Carbon monoxide (CO) acts as a

Options:

A. strong π-donor and weak π-acceptor

B. weak π-donor and strong π-acceptor

C. weak σ-donor and strong π-acceptor

D. strong σ-donor and good π-acceptor

Answer: D

Solution:

Solution:

Question 76

Methoxypropane and Ethoxyethane constitute a pair of

Options:

A. functional group isomers

B. metamers

C. position isomers

D. regioisomers

Answer: B

Solution:

Solution:

Question 77

The stability order of methyl, ethyl, isopropyl and tert-butyl carbocations is

Options:

A. methyl > ethyl > isopropyl > tert-butyl

B. methyl < ethyl < isopropyl < tert-butyl

C. methyl ≈ ethyl > isopropyl > tert-butyl

D. methyl < ethyl ≈ isopropyl < tert-butyl

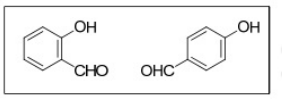
Answer: B

Solution:

Solution:

Question 78

Compare the steam volatility of 2-hydroxybenzaldehyde with that of 4-hydroxybenzaldehyde.



Options:

A. both are equally steam volatile

B. both are not steam volatile

C. 2-hydroxybenzaldehyde is much more steam volatile than 4-hydroxybenzaldehyde

D. 4-hydroxybenzaldehyde is much more steam volatile than 2-hydroxybenzaldehyde

Answer: C

Solution:

Solution:

Question 79

The active stationary phase in Partition chromatography over chromatographic paper is

Options:

A. cellulose

B. starch

C. hemicellulose

D. water trapped in chromatographic paper

Answer: D

Solution:

Solution:

Question 80

Kolbe’s electrolytic method is suitable for the generation of which among the following gases in the pure form?

Options:

A. Methane

B. Ethane

C. Propane

D. Isobutane (2-methylpropane)

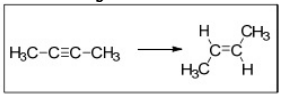
Answer: B

Solution:

Solution:

Question 81

But-2-yne is converted to



Options:

A. -but-2-ene by

B. catalytic hydrogenation using Lindlar’s catalyst

C. using Raney nickel

D. copper catalyzed partition reaction with n-butane

E. reduction using controlled amount of sodium in liquid ammonia

Answer: E

Solution:

Solution:

Question 82

Cyclic compounds with alternating single and double bonds can be

Options:

A. aromatic or antiaromatic

B. aromatic or nonaromatic

C. antiaromatic or nonaromatic

D. aromatic, antiaromatic or nonaromatic

Answer: D

Solution:

Solution:

Question 83

Which among the following methods is NOT a suitable one for the preparation of benzene?

Options:

A. Passing ethyne under pressure through an iron tube heated up to 873 K

B. Soda lime distillation of benzoic acid

C. Treatment of chlorobenzene with sodium metal in dry ether

D. Passing phenol in the gaseous state over a heated bed of zinc dust

Answer: C

Solution:

Solution:

Question 84

Which among the following halides will undergo fastest SN1 solvolysis in water?

Options:

A. 2-fluoro-2-methylpropane

B. 2-chloro-2-methylpropane

C. 2-bromo-2-methylpropane

D. 2-iodo-2-methylpropane

Answer: D

Solution:

Solution:

Question 85

Which among the following methods is NOT suitable for selective generation of butan-1-ol?

Options:

A. Reaction of butylmagnesium bromide with water

B. Reaction of propylmagnesium bromide with formaldehyde

C. Reaction of ethylmagesium bromide with ethylene oxide

D. Hydroboration of but-1-ene followed by oxidation with hydrogen peroxide in the presence of aqueous sodium hydroxide

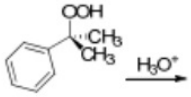
Answer: A

Solution:

Solution:

Question 86

Predict the major products formed in the acidic hydrolysis of cumene hydroperoxide.



Options:

A. Phenol and acetone

B. Benzoic acid and methanol

C. Acetophenone and ethanol

D. Phenol and propan-2-ol

Answer: A

Solution:

Solution:

Question 87

Which of the following nuclides is most radioactive?

Options:

A. ${}_{47}^{108}\mathrm{Ag}$

B. ${}_{30}\mathrm{Zn}$

C. ${}_{17}^{37}\mathrm{Cl}$

D. ${}_{15}^{31}\mathrm{P}$

Answer: A

Solution:

Solution:

Question 88

Which radical can be tested with Nessler's reagent?

Options:

A. K

B. NH_4^+

C. Na^+

D. Fe^{3+}

Answer: B

Solution:

Solution:

Question 89

The observed mass of ${}_{26}\mathrm{Fe}^{56}$ is 55.9375 amu. Using the mass of proton and neutron = 1.00732 amu and 1.00866 amu respectively, calculate the mass defect?

Options:

A. 0.6234

B. 0.6753

C. 0.5678

D. 0.5126

Answer: D

Solution:

Solution:

Question 90

The thermal stability of hydrides is in the order of

Options:

A. HF > HCl > HBr > HI

B. HF > HI > HCl > HBr

C. HF > HBr > HI > HCl

D. HF < HI < HBr > HCl

Answer: A

Solution:

Solution:

Question 91

Which complex is called as outer orbital complex?

Options:

A. $[Fe(CO)\,5]$

B. $[Fe(H_2O)_6]^{2+}$

C. $[Ni(CO)_4]$

D. $[Fe(CN)_6]^{2-}$

Answer: B

Solution:

Solution:

Question 92

How many atoms are present in a FCC unit cell?

Options:

A. 3

B. 4

C. 2

D. 6

Answer: B

Solution:

Solution:

Question 93

How many elements are present in the sixth period of the modern periodic table?

Options:

A. 18

B. 22

C. 36

D. 32

Answer: D

Solution:

Solution:

Question 94

In which of the following pairs, Dipole-induced dipole interaction is present?

Options:

A. HCl and He atoms

B. Cl_2 and CCl_4

C. SiF_4 and He atoms

D. H_2O and alcohol

Answer: A

Solution:

Solution:

Question 95

In which of the following compounds, the maximum covalent character is shown?

Options:

A. $MgCl_2$

B. $FeCl_2$

C. $SnCl_2$

D. $AlCl_3$

Answer: D

Solution:

Solution:

Question 96

Which of the following is Paramagnetic?

Options:

A. CO

B. CN^-

C. NO^+

D. O_2

Answer: D

Solution:

Solution:

Question 97

Choose the correct formula for borax.

Options:

A. $Na_2B_4O_7.5H_2O$

B. $Na_2B_4O_7 \cdot 10H_2O$

C. $Na_2B_4O_7 \cdot 3H_2O$

D. $Na_2B_4O_7 \cdot H_2O$

Answer: B

Solution:

Solution:

Question 98

Diagonal relationship between beryllium and aluminium is due to the fact that

Options:

A. the ionic radius and charge/radius ratio of Be^{2+} is nearly the same as that of Al^{3+} ion.

B. like aluminium, beryllium is readily attacked by acids

C. the chlorides of beryllium and aluminium are not soluble in organic solvents and are strong Lewis bases

D. beryllium and aluminium ions have no tendency to form complexes

Answer: A

Solution:

Solution:

Question 99

Identify the CORRECT statement

Options:

A. Sodium carbonate is also called as baking soda

B. Sodium carbonate is a white crystalline solid which exists as a decahydrate, $Na_2CO_3 \cdot 10H_2O$

C. Sodium carbonate is generally prepared by Castner-Kellner process

D. Anhydrous sodium carbonate is called as soda lime

Answer: B

Solution:

Solution:

Question 100

Considering the elements F, Cl, O and N, the correct order of their chemical reactivity in terms of oxidizing property is

Options:

A. F > Cl > O > N

B. F >O > Cl > N

C. Cl > F > O > N

D. O > F > N > Cl

Answer: B

Solution:

Solution:

Question 101

If the value of $\lim_{x \to 0} \frac{(1-x)^n - 1}{x}$ is 100 , then n is equal to

Options:

A. 100

B. -100

C. 99

D. -99

Answer: B

Solution:

Solution:

Question 102

Let f (x) be a polynomial of degree 2 satisfying f (0) = 1, f ′(0) = −2 and f ″(0) = 6. Then $\int_{-1}^{2} f(x)\,dx$ is equal to

Options:

A. 6

B. 0

C. 9

D. 3

Answer: C

Solution:

Solution:

Question 103

The domain of the derivative of the function f (x) = $\tan^{-1}$x, if |x| ≤ 1 and f (x) = $\frac{1}{2}$(|x| − 1), if |x| > 1, is

Options:

A. $\mathbb{R} - \{0\}$

B. $\mathbb{R} - \{1\}$

C. $\mathbb{R} - \{-1\}$

D. $\mathbb{R} - \{-1, 1\}$

Answer: D

Solution:

Solution:

Question 104

The function f : $\mathbb{R} - [0] \to \mathbb{R}$ given by f (x) = $\frac{1}{x} - \frac{2}{e^{2x} - 1}$ can be made continuous at x = 0 by defining f (0) as

Options:

A. 0

B. 1

C. 2

D. -1

Answer: B

Solution:

Solution:

Question 105

Rolle's theorem is applicable to the function

Options:

A. $f(x) = |x|, -1 \leq x \leq 1$

B. $f(x) = \tan x, 0 \leq x \leq \pi$

C. $f(x) = \sin^2 x, 0 \leq x \leq \pi$

D. $f(x) = x^3 - 3x + 3, 0 \leq x \leq 1$

Answer: C

Solution:

Solution:

Question 106

If $\sin^{-1}x + \sin^{-1}y = \frac{\pi}{2}$, then the value of $\cos^{-1}x + \cos^{-1}y$ is

Options:

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

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

C. π

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

Answer: B

Solution:

Solution:

Question 107

The number of different salads that can be made from cucumber, tomatoes, onions, beetroot and carrots is

Options:

A. 16

B. 28

C. 31

D. 32

Answer: C

Solution:

Solution:

Question 108

The total number of subsets of a finite set A has 56 more elements than the total number of subsets of another finite set B. The number of elements in the set A is

Options:

A. 5

B. 6

C. 7

D. 8

Answer: B

Solution:

Solution:

Question 109

If $\sqrt{5}$ and $-\sqrt{5}$ are two roots of the polynomial $x^3 + 3x^2 - 5x - 15$, then its third root is

Options:

A. 3

B. -3

C. 5

D. -5

Answer: B

Solution:

Solution:

Question 110

The value(s) of p such that the lines, represented by the pair of linear equations $3x - y - 5 = 0$ and $6x - 2y - p = 0$, be parallel is

Options:

A. all real values except 10

B. 10

C. $\frac{5}{2}$

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

Answer: A

Solution:

Solution:

Question 111

If $A = [a_{ij}]$ is a symmetric matrix of order 2×2 such that $|A| = -15$ and c_{ij} represents the cofactor of a_{ij} then the value of $a_{21}c_{12} + a_{22}c_{22}$ is

Options:

A. 17

B. 18

C. 19

D. -15

Answer: D

Solution:

Solution:

Question 112

One ticket is selected at random from 50 tickets numbered 00, 01, 02, . . . 49. Then the probability that the sum of the digits on the selected ticket is 8 , given that the product of these digits is zero, equals

Options:

A. $\frac{5}{14}$

B. $\frac{1}{50}$

C. $\frac{1}{7}$

D. $\frac{1}{14}$

Answer: D

Solution:

Solution:

Question 113

Let x + 8y − 22 = 0, 5x + 2y − 34 = 0, 2x − 3y + 13 = 0 be the three sides of a triangle. Then the area of the triangle is

Options:

A. 19 square unit

B. 36 square unit

C. 42 square unit

D. 72 square unit

Answer: A

Solution:

Solution:

Question 114

For any two real numbers θ and φ, we define θRφ if and only if $\sec^2\theta - \tan^2\theta = 1$. The relation R is

Options:

A. reflexive but not transitive

B. symmetric but not reflexive

C. both reflexive and symmetric but not transitive

D. an equivalence relation

Answer: D

Solution:

Solution:

Question 115

Let f : R → R be a positive increasing function with $\lim_{x \to \infty} \frac{f(3x)}{f(x)} = 1$. Then $\lim_{x \to \infty} \frac{f(2x)}{f(x)} =$

Options:

A. $\frac{3}{2}$

B. 3

C. 1

D. $\frac{2}{3}$

Answer: C

Solution:

Solution:

Question 116

From 6 different novels and 3 different dictionaries, 4 novels and 1 dictionary are to be selected and arranged in a row on a shelf so that the dictionary is always in the middle. Then the number of such arrangement is

Options:

A. at least 750 but less than 1000

B. at least 1000

C. at least 500 but less than 750

D. less than 500

Answer: B

Solution:

Solution:

Question 117

If the imaginary part of $\frac{2z+1}{iz+1}$ is -1 , then the locus of the point representing z in the complex plane is

Options:

A. a straight line

B. a parabola

C. a circle

D. an ellipse

Answer: C

Solution:

Solution:

Question 118

The minimum value of $27\tan^2\theta + 3\cot^2\theta$

Options:

A. lies between 1 and 17

B. greater than or equal to 18

C. less than 18

D. lies between 2 and 12

Answer: B

Solution:

Solution:

Question 119

If $\sin^{-1}x + \sin^{-1}y + \sin^{-1}z = \frac{3\pi}{2}$, then the value of $x^{100} + y^{100} + z^{100} - \frac{9}{x^{101} + y^{101} + z^{101}}$ is

Options:

A. -1

B. 0

C. 1

D. 3

Answer: B

Solution:

Solution:

Question 120

Let x be an integer such that $x^2 - 3x < 4$. Then the number of possible values of x is

Options:

A. 1

B. 2

C. 3

D. 4

Answer: D

Solution:

Solution:

Question 121

The product of all solutions of the equation $(x-2)^2 - 3x - 2 \mid +2 = 0$ is

Options:

A. 0

B. -2

C. 2

D. 3

Answer: A

Solution:

Solution:

Question 122

If $\log_{0.5}\sin x = 1 - \log_{0.5}\cot x$, then the number of solutions of $x \in [-2\pi, 2\pi]$ is

Options:

A. 1

B. 2

C. 3

D. 4

Answer: B

Solution:

Solution:

Question 123

The value of $\sqrt{3} \cdot \operatorname{cosec} 20^{\circ} - \sec 20^{\circ}$ is equal to

Options:

A. 1

B. $3\sin 20^{\circ}$

C. 4

D. $4\cos 40^{\circ}$

Answer: C

Solution:

Solution:

Question 124

If $5\sin\alpha = 7\sin\beta$, then $\frac{\tan\left(\frac{\alpha+\beta}{2}\right)}{\tan\left(\frac{\alpha-\beta}{2}\right)}$ is equal to

Options:

A. 6

B. 8

C. 10

D. 12

Answer: A

Solution:

Solution:

Question 125

The minimum value of P = bcx + cay + abz, when xyz = abc is

Options:

A. abc

B. 2abc

C. 3abc

D. 6abc

Answer: C

Solution:

Solution:

Question 126

If $\sqrt{3} + i = (a + ib)(c + id)$, then $\tan^{-1}\frac{b}{a} + \tan^{-1}\frac{d}{c}$ is equal to

Options:

A. $\frac{\pi}{2} + 2n\pi$ for some integer n

B. $-\frac{\pi}{3} + n\pi$ for some integer n

C. $-\frac{\pi}{6} + 2n\pi$ for some integer n

D. $\frac{\pi}{6} + n\pi$ for some integer n

Answer: D

Solution:

Solution:

Question 127

If three positive unequal numbers x, y, z are in Harmonic Progression, then

Options:

A. $x^2 + y^2 > z^2$

B. $x - y > z$

C. $x^2 + z^2 > 2y^2$

D. $x^2 + y^2 + z^2 > 1$

Answer: C

Solution:

Solution:

Question 128

Let a be positive and let M and N be the arithmetic and geometric means of the roots of $x^2 - 2ax + a^2$ respectively. Then

Options:

A. $M = 2N$

B. $M = -N$

C. $M = N$

D. $M = -2N$

Answer: C

Solution:

Solution:

Question 129

Let $y = f(x^3)$, $z = g(x^5)$, $f'(x) = \tan x$ and $g'(x) = \sec x$. Then $\frac{dy}{dz}$ is equal to

Options:

A. $\frac{3}{5x^2} \cdot \frac{\tan x^3}{\sec x^5}$

B. $\frac{5x^2}{3} \cdot \frac{\sec x^5}{\tan x^3}$

C. $\frac{3x^2}{5} \cdot \frac{\tan x^3}{\sec x^5}$

D. $\frac{5}{3x^2} \cdot \frac{\sec x^5}{\tan x^3}$

Answer: A

Solution:

Solution:

Question 130

Let $y = \sin^{-1}(\sqrt{x - ax} - \sqrt{a - ax})$. Then $\frac{dy}{dx}$ is equal to

Options:

A. $\frac{1}{\sin\sqrt{a - ax}}$

B. $\sin\sqrt{x} \cdot \sin\sqrt{a}$

C. $\frac{1}{2\sqrt{x}\sqrt{1 - x}}$

D. 0

Answer: C

Solution:

Solution:

Question 131

If $3^x + 3^y = 3^{x+y}$, then $\frac{dy}{dx}$ equals

Options:

A. $\frac{3^x + 3^y}{3^x - 3^y}$

B. $\frac{3^x + 3^y}{1 + 3^{x+y}}$

C. $\frac{3^{x+y} - 3^y}{3^y}$

D. $3^{x-y}\left(\frac{3^y - 1}{1 - 3^x}\right)$

Answer: D

Solution:

Solution:

Question 132

If P(1, 2), Q(4, 6), R(5, 7) and S(a, b) are the vertices of a parallelogram PQRS, then

Options:

A. a = 2, b = 4

B. a = 3, b = 4

C. a = 2, b = 3

D. a = 3, b = 5

Answer: C

Solution:

Solution:

Question 133

The area of the triangle formed by joining the origin to the points of intersection of the line $\sqrt{5}x + 2y = 3\sqrt{5}$ and the circle $x^2 + y^2 = 10$, is

Options:

A. 6 sq units

B. 5 sq units

C. 4 sq units

D. 3 sq units

Answer: B

Solution:

Solution:

Question 134

The lines $x - y - 2 = 0$, $x + y - 4 = 0$ and $x + 3y = 6$ meet at the common point

Options:

A. (1, 2)

B. (2, 2)

C. (3, 1)

D. (1, 1)

Answer: C

Solution:

Solution:

Question 135

The equation of the chord of the circle $x^2 + y^2 - 4x = 0$, whose mid point is (1, 0), is

Options:

A. y = 2

B. y = 1

C. x = 2

D. x = 1

Answer: D

Solution:

Solution:

Question 136

One of the diametrical chord of the circle $x^2 + y^2 - 12x + 4y + 6 = 0$ is

Options:

A. x + y = 0

B. x + 3y = 0

C. x = y

D. 3x + 2y = 0

Answer: B

Solution:

Solution:

Question 137

The equation of the line which is tangent to both the circle $x^2 + y^2 = 5$ and the parabola $y^2 = 40x$ is

Options:

A. $2x - y \pm 5 = 0$

B. $2x \pm y + 5 = 0$

C. $2x \pm y - 5 = 0$

D. $2x + y \pm 5 = 0$

Answer: B

Solution:

Solution:

Question 138

Let the points (1, 2) and (k, −1) be conjugate points with respect to the ellipse $2x^2 + 3y^2 = 6$. Then the value of k is

Options:

A. 2

B. 4

C. 6

D. 8

Answer: C

Solution:

Solution:

Question 139

If f (x + y, x − y) = xy, then the arithmetic mean of f (x, y) and f (y, x) is

Options:

A. y

B. x

C. 0

D. xy

Answer: C

Solution:

Solution:

Question 140

If f (x) is an odd periodic function with period 2 , then f (4) equals

Options:

A. -4

B. 4

C. 2

D. 0

Answer: D

Solution:

Solution:

Question 141

$\lim_{x \to 2} \frac{2^x - x^2}{x^x - 2^2}$ is equal to

Options:

A. $\frac{\log 2 - 1}{\log 2 + 1}$

B. $\frac{\log 2 + 1}{\log 2 - 1}$

C. 1

D. -1

Answer: A

Solution:

Solution:

Question 142

If $f(x) = \sum_{n=0}^{\infty} \frac{x^n}{n!}(\log a)^n$, then at x = 0, f (x)

Options:

A. has no limit

B. is discontinuous

C. is continuous but not differentiable

D. is differentiable

Answer: D

Solution:

Solution:

Question 143

Let $f(x + y) = f(x)f(y)$ and $f(x) = 1 + \sin 2x \cdot g(x)$, where g(x) is continuous. Then $f'(x)$ equals

Options:

A. f (x)g(0)

B. 2f (x)g(0)

C. 2g(0)

D. g(0)

Answer: B

Solution:

Solution:

Question 144

The area of the triangle formed by a tangent to the curve $2xy = a^2$ and the coordinate axes is

Options:

A. $2a^2$

B. a^2

C. $3a^2$

D. $4a^2$

Answer: B

Solution:

Solution:

Question 145

$\int \sin^3 x \cdot \cos^2 x \, dx$ is equal to

Options:

A. $\frac{\sin^5 x}{5} - \frac{\sin^3 x}{3} + c$

B. $\frac{\sin^5 x}{5} + \frac{\sin^3 x}{3} + c$

C. $\frac{\cos^5 x}{5} - \frac{\cos^3 x}{3} + c$

D. $\frac{\cos^5 x}{5} + \frac{\cos^3 x}{3} + c$

Answer: C

Solution:

Solution:

Question 146

$\int \frac{\sin(2x)}{1 + \cos^2 x} dx$ is equal to

Options:

A. $-\frac{1}{2}\log(1 + \cos^2 x) + c$

B. $2\log(1 + \cos^2 x) + c$

C. $\frac{1}{2}\log(1 + \cos 2x) + c$

D. $c - \log(1 + \cos^2 x)$

Answer: D

Solution:

Solution:

Question 147

$\int \frac{x^3 + 3x^2 + 3x + 1}{(x + 1)^5} dx$ is equal to

Options:

A. $-\frac{1}{x + 1} + c$

B. $\frac{1}{5}\log(x + 1) + c$

C. $\log(x + 1) + c$

D. $\tan^{-1} x + c$

Answer: A

Solution:

Solution:

Question 148

The solution of the differential equation $\frac{dy}{dx} = \frac{x(2\log x + 1)}{\sin y + y\cos y}$ is

Options:

A. $y\sin y = x^2 \log x + \frac{x^2}{2} + c$

B. $y\cos y = x^2(\log x + 1) + c$

C. $y\cos y = x^2 \log x + \frac{x^2}{2} + c$

D. $y\sin y = x^2 \log x + c$

Answer: D

Solution:

Solution:

Question 149

The solution of the differential equation $y\,dx + (x - y^3)dy = 0$ is

Options:

A. $xy = \frac{1}{3}y^3 + c$

B. $xy = y^4 + c$

C. $y^4 = 4xy + c$

D. $4y = y^3 + c$

Answer: C

Solution:

Solution:

Question 150

The ratio in which $\hat{i} + 2\hat{j} + 3\hat{k}$ divides the join of $-2\hat{i} + 3\hat{j} + 5\hat{k}$ and $7\hat{i} - \hat{k}$ is

Options:

A. 1 : 2

B. 2 : 3

C. 3 : 4

D. 1 : 4

Answer: A

Solution:

Solution:

Question 151

A vector perpendicular to the plane containing the points A(1, −1, 2), B(2, 0, −1) and C(0, 2, 1) is

Options:

A. $4\hat{i} + 8\hat{j} - 4\hat{k}$

B. $8\hat{i} + 4\hat{j} + 4\hat{k}$

C. $3\hat{i} + \hat{j} + 2\hat{k}$

D. $\hat{i} + \hat{j} - \hat{k}$

Answer: B

Solution:

Solution:

Question 152

Let the angle θ between the line $\frac{x+1}{1} = \frac{y-1}{2} = \frac{z-2}{2}$ and the plane $2x - y + \sqrt{\lambda}z + 4 = 0$ be such that $\sin\theta = \frac{1}{3}$. Then the value of λ is

Options:

A. $-\frac{4}{3}$

B. $\frac{3}{4}$

C. $-\frac{3}{5}$

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

Answer: D

Solution:

Solution:

Question 153

The order of the element $\overline{4}$ in the group (11, 11) is

Options:

A. 1

B. 3

C. 10

D. 11

Answer: C

Solution:

Solution:

Question 154

Let a, b, c be the l^{th} m^{th} and n^{th} powers of a GP and all are positive.

Then $\begin{vmatrix} \log a & l & 1 \\ \log b & m & 1 \\ \log c & n & 1 \end{vmatrix}$ **equals**

Options:

A. 0

B. 1

C. 2

D. 3

Answer: A

Solution:

Solution:

Question 155

The torque about the point $3\vec{i} - \vec{j} + 3\vec{k}$ of a force $4\vec{i} + 2\vec{j} + \vec{k}$ through the point $5\vec{i} + 2\vec{j} + 4\vec{k}$, is

Options:

A. $\vec{i} + 2\vec{j} - 8\vec{k}$

B. $\vec{i} + 2\vec{j} + 8\vec{k}$

C. $\vec{i} - 2\vec{j} - 8\vec{k}$

D. $\frac{\vec{i} + 2\vec{j} - \vec{k}}{3}$

Answer: A

Solution:

Solution:

Question 156

If $i = \sqrt{-1}$, then the value of $i + i^{22} + i^{23} + i^{24} + i^{25}$ is

Options:

A. i

B. -1

C. 1

D. $-i$

Answer: A

Solution:

Solution:

Question 157

If $f'(x) = x$ and $f(1) = 2$, then $f(x)$ is

Options:

A. $-\frac{2}{3}(x\sqrt{x} + 2)$

B. $\frac{2}{3}(x\sqrt{x} + 2)$

C. $-\frac{1}{2}(x^2 + 3)$

D. $\frac{1}{2}(x^2 + 3)$

Answer: D

Solution:

Solution:

Question 158

If $f(x) = x^2$ and $g(x) = \sqrt{x}$, then

Options:

A. $(g \circ f)(-2) = 2$

B. $(f \circ g)(2) = 4$

C. $(g \circ f)(2) = 4$

D. $(f \circ g)(3) = 6$

Answer: A

Solution:

Solution:

Question 159

The value of k, such that the function f (x) = $\begin{cases} kx^2 & x \le 2 \\ 3 & x > 2 \end{cases}$. is continuous at x = 2, is

Options:

A. 2

B. 1.75

C. 0.75

D. 2.75

Answer: C

Solution:

Solution:

Question 160

The missing vertex of a triangle whose other two vertices $(-3, -9)$, $(-1, 6)$ and centroid $\left(-\frac{1}{3}, 2\right)$ is

Options:

A. (3, 9)

B. (2, 3)

C. (3, 4)

D. (4, 3)

Answer: A

Solution:

Solution:

Question 161

The function f (x) = $|x - 1|$ is not differentiable at

Options:

A. 1

B. $\frac{3}{4}$

C. 2

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

Answer: A

Solution:

Solution:

Question 162

If $\omega(\neq 1)$ be a cube root of unity, then the value of $\tan\left\{(\omega^{10} + \omega^{20})\pi + \frac{\pi}{4}\right\}$ is

Options:

A. 1

B. -1

C. $\frac{1}{\sqrt{3}}$

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

Answer: A

Solution:

Solution:

Question 163

The two circles $|z-1-i| = \sqrt{2}$ and $|z| = \sqrt{2}$ intersect at

Options:

A. no point

B. one point

C. two points

D. four points

Answer: C

Solution:

Solution:

Question 164

In the binomial expansion of $(a-b)^n$, $n \geq 5$, the sum of the 5^{th} and 6^{th} terms is zero. Then $\frac{a}{b}$ equals

Options:

A. $\frac{n-5}{6}$

B. $\frac{n-4}{5}$

C. $\frac{5}{n-4}$

D. $\frac{6}{n-5}$

Answer: B

Solution:

Solution:

Question 165

The radius of the circle passing through the foci of the ellipse $\frac{x^2}{16} + \frac{y^2}{9} = 1$, and having its centre at (0, 3) is

Options:

A. 4

B. 3

C. $\sqrt{12}$

D. $\frac{7}{2}$

Answer: A

Solution:

Solution:

Question 166

The harmonic mean of the roots of the equation $(5 + \sqrt{2})x^2 - (4 + \sqrt{5})x + (8 + 2\sqrt{5}) = 0$ is

Options:

A. 2

B. 4

C. 6

D. 8

Answer: B

Solution:

Solution:

Question 167

The point at which the tangent to the curve $y = \sqrt{4x - 3} - 1$ has its slope $\frac{2}{3}$ is

Options:

A. (1, 2)

B. (3, 2)

C. (2, 3)

D. (2, 1)

Answer: B

Solution:

Solution:

Question 168

The solution set of the inequality $\frac{x+3}{x-4} \geq 0$ is

Options:

A. $(-\infty, -3] \cup (4, \infty)$

B. $(-\infty, -3] \cup [4, \infty)$

C. $(-\infty, -3) \cup (1, \infty)$

D. 3 and -4

Answer: A

Solution:

Solution:

Question 169

If $f(x) = A(2^x) + B$, where $f'(1) = 2$ and $\int_0^3 f(x)\,dx = 7$, then which of the following statements are not correct?

(i) $A = \frac{1}{\log 2}$

(ii) $B = \frac{7}{3(\log 2)^2}[(\log 2)^2 - 1]$

(iii) $B = \frac{7}{\log 2}$

(iv) A = $\frac{7}{3(\log 2)^2}[(\log 2)^2 - 1]$

Options:

A. (i) only

B. (i) and (iii)

C. All are correct

D. (i) and (ii)

Answer: D

Solution:

Solution:

Question 170

The area of the portion of the circle $x^2 + y^2 = 64$ which is exterior to the parabola $y^2 = 12x$ is equal to

Options:

A. $\frac{16}{3}(8\pi + \sqrt{3})$

B. $\frac{8}{3}(8\pi + \sqrt{3})$

C. $\frac{16}{3}(8\pi - \sqrt{3})$

D. $(8\pi + \sqrt{3})$

Answer: C

Solution:

Solution:

Question 171

If $\int_{-3}^{2} f(x)\,dx = 2$ and $\int_{2}^{5} [5 + f(x)]\,dx = 9$, then the value of the integral $\int_{5}^{-3} f(x)\,dx$ is

Options:

A. 3

B. 2

C. 5

D. 4

Answer: D

Solution:

Solution:

Question 172

The relation R in the set A = {1, 2, 3} is given by R = {(1, 1), (2, 2), (3, 3), (1, 2), (2, 3)} is

Options:

A. symmetric

B. asymmetric

C. neither symmetric nor transitive

D. either symmetric or reflexive

Answer: C

Solution:

Solution:

Question 173

The locus of the poles of the focal chords of a parabola is the

Options:

A. axis

B. directrix

C. tangent at the vertex

D. circle

Answer: B

Solution:

Solution:

Question 174

The eccentricity of the hyperbola $\frac{\sqrt{1999}}{3}(x^2 - y^2) = 1$ is

Options:

A. $\sqrt{2}$

B. 2

C. $2\sqrt{2}$

D. $\sqrt{3}$

Answer: A

Solution:

Solution:

Question 175

The sum of distances of any point on the ellipse $3x^2 + 4y^2 = 24$ from its foci is

Options:

A. $8\sqrt{2}$

B. $4\sqrt{2}$

C. $24\sqrt{2}$

D. $16\sqrt{2}$

Answer: B

Solution:

Solution:

Question 176

Two dice are thrown. The probability that the numbers appeared have a sum 8 if it is known that the second dice always exhibits 4 , is

Options:

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

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

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

D. $\frac{2}{3}$

Answer: C

Solution:

Solution:

Question 177

Which of the following is not a group?

Options:

A. $(Z_n, +_n)$

B. (Z , +)

C. (Z ,.

D. (R, +)

Answer: C

Solution:

Solution:

Question 178

If the value of mode and mean is 60 and 66 respectively, then the value of median is

Options:

A. 60

B. 64

C. 68

D. 63

Answer: B

Solution:

Solution:

Question 179

The function f (x) = $\frac{\log_e(\pi + x)}{\log_e(e + x)}$ is

Options:

A. increasing on (0, ∞)

B. decreasing on $\left(0, \frac{\pi}{e}\right)$, increasing on $\left(\frac{\pi}{e}, \infty\right)$

C. decreasing on (0, ∞)

D. increasing on $\left(0, \frac{\pi}{e}\right)$, decreasing on $\left(\frac{\pi}{e}, \infty\right)$

Answer: C

Solution:

Solution:

Question 180

The integrating factor of the differential equation $\cos x \frac{dy}{dx} + y \sin x = 1$ is

Options:

A. $\sin x$

B. $\cos x$

C. $\tan x$

D. $\sec x$

Answer: D

Solution:

Solution:

Question 181

The circles $x^2 + y^2 - 10x + 16 = 0$ and $x^2 - y^2 = r^2$ intersect each other in two distinct points if

Options:

A. $r < 2$

B. $r > 8$

C. $2 < r < 8$

D. $2 \leq r \leq 8$

Answer: C

Solution:

Solution:

Question 182

Suppose $A_1, A_2, \ldots, A_{30}$ are thirty sets, each with five elements and $B_1, B_2, \ldots, B_{30}$ are n sets each with three elements. Let $\bigcup_{i=1}^{30} A_i = \bigcup_{j=1}^{n} B_j = S$. If each element of S belongs to exactly ten of the A_i 's and exactly nine of the B_j 's then n =

Options:

A. 45

B. 35

C. 40

D. 25

Answer: A

Solution:

Solution:

Question 183

The function $f(x) = \sec\left[\log\left(x + \sqrt{1 + x^2}\right)\right]$ is

Options:

A. even

B. odd

C. constant

D. neither even nor odd

Answer: A

Solution:

Solution:

Question 184

A solution of the equation $|z| - z = 1 + 2i$ is

Options:

A. $\frac{3}{2} - 2i$

B. $\frac{3}{2} + 2i$

C. $2 - \frac{3}{2}i$

D. $2 + \frac{3}{2}i$

Answer: A

Solution:

Solution:

Question 185

The equation $|z-1|^2 + |z+1|^2 = 4$ represents on the Argand plane

Options:

A. a straight line

B. an ellipse

C. a circle with centre origin and radius 2

D. a circle with centre origin and radius unity

Answer: D

Solution:

Solution:

Question 186

If A is a singular matrix, then adj A is

Options:

A. non-singular

B. singular

C. symmetric

D. antisymmetric

Answer: B

Solution:

Solution:

Question 187

The determinant $\begin{vmatrix} xp+y & x & y \\ yp+z & y & z \\ 0 & xp+y & yp+z \end{vmatrix}$ = 0 if

Options:

A. x, y, z are in A.P

B. x, y, z are in G.P

C. x, y, z are in H.P

D. xy, yz, zx are in A.P

Answer: B

Solution:

Solution:

Question 188

A telegraph has 5 arms and each arm is capable of 4 distinct positions, including the position of rest. The total number of signals that can be made is

Options:

A. 473

B. 1023

C. 1173

D. 423

Answer: B

Solution:

Solution:

Question 189

A club consists of members whose ages are in A.P, the common difference being 3 months. If the youngest member of the club is just 7 years old and the sum of the ages of all the members is 250 years, then the number of members in the club is

Options:

A. 15

B. 25

C. 20

D. 30

Answer: B

Solution:

Solution:

Question 190

$$\lim_{x \to 5} \frac{x^2 - 9x + 20}{x - [x]}$$

Options:

A. is 1

B. is 0

C. does not exist

D. cannot be determined

Answer: C

Solution:

Solution:

Question 191

If f (9) = 0 and f ′(9) = 1, then $\lim_{x \to 9} \frac{3 - \sqrt{f(x)}}{3 - \sqrt{x}}$ is equal to

Options:

A. 0

B. 1

C. -1

D. 3

Answer: B

Solution:

Solution:

Question 192

Let f (x + y) = f (x) · f (y) for all x, y where f (0) ≠ 0. If f (5) = 2 and f ′(0) = 3, then f ′(5) is equal to

Options:

A. 6

B. 0

C. 1

D. -1

Answer: A

Solution:

Solution:

Question 193

The shortest distance of the point (0, 0) from the curve $y = \frac{1}{2}\left(e^{x} + e^{-x}\right)$ is

Options:

A. 2

B. 1

C. 3

D. 0

Answer: 0

Solution:

Solution:

Question 194

A determinant is chosen at random from the set of all determinants of order 2 with elements 0 or 1 only. The probability that the value of the determinant chosen is positive is

Options:

A. $\frac{16}{81}$

B. $\frac{7}{16}$

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

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

Answer: C

Solution:

Solution:

Question 195

If $\vec{a}$ is a unit vector and $(\vec{x} + \vec{a}) \cdot (\vec{x} - \vec{a}) = 24$, the $|\vec{x}|$ must be

Options:

A. 3

B. 4

C. 5

D. 6

Answer: C

Solution:

Solution:

Question 196

The angle between two vectors $\vec{a}$ and $\vec{b}$ with magnitudes $\sqrt{5}$ and 4 respectively and $\vec{a}.\vec{b} = 2\sqrt{5}$ is

Options:

A. π/3

B. π/6

C. π/2

D. 5π/12

Answer: B

Solution:

Solution:

Question 197

The length of perpendicular from the point $\left(1, \frac{3}{2}, 2\right)$ to the plane $2x - 2y + 4z + 5 = 0$ is

Options:

A. $\sqrt{3}$

B. $\sqrt{6}$

C. $\sqrt{5}$

D. $\sqrt{7}$

Answer: C

Solution:

Solution:

Question 198

P is a point on the line segment joining the points $A(3, 2, 1)$ and $B(6, 2, -2)$. If the $x-$ coordinate of P is 5, then the $z-$ coordinate of P is

Options:

A. -2

B. 1

C. -1

D. 2

E.

Answer: A

Solution:

Solution:

Question 199

The probability of A and B solving a problem correctly is $\frac{1}{3}$ and $\frac{1}{4}$ respectively. If the probability of their making a common error is 1 / 20 and they obtain the same answer, then the probability of their answer to be correct is

Options:

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

B. $\frac{1}{40}$

C. $\frac{13}{120}$

D. $\frac{10}{13}$

Answer: D

Solution:

Solution:

Question 200

A pair of dice is thrown 4 times. If getting a doublet is considered to be a success, the probability of 2 successes is

Options:

A. $\frac{25}{216}$

B. $\frac{29}{216}$

C. $\frac{31}{216}$

D. $\frac{33}{216}$

Answer: A

Solution:

Solution: