Section 1 - Section 1

Question No.1   4.00
Bookmark ☐

A solid-state laser emits radiation of wavelength of 6000 Å and the life time, $\tau_{sp} = 10^{-6}$ s. Assume that the refractive index of the medium is one and the co-efficient of stimulated emission is

- ○ 6.6×10^{19} cm/kg
- ○ 6.6×10^{19} m/g
- ○ 1.3×10^{19} m/kg
- ○ 1.3×10^{19} m/g

Question No.2   4.00
Bookmark ☐

A simple classical model of the CO_2 molecule would be a linear structure of three masses with the electrical forces between the ions represented by two identical springs of equilibrium length l and force of constant k, as shown in Figure. Assume that only motion along the original equilibrium line is possible, that is, ignore rotations. How many vibrational degrees of freedom does this system have?
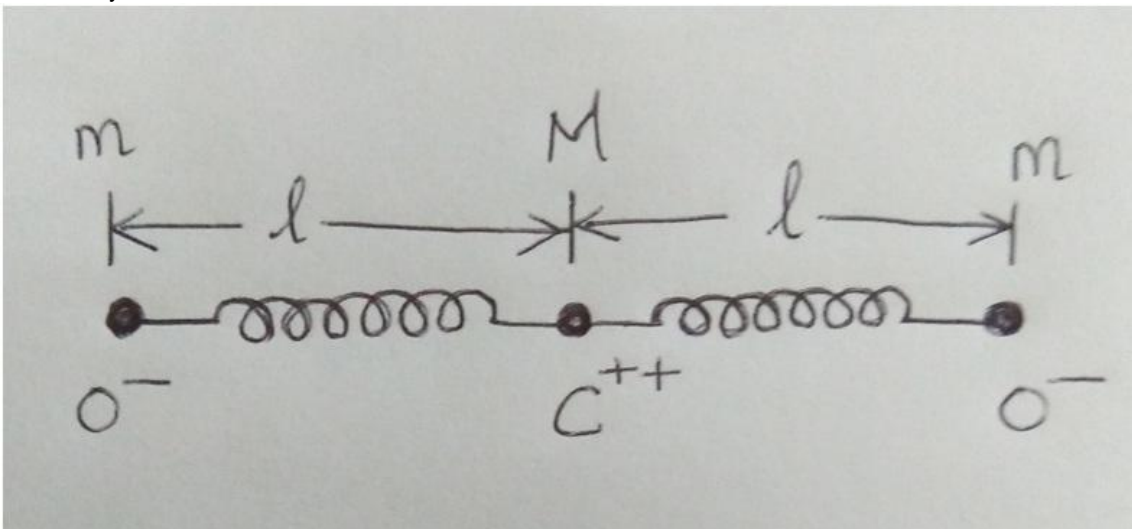
- ○ 4
- ○ 2
- ○ 1
- ○ No vibrational degrees of freedom

Question No.3   4.00
Bookmark ☐

If three real numbers a, b, and c are successive terms of an arithmetic sequence, then what is the value of

$$\frac{\sin(a)+\sin(b)+\sin(c)}{\cos(a)+\cos(b)+\cos(c)} ?$$

○ $\tan(b)$

○ $\mathrm{cosec}\,(a\text{-}b\text{-}c)$

○ $\dfrac{\sin\left(\dfrac{b}{2}\right)}{\cos(c-a)}$

○ $\cot(b\text{+}a\text{-}c)$

Question No.4	4.00

Which of the following is used in atomic clocks?

○ Laser

○ Quartz

○ Helium

○ Maser

Question No.5	4.00

Laplace transform of $\{e^{-2t} - e^{-3t}\}$ is

○ $1/(s+2)$

○ $1/(s-2)$

○ $- 1/(s^2+5s+6)$

○ $1/(s^2 +3s+6)$

Question No.6	4.00

The Doppler broadening of the emission wavelength takes place in

○ Nd:glass laser

○ He-Ne laser

○ Nd:YAG laser

○ Ruby laser

Question No.7	4.00

The classical value of molar specific heat is

○ R

○ 3R/2

○ 3R

○ R/2

Question No.8   4.00

Bookmark ☐

If $y = 2^{\frac{1}{2+x}}$, find the value of $\dfrac{dy}{dx}$

○ $-\dfrac{(2+x)^2}{\ln 2} \, 2^{\frac{1}{2+x}}$

○ $-\dfrac{\ln 2}{(2+x)^2} \, 2^{\frac{1}{2+x}}$

○ $\dfrac{2^{\frac{x}{2+x}}}{(2+x)^2}$

○ $\dfrac{\ln 2}{(2+x)^2}$

Question No.9   4.00

Bookmark ☐

In terms of the basic units of mass (M), length (L), time (T) and charge (Q), the dimensions of magnetic permeability of vacuum (μ0) are

○ $ML^2T^{-1}Q^{-2}$

○ MLQ^{-2}

○ $LT^{-1}Q^{-1}$

○ LTQ^{-1}

Question No.10   4.00

Bookmark ☐

A coin is placed on a horizontal platform that undergoes vertical simple harmonic motion of angular frequency ω. The amplitude of oscillation is gradually increased. The coin will leave contact with the platform for the first time

○ At the mean position of the platform

At an amplitude of g/ω^2

At an amplitude of g^2/ω^2

○ At the highest position of the platform

Question No.11   4.00

Bookmark ☐

Study the following information carefully and answer the question below it (i) There is a group of five persons- A, B, C, D and E (ii) One of them is manual scavenger, one is sweeper, one is watchman, one is human scarecrow and one is grave-digger (iii) Three of them – A, C and grave-digger prefer tea to coffee and two of them – B and the watchman prefer coffee to tea (iv) The human scarecrow and D and A are friends to one another but two of these prefer coffee to tea. (v) The manual scavenger is C's brother Which of the following groups includes a person who likes tea but is not a grave-digger?

○ BD

○ DE

○ BCE

○ None of the above

Question No.12   4.00

Bookmark ☐

Sunil likes chocolates very much, _____?

○ doesn't he?

○ does he

○ isn't it?

○ is it?

Question No.13   4.00

Bookmark ☐

Evaluate the derivative of the function $f(x) = \sqrt{1 + \sqrt{(x+1)}} = [1 + (x+1)^{\frac{1}{2}}]^{\frac{1}{2}}$ with respect to x at $x=0$.

○ 0

○ $\dfrac{1}{4\sqrt{3}}$

○ $\dfrac{1}{4\sqrt{2}}$

○ None of the above

Question No.14   4.00

Bookmark ☐

The freezing point of water

○ decreases with decrease of pressure

○ increases with increase of pressure

○ decreases with increase of pressure

○ does not depends on pressure

Question No.15   4.00

Bookmark ☐

If 9 men working 6 hours a day can do a work in 88 days. Then 6 men working 8 hours a day can do it in how many days?

○ 95

○ 97

○ 99

○ 89

Question No.16   4.00

Bookmark ☐

The operating frequency of a Wien-bridge oscillator is given by

○

$$\frac{1}{4\pi\sqrt{LC}}$$

○

$$\frac{1}{2\pi RC}$$

○

$$\frac{1}{2\pi\sqrt{LC}}$$

○

$$\frac{1}{2\pi\sqrt{RC}}$$

Question No.17   4.00

Bookmark ☐

A mono-atomic ideal gas, initially at temperature T_1, is enclosed in a cylinder fitted with a frictionless piston. The gas is allowed to expand adiabatically to a temperature T_2 by releasing the piston suddenly. If L_1 and L_2 are the lengths of the gas column before and after expansion respectively, then T_1/T_2 is given by

○ $\dfrac{L_2}{L_1}$

○ $\left(\dfrac{L_1}{L_2}\right)^{2/3}$

○ $\left(\dfrac{L_2}{L_1}\right)^{2/3}$

○ $\dfrac{L_1}{L_2}$

Question No.18

4.00

Bookmark ☐

Consider an ideal op-amplifier with infinite voltage gain. Let V_1 and V_2 be the values of independent voltage sources connected to the positive and negative input terminals, respectively, and let V_o be the output voltage. If $V_1 \neq V_2$, then Vo will be

○ Unpredictable

○ infinite

○ zero

○ finite

Question No.19

4.00

Bookmark ☐

Find the value of

Find the value of $\ln\left(\ln\left(\dfrac{x^{x^x}}{x^x}\right)\right)$

○ $\ln x + \ln\left(x^{x-1}\right.$ -
$-\ln(\ln x)$

○ $\ln x + \ln\left(x^{x-1} - 1\right)$
$+\ln(\ln x)$

○ $\ln x + \ln\left(x^{x-1} + 1\right.$
$+\ln(\ln x)$

○ $\ln(x) - \ln\left(x^x + x\right)$
$+\ln(\ln x)$

Question No.20

4.00

Bookmark ☐

Match the following:

List 1		List 2	
1	One dimensional heat equation	A	$\dfrac{\partial u}{\partial t} = \alpha^2 \dfrac{\partial^2 u}{\partial x^2}$
2	Two dimensional heat equation	B	$\dfrac{\partial u}{\partial t} = \alpha^2 \left[\dfrac{\partial^2 u}{\partial x^2} + \dfrac{\partial^2 u}{\partial y^2}\right]$
3	Laplace equation	C	$\dfrac{\partial^2 u}{\partial x^2} + \dfrac{\partial^2 u}{\partial y^2} = 0$
4	Poisson's equation	D	$\quad^2 \qquad \rho$

| | | | $\nabla^2 \varphi = -\dfrac{}{\varepsilon_0}$ |

○ 1-C ; 2-D ; 3-A ; 4-B

○ 1-A ; 2-B ; 3-C ; 4-D

○ 1-D ; 2-C ; 3-B ; 4-A

○ 1-B ; 2-A ; 3-D ; 4-C

Question No.21 4.00

Bookmark ☐

Fill in the blank with the correct form of the verb.
The International Women's Day _____ with great enthusiasm by our university last month.

○ celebrated

○ is celebrated

○ was celebrated

○ has celebrated

Question No.22 4.00

Bookmark ☐

The following type of laser can be used for generation of laser pulse

○ Nd- YAG laser

○ Carbon dioxide laser

○ Helium neon laser

○ Ruby laser

Question No.23 4.00

Bookmark ☐

The greater the quantum number, the closer the quantum physics approaches classical physics. This principle is known as

○ Least action principle

○ Complementary principle

○ Correspondence principle

○ Uncertainty principle

Question No.24 4.00

Bookmark ☐

Maxwell modified the Biot-Savart's law to

○ Lenz's law

○ Faraday's law

○ Kirchoff's law

○ Ampere's law

Question No.25 4.00

Bookmark ☐

If $a^2 = b^3 = c^4 = d^5$, then the value of $\log_a (bcd)$ is

○ $\dfrac{81}{24}$

○ $\dfrac{4}{3}$

○ $\dfrac{33}{20}$

○ $\dfrac{47}{30}$

Question No.26 4.00

Bookmark ☐

Statements: Buses are cars. Cycles are cars
Conclusion:
I. Cars are buses
II. Buses are Cycles

- If neither I nor II follows
- If only conclusion I follows
- If only conclusion II follows
- If either I or II follows

Question No.27
4.00

Bookmark ☐

Consider the two-level system with E_1 = -13.6 eV, E_2 = -3.4 eV and the co-efficient A_{21}= 6 x 10^8 s^{-1}. The frequency of light emitted due to transition from E_2 and E_1 is

- 2.5 x10^{15} Hz
- 6.5 x 10^{14} Hz
- 8.2 x 10^{17} Hz
- 4.5 x 10^{16} Hz

Question No.28
4.00

Bookmark ☐

A transistor has a collector current of 5 mA, when the emitter voltage is 20 mV. At 30 mV. At 30 mV, the current is 30 mA. At 50 mV, it is

- 280 mA
- 80 mA
- 480 mA
- 1080 mA

Question No.29
4.00

Bookmark ☐

Calculate the wavelength of the radiative transition from n=3 to n=2 in the hydrogen atom. (where Rydberg constant R_H=1.096778x10^7 m^{-1})

- 536 nm
- 252.5 nm
- 658 nm
- 656.5 nm

Question No.30
4.00

Bookmark ☐

Three concentric metallic spherical shells of radii R, 2R, 3R, are given charges Q1, Q2, Q3, respectively. It is found that the surface charge densities on the outer surfaces of the shells are equal. Then, the ratio of the charges given to the shells, Q1 : Q2 : Q3, is

- 1 : 3 : 5
- 1 : 8 : 18
- 1 : 4 : 9
- 1 : 2 : 3

Question No.31
4.00

Bookmark ☐

One of the most efficient engines ever developed operates between 2100 K and 700 K. Its actual efficiency is 40%. Find the ratio of its actual efficiency to its maximum efficiency in percentage.

- 60%
- 55%
- 66.60%
- 40%

Question No.32
4.00

Bookmark ☐

Two charges, one positive and one negative, of same magnitude, Q= 1.1×10^{-10} C, are located 2×10^6 m apart. A third charge q = 10^{17} C is located exactly between them. What is the magnitude of the total force acting on charge q? (Coulomb constant, k=8.98×10^9 $N^2\,mC^2$).

○ 2×10^{-10} N

○ 2×10^5 N

○ 2×10^{-5} N

○ 2×10^{10} N

Question No.33
4.00

Bookmark ☐

In the following question, the first two words (given in italics) have a definite relationship. Choose one word out of the given four alternatives which will fill the blank space and show the same relationship with the third word as between the first two.

Latex is to *Rubber* as *Flax* is to ………?………….

○ Cotton

○ Linen

○ Silk

○ Jute

Question No.34
4.00

Bookmark ☐

A pipe AB of circular cross section has radii 6 cm and 3 cm at the ends A and B respectively. The water is flowing from A to B. If the water flow rate at A is 0.06 m^3/s, what will be the approximate velocity of water at B?

○ 96 m/s

○ 67 m/s

○ 21 m/s

○ 85 m/s

Question No.35
4.00

Bookmark ☐

A cinema theatre has a volume of 750m^3. What should be the total absorption in the theatre if the reverberation time of 1.5seconds is to be maintained?

○ 750 open window units

○ 835 open window units

○ 500 open window units

○ 1125 open window units

Question No.36
4.00

Bookmark ☐

The potential energy of system of Na^+ and Cl^- ions when they are at 4 Å apart

○ -5.5 eV

○ -8.5 eV

○ -2.5 eV

○ -3.6 eV

Question No.37

4.00

An object is placed at a distance of 100 cm from a convex mirror; the magnification produced is 1/2. Where the object should be placed to get a magnification of 1/4?

○ 30 cm
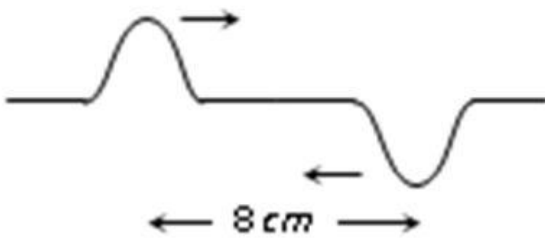
○ -300 cm

○ -30 cm

○ 300 cm

Question No.38

4.00

Two pulses in a stretched string whose centres are initially $8cm$ apart are moving towards each other as shown in the figure. The speed of each pulse is 2 cm/s. What will be the total energy of the pulses after 2 seconds?

○ Zero

○ Purely kinetic

○ Purely potential

○ Both kinetic and potential

Question No.39

4.00

A spring stretched by 'x' has a potential energy U. If it is stretched by 2x more, the increase in potential energy due to second stretching is

○ 6U

○ 4 U

○ 8 U

○ 2U

Question No.40

4.00

A battery of emf E and internal resistance r is used in a circuit with a variable external resistance R. Find the value of R for which the power consumed in R is maximum

○ r

○ r/2

○ 2r

○ 0

Question No.41   4.00
Bookmark ☐

When forces F_1, F_2, and F_3 are acting on a particle of mass m such that F_2 and F_3 are mutually perpendicular, then the particle remains stationary. If the force F_1 is now removed then the acceleration of the particle is

○ F_1 / m

○ $F_2 F_3 / m F_1$

○ F_2 / m

○ $(F_2 - F_3)/m$

Question No.42   4.00
Bookmark ☐

Choose the correct meaning of the italicized idiom.
The police *cordoned off* the area after the explosion.

○ did not allow anyone to leave the area

○ isolated the area

○ checked everyone in the area

○ filled the whole area

Question No.43   4.00
Bookmark ☐

The laser action is mainly characterized by

○ Spontaneous emission process

○ Plasmonic process

○ Stimulated emission process

○ Thermionic emission process

Question No.44   4.00
Bookmark ☐

Oxygen is 16 times heavier than hydrogen. Equal volumes of hydrogen and oxygen are mixed. Find out the ratio of speed of sound in the mixture to that in hydrogen.

○ $\sqrt{\dfrac{1}{8.5}}$

○ $\sqrt{8.5}$

○ $\sqrt{\dfrac{8.5}{3}}$

$$\sqrt{\frac{16}{8.5}}$$

Question No.45   4.00
Bookmark ☐

The reaction $e^+ + e^- \rightarrow \gamma$ is forbidden because,

○ linear momentum is not conserved

○ charge is not conserved

○ angular momentum is not conserved

○ lepton number is not conserved

Question No.46   4.00
Bookmark ☐

The pressure of a gas contained in a vessel is P. If mass of each molecule is reduced to half and root mean square (RMS) velocity doubled, the pressure will be

○ P/4

○ P/2

○ 2P

○ P

Question No.47   4.00
Bookmark ☐

The most unique property of laser

○ speed

○ coherence

○ directional

○ wavelength

Question No.48   4.00
Bookmark ☐

For an intrinsic semiconductor, me* and mh* are respectively the effective masses of electrons and holes near the corresponding band edges. At a finite temperature the position of the Fermi level

○ depends on $m_h{}^*$ but not on $m_e{}^*$

○ depends on $m_e{}^*$ but not on $m_h{}^*$

○ depends neither on $m_e{}^*$ nor on $m_h{}^*$
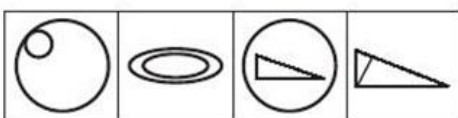
○ depends on both $m_e{}^*$ and $m_h{}^*$

Question No.49   4.00
Bookmark ☐
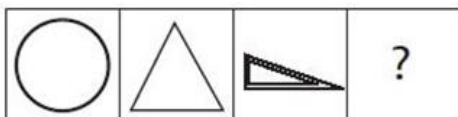
○ 1

○ 4

○ 3

○ 2

Question No.50
4.00

A shell is fired upward from a Cannon with a velocity v (m/s) at an angle θ with the horizontal direction. At the highest point in its path it explodes into two pieces of equal mass. If one of the pieces retraces its path to the cannon, what will be the speed (in m/s) of the other piece immediately after the explosion?

- $(3/2)$ v cosθ
- $(\sqrt{3}/2)$ v cosθ
- 2 v cosθ
- 3v cosθ

Question No.51
4.00

What is the approximate optical length of a ring cavity synchronized to a laser of repetition rate of 80 MHz?
- 7.5 m
- 3.75 m
- 0.94 m
- 1.86 m

Question No.52
4.00

The electrical power output of a photodiode is maximum when a
- Small forward bias exists across it
- Large reverse bias exists across it
- Small forward current flows through it, irrespective of the bias
- Small reverse bias exists across it

Question No.53
4.00

The critical magnetic field for aluminium is 7.9 x 10^3 A/m in which current flow through a long thin superconducting wire of diameter 10^{-3}m. The critical current is found to be

- 24.81 A
- 34 A
- 35.46 A
- 15.55 A

Question No.54
4.00

The packing efficiency of diamond cubic unit cell is
- 0.52
- 0.68
- 0.34
- 0.74

Question No.55
4.00

The work done in the isothermal expansion of an ideal gas from its initial pressure (P_1) and volume (V_1) to final pressure (P_2) and volume (V_2) is
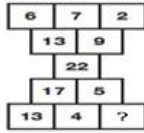
○ $P_1 V_1 \ln (P_1/P_2)$

○ $P_2 V_2 \ln (V_1/V_2)$

○ $P_1 V_1 \ln (P_2/P_1)$

○ Zero

Question No.56   4.00

Which number replaces the question mark?

○ 2

○ 4

○ 3

○ 1

Question No.57   4.00

A wave traveling at 5.0×10^4 meters per second has wavelength of 2.5×10 meters. What is the frequency of the wave?

○ 5.0×10^3 Hz

○ 2.0×10^3 Hz

○ 1.25×10^6 Hz

○ 5.0×10^{-4} Hz

Question No.58   4.00

If the mobility of electrons in metal decreases, the resistivity

○ increases

○ fluctuate

○ decreases

○ remains constant

Question No.59   4.00

Choose the most appropriate preposition to fill the blank:
The mathematics exam will be held between 2_____4pm.

○ to

○ from

○ at

○ and

Question No.60   4.00

Coefficient of performance of refrigerator is(Q_c is the heat removed from the refrigerator and Q_h is the heat delivered outside)

○ $(Q_h-Q_c)/Q_h$

○ $Q_c/(Q_h-Q_c)$

○ $Q_h/(Q_h-Q_c)$

○ $(Q_h-Q_c)/Q_c$

Question No.61   4.00

A 3×3 matrix has eigen values 0, 2+i and 2-i. Which of the following is a correct statement?

○ The inverse of the matrix exists

○ The matrix is Hermitian

○ det A = 0

○ The matrix is unitary

Question No.62   4.00

Bookmark ☐

If $\varepsilon \ll 1$ and $\eta \ll 1$ but both of them are positive, then find out the approximate value of $\dfrac{1+\varepsilon}{1+\eta}$

○ $1 + \varepsilon - \eta$

○ $\dfrac{\eta}{\varepsilon}$

○ $1 - \varepsilon + \eta$

○ $\dfrac{\varepsilon}{\eta}$

Question No.63   4.00

Bookmark ☐

Consider a beam of light of wavelength λ incident on a system of a polarizer and an analyzer. The analyzer is oriented at 45⁰ to the polarizer. When an optical component is introduced between them, the output intensity becomes zero. (Light is incident normally on all components). The optical component is
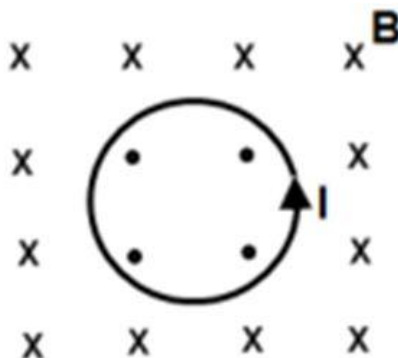
○ a half-wave plate

○ a quarter-wave plate

○ a full-wave plate
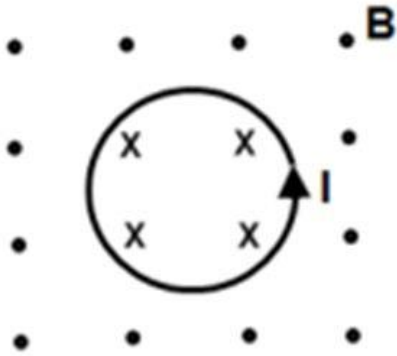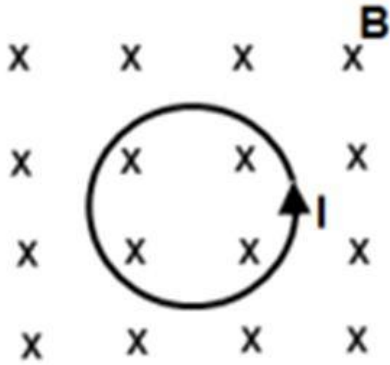
○ an ordinary glass plate

Question No.64   4.00

Bookmark ☐

Which of the following diagrams represents the magnetic field due to a circular current?

○

○

○

○

Question No.65   4.00

Bookmark ☐

Choose the synonym of the italicized word.
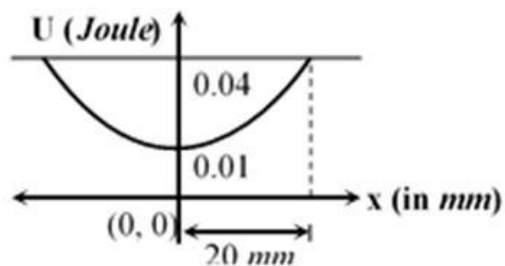Some people are extremely *fastidious* in their choice of dress.

○ fussy

○ discriminating

○ careless

○ pompous

Question No.66   4.00

Bookmark ☐

The variation of potential energy of harmonic oscillator is shown in figure. The force constant of the oscillator is

○ 400 *N/m*

○ 75 *N/m*

○ 150 *N/m*

○ 250 *N/m*

Question No.67
4.00

Bookmark ☐

The coefficient of performance of a refrigerator is 5. If the temperature inside freezer is –20°C, the temperature of the surroundings to which it rejects heat is

○ 31°C

○ 41°C

○ 21°C

○ 11°C

Question No.68
4.00

Bookmark ☐

In photoelectric experiment both sodium (work function = 2.3eV) and tungsten (work function =4.5eV) metals were illuminated by an ultraviolet light of same wavelength. If the stopping potential for tungsten is measured to be 1.8V, the value of the stopping potential for sodium will be

○ 2.2 V

○ 6.3 V

○ 6.8 V

○ 4 V

Question No.69
4.00

Bookmark ☐

The equation of a wave is given by $y = a \sin[\omega((x/v) - k)]$, where ω is the angular velocity, v is the linear velocity. The dimension of k will be

○ [LT]

○ $[T^{-1}]$

○ $[T^2]$

○ [T]

Question No.70
4.00

Bookmark ☐

Calculate the wavelength of the photon, which will be required to break a Cooper pair in a superconductor like zirconium whose T_c is 0.56 K

○ 7.2×10^{-3} m

○ 3.8×10^{-2} m

○ 1.5×10^{-4} m

○ 4.3×10^{-5} m

Question No.71
4.00

Bookmark ☐

Statement: Be humble even after being victorious.
Assumptions:
I. Many people are humble after being victorious
II. Generally People are not humble

Question No.72   4.00

Bookmark ☐

If black is called white, white is called red, red is called pink, pink is called green, green is called blue, what would be the colour of human blood?

○ Green

○ Blue

○ Pink

○ White

Question No.73   4.00

Bookmark ☐

Study the following information carefully and answer the question below it:

Aasha, Bhuvnesh,Charan, Danesh, Ekta, Farhan, Ganesh and Himesh are sitting around a circle, facing the centre. Aasha sits fourth to the right of Himesh while second to the left of Farhan. Charan is not the neighbour of Farhan and Bhuvnesh. Danesh sits third to the right of Charan. Himesh never sits next to Ganesh.

Which is the position of Farhan with respect to Ekta?

○ Fourth to the right

○ Third to the left

○ Second to the right

○ Sixth to the left

Question No.74   4.00

Bookmark ☐

A Carnot engine working between 300 K and 400 K has 800 J of useful work. The amount of heat energy supplied to the engine from the source is

○ 1200 J

○ 3600 J

○ 3200 J

○ 2400 J

Question No.75   4.00

Bookmark ☐

The half-life of a radioactive nuclear source is 9 days. The fraction of nuclei which are left undecayed after 3 days is

○ 2/3

○ 1/3

○ 7/8

○ $1/2^{1/3}$

Question No.76   4.00

Bookmark ☐

A body floats with 1/3 of its volume outside water. The same body floats with 3/4 of its volume inside another liquid. The density of the other liquid is

○ 2/9 gm/cc

○ 9/4 gm/cc

○ 4/9 gm/cc

○ 8/9 gm/cc

Question No.77

4.00

A combination of two thin convex lenses of equal focal lengths, is kept separated along the optic axes by a distance of 20 cm between them. The combination behaves as a lens system of infinite focal length. If an object is kept at 10 cm from the first lens, its image will be formed on the other side at a distance x from the second lens. The value of x is

- ○ 6.67 cm
- ○ 20 cm
- ○ 10 cm
- ○ infinite

Question No.78

4.00

The method of mining silver varies from place to place, _____?

- ○ is it?
- ○ doesn't it?
- ○ does it?
- ○ isn't it?

Question No.79

4.00

1, 4, 27, 16, ?, 36, 343

- ○ 132
- ○ 125
- ○ 72
- ○ 25

Question No.80

4.00

Suppose the gravitational force varies inversely as the nth power of distance. Then the time period of a planet in circular orbit of radius R around the sun will be proportional to

- ○ $R^{\left(\frac{n+1}{2}\right)}$
- ○ R^n
- ○ $R^{\left(\frac{n-2}{2}\right)}$
- ○ $R^{\left(\frac{n-1}{2}\right)}$

Question No.81

4.00

The output of operational amplifier increases 5 V in 15 µs. The slew rate is

- ○ 30 V/µs
- ○ 5 V/µs
- ○ 0.333 V/µs
- ○ 90 V/ µs

Question No.82

4.00

Study the following information carefully and answer the question below it

In a family, Isha is the granddaughter of Asha. Deepa is the mother of Hansa. Charan is the son of Anand. Radha is the

In a family, Isha is the granddaughter of Asha. Deepa is the mother of Hansa. Charan is the son of Anand. Radha is the mother of Isha. Deepa is the sister of Vinod and Charan. Nagesh has two children, Gita and Hansa. Emesh is the only grandson in the family. Charan is not married. Radha is the daughter-in-law of Anand.

Who is married to Radha?
- ○ Nagesh
- ○ Charan
- ○ Anand
- ○ Vinod

Question No.83   4.00

Bookmark ☐

If $y = \sqrt{\dfrac{1}{2} + \sqrt{\dfrac{1}{2} + \sqrt{\dfrac{1}{2} + \ ......}}}$, then find the value of y

- ○ $\dfrac{1+\sqrt{3}}{2}$

- ○ $\dfrac{1+\sqrt{2}}{2}$

- ○ $\dfrac{1-\sqrt{3}}{2}$

- ○ $\dfrac{1-\sqrt{2}}{2}$

Question No.84   4.00

Bookmark ☐

For an n-channel silicon FET with channel width of 3×10^{-4} cm and the dopant concentration of 10^{15} electrons/cm^3. The relative dielectric constant of silicon is 12 and the pinch of voltage is
- ○ 6.8 V
- ○ 13.5 V
- ○ 10 V
- ○ 15.5 V

Question No.85   4.00

Bookmark ☐

The phase difference between the input and output voltages of a transistor connected in common emitter arrangement is
- ○ 180°
- ○ 360°
- ○ 270°
- ○ 90°

Question No.86   4.00

Bookmark ☐

For aluminium, the modulus of rigidity is 2.1×10^{10} N/m^2 and density is 2.7×10^3 kg/m^3. Find the speed of transverse waves in the medium.
- ○ 25.14×10^3 m/s
- ○ 27.9×10^3 m/s
- ○ 2.79×10^3 m/s
- ○ 24.1×10^3 m/s

Question No.87

For a given motion, the relationship between time t and distance x is found out to be $t = \alpha x^2 + \beta x$, where α and β are constants. Considering v as velocity, the retardation will be given by,

○ $2\beta^2 v^3$

○ $2\alpha v^3$

○ $2\alpha\beta v^3$

○ $2\beta v^3$

Question No.88

Based on the information given answer the following question.
1. In a family of six persons, there are people from three generations. Each has separate professions and they like different colours. There are two couples.
2. Shyam is an Engineer and his wife is not a doctor and she does not like Red colour.
3. Chartered Accountant likes green colour and his wife is a teacher.
4. Manisha is the mother-in-law of Sunita and she likes orange colour.
5. Vimal is the grand father of Tarun and tarun is the Principal and likes black colour.
6. Nyna is the grand daughter of Manisha and she likes blue colour. Nyna's Mother likes white colour.

Which Colour is liked by the Sunita?
○ White
○ Green
○ Black
○ Cannot be determined

Question No.89

Choose the best antonym of the italicized word.
The principal *deprecated* the attitude of some student-leaders.
○ ignored
○ derided
○ appreciated
○ tolerated

Question No.90

A 200 turn coil having an axial length of 30 mm and a radius of 10mm is pivoted in a magnetic field having a flux density of 0.8 T. If the coil carries a current of 0.5A, the torque acting on the coil will be
○ 0.0048 Nm
○ 0.048 Nm
○ 8 Nm
○ 0.48 Nm

Question No.91

If $3^{\frac{1}{3}} x - 2^{\frac{1}{2}} y = 0$ and $2^{\frac{1}{3}} x - 3^{\frac{1}{2}} y = 1$, find the value of x and y.

$$x = \frac{2^{\frac{1}{2}}}{2^{\frac{1}{6}} + 3^{\frac{1}{6}}},$$

$$y = \frac{3^{\frac{1}{3}}}{2^{\frac{1}{6}} + 3^{\frac{1}{6}}}$$

Question No.92   4.00

Bookmark ☐

The DC current gain of a common-base transistor is 0.956 and emitter current is 10 mA. The base current value is

○ 0.38 mA
○ 0.66 mA
○ 0.44 mA
○ 0.25 mA

Question No.93   4.00

Bookmark ☐

Solar energy reaches the earth at the rate of about 1.4 kW per square meter of surface perpendicular to the direction of the sun (The mean radius of the earth's orbit is 1.5×10^{11} m). The mass of the sun decrease per second owing to this energy loss is

○ 4.4×10^9 kg

○ 2.0 x 10^{19} kg

○ 4.4 x 10^{26} kg

○ 2.0 x 10^{30} kg

Question No.94	4.00

Bookmark ☐

A uniform metal disc with a small hole at the center is rotating at a constant period around an axis that passes through the center of mass of the disc. If the disc is heated uniformly, the period of rotation will

○ decrease

○ increase

○ remain same

○ first increase then decrease

Question No.95	4.00

Bookmark ☐

The proton proton chain reaction

○ is the runaway reaction that produces the fission of iron during a supernova explosion

○ is a three-step process which converts some mass to energy as helium nuclei are formed

○ adds protons together until a massive carbon nucleus is produced at the core of the Sun

○ produces chains of protons which are then broken apart to produce the Sun's energy

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Question No.96	4.00

Bookmark ☐

The cosmic micorwave background radiation comes from

○ the solar nebula

○ quasars

○ the Big Bang

○ radio galaxies

Question No.97	4.00

Bookmark ☐

The position vector of a particle is represented as $\vec{r} = (a\cos\omega t)\hat{i} + (a\sin\omega t)\hat{j}$. What is the direction of the velocity vector?

○ Parallel to position vector

○ Always directed away from the origin

○ Perpendicular to position vector

○ Always directed towards origin

Question No.98	4.00

Bookmark ☐

The efficiency of a full-wave rectifier is

○ double the half-wave rectifier

○ one-half of half-wave rectifier

○ one-third of half-wave rectifier

○ Same as half-wave rectifier

Question No.99	4.00

Bookmark ☐

You wouldn't tell them what happened, _____

○ isn't it?

○ would you?

○ wouldn't you?

○ won't you?

Question No.100   4.00

At certain place, the horizontal component of earth's magnetic field is 3.0 G and the angle dip at the place is 30°. The magnetic field of earth at that location

- ○ 4.5 G
- ○ 3.5 G
- ○ 6.0 G
- ○ 5.1 G