Padasalai’s Telegram Groups!

- Padasalai's NEWS - Group
  https://t.me/joinchat/NIfCqVRBNj9hhV4wu6_NqA

- Padasalai's Channel - Group
  https://t.me/padasalaichannel

- Lesson Plan - Group
  https://t.me/joinchat/NIfCqVWwo5iL-21gpzrXLw

- 12th Standard - Group
  https://t.me/Padasalai_12th

- 11th Standard - Group
  https://t.me/Padasalai_11th

- 10th Standard - Group
  https://t.me/Padasalai_10th

- 9th Standard - Group
  https://t.me/Padasalai_9th

- 6th to 8th Standard - Group
  https://t.me/Padasalai_6to8

- 1st to 5th Standard - Group
  https://t.me/Padasalai_1to5

- TET - Group
  https://t.me/Padasalai_TET

- PGTRB - Group
  https://t.me/Padasalai_PGTRB

- TNPSC - Group
  https://t.me/Padasalai_TNPSC
Question No.1

The Rodrigue's representation of Lagurre's polynomial $L_n(x)$ is:

(B) $\frac{e^x}{n!} \frac{d^n}{dx^n} (x^n e^{-x})$

Independent of the strength of the applied magnetic field and coupling constants. (Chosen option)

Question No.2

Spin - Spin interaction is:

(C) Independent of the strength of the applied magnetic field and coupling constants.

Question No.3

The normalized eigen vectors for a given matrix

$$A = \begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 1 \\ 0 & 1 & 1 \end{bmatrix}$$

at eigen value of unity is:
Question No.4

If \( L^+ \) is the raising operator and \( L^- \) is the lowering operator, then the value of \( L + L^- \) is:

\[
L^+ \text{ (Chosen option)} \\
2 \leftrightarrow L_z
\]

Question No.5

The zero point energy of the Linear Harmonic Oscillator is given by:

\[
\frac{1}{2} \hbar \omega_c
\]

(Chosen option)
Question No.7

The material, which is used for making Solar cells:

(A) Copper
(B) Iron
(C) Aluminium (Chosen option)
(D) Silicon

Question No.8

The expectation value of the position vector of a particle is a function only of:

(A) t and r
(B) space co-ordinates (Chosen option)
(C) None of these

For the circuit of a given figure with an ideal operational amplifier, the maximum phase shift of the output $V_{out}$ with reference to the input $V_{in}$ is:

- **Option b or c**
- $<r>=0$
- for particle in a box
Question No.10

According to Pauli's theory of paramagnetism, the magnetic susceptibility of free electrons is $\chi_m = \frac{-\mu_B}{E_F}$.

(A) $\pm 180^\circ$ (Chosen option)

(B) $0^\circ$

(C) $-90^\circ$

(D) $90^\circ$

Question No.11

The kinetic energy $T$ for a system of mass $m$ in generalised plane polar co-ordinates $(r, \theta)$ is:

$T = \frac{3}{2} \frac{\mu_B^2}{E_F}$

Bookmark
Question No.12

What is the mass 'm' of a particle, if its rest mass 'm₀' moves with a speed \( \frac{c}{\sqrt{2}} \)?

(C) \( 1.414 \ m₀ \)

Question No.13

The book which describes about the Tamils Society and Economic Conditions was ________.

(B) Sangam Literature

Question No.14

The objectives of ________ are the development of abilities and values such as the spirit of enquiry, creativity, objectivity and aesthetic sensitivity.

(C) Indica
**Question No.16**

The total power radiated by an oscillating electric dipole is proportional to _______ of the exciting wavelength.

(A) $E^2$  
(B) $\frac{\omega^4}{\omega^4}$  
(C) $\omega^4$  
(D) $\omega^4$

- (C) $\omega^4$ (Chosen option)

**Question No.17**

Raman effect is:

(A) Elastic scattering of light  
(B) Inelastic scattering of light  
(C) Absorption of light  
(D) Reinforcement

- (B) Inelastic scattering of light (Chosen option)

**Question No.18**

If $E_1$ is the energy of the lowest state of a one-dimensional potential box of length '$a$' and $E_2$ is the energy of the lowest state when the length of the box is halved, then what is the relation between $E_1$ and $E_2$?

'ஒளிசதற' மீது மறுபாடான உடற்போன போட்குப் பகுதியின் அளவில் $E_1$ மறுபாடான $E_2$ நூற்று மீது வளர்ந்து வந்து, $E_1$ மறுபாடான $E_2$ வளர்ந்து வந்து விளக்கினால்:

- (A) 2$E_1$  
- (B) $E_1$  
- (C) $E_1$  
- (D) $E_1$
Question No.20

The rotation of a symmetric top about intermediate axis or line of nodes is called:

(A) **Precession**

(B) **Nutation**

(C) **Open Pit**

(D) **Alluvial**

Which of these is not a characteristic of Poisson distribution?

(A) The parameter is constant.

(B) The distribution is J-shaped when p is close to zero.

(C) The distribution is bell-shaped when both n and p are small.

(D) E₂ = 4E₁ (Chosen option)

E₂ = 4E₁

Question No.21

The geometrical depolarizing factor 'N' for a sphere about any axis is:

(A) **n is small and p is large** (Chosen option)

(B) **n is large and p is small**

(C) **p is close to zero, the distribution is J shaped**

(D) **n is large and p is small**

Question No.22

The rotation of a symmetric top about intermediate axis or line of nodes is called:

(A) **Precession**

(B) **Nutation**

(C) **Open Pit**

(D) **Alluvial**

Which of these is not a characteristic of Poisson distribution?

(A) The parameter is constant.

(B) The distribution is J-shaped when p is close to zero.

(C) The distribution is bell-shaped when both n and p are small.

(D) E₂ = 4E₁ (Chosen option)

E₂ = 4E₁
Question No.23

According to the principle of virtual work, a system of particles is in equilibrium only if the virtual work of the applied forces is __________. (A) infinite (B) frictional (C) zero (D) constant

(C) zero (Chosen option)

Question No.24

A clock in the moving rocket will appear to run slower than the clock on the surface of the earth. In accordance with this $t =$ __________. (Given $t_o$ - time interval of clock at rest, $t$ - time interval of clock in motion with velocity $v$)

(B) $t = \frac{t_o}{\sqrt{1 - \frac{v^2}{c^2}}}$ (Chosen option)

Question No.25
Curie - Weiss law is:

\[
\chi_m = C/(T - \theta)
\]

(C) \( \chi_m = C/(T - \theta) \) (Chosen option)

\( \chi_m = C/(T - \theta) \)

---

**Question No.26**

Which of the following equation explains that net magnetic induction through any closed surface is zero?

(A) \( \nabla \cdot B = 0 \)

(B) \( \nabla \times B = 0 \)

(C) \( \frac{\partial B}{\partial t} = \frac{\mu_0}{\varepsilon_0} \nabla \times E \)

(D) \( \nabla \times E = 0 \)

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**Question No.27**

Centre for Policy Research (CPR) is one of India's leading think tanks focussing on public policy was established in _______.

(A) 2019

(B) 1956

(C) 1973 (Chosen option)

(D) 2015

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**Question No.28**

In a diatomic molecule, the vibrational energy of the lowest state:

(A) \( \varepsilon_0 = \frac{1}{2} \varepsilon_0 \)

(B) \( \varepsilon_0 = \frac{1}{2} \varepsilon_0 \)

(C) \( \varepsilon_0 = \frac{1}{2} \varepsilon_0 \) (Chosen option)

(D) \( \varepsilon_0 = \frac{1}{2} \varepsilon_0 \)
Question No.30

The temperature of the sample is increased, the intensity of hot bands:
(A) Increases
(B) Decreases
(C) No change

Question No.31

Ordinance must be ratified by the State legislature, within:
(A) 7 weeks
(B) 100 days
(C) 150 days

Question No.32

Home Rule league in Bombay was formed by:
(A) Sri Dayanand Saraswathi
(B) Nehru
(C) Bharathiar
(D) Tilak

Question No.33

'Regaining Excellence in Education' and 'What's Best for Children' are the works of __________, who concentrated on alternatives in public school system.

(A) Mario D. Fantini
(B) Mrs. Annie Besant
(C) Sri Aurobindo
(D) Paul Goodman
If \( g \) represents the number of states and \( n \) represents the number of particles in the \((E, E + dE)\) domain, Maxwell-Boltzmann, Bose-Einstein and Fermi-Dirac statistics produce the same result when \( \frac{g}{n} \) is:

\[ \text{(E, E + dE)} \quad \text{Bose-Einstein}\]
\[ \text{Maxwell-Boltzmann}\]
\[ \text{Fermi-Dirac}\]

\[ \text{same result when } \frac{g}{n} \text{ is:} \]

(C) \( \gg 1 \)
\[ \gg 1 \]

Question No. 36

What is the normal frequency of vibration of a linear triatomic molecule executing asymmetric stretching?

(Chosen option)

\[ \omega = \sqrt{\frac{k}{M}} \left[ 1 + \frac{2n}{M} \right] \]
Coulomb's law states that the force of attraction or repulsion between two electric point charges is directly proportional to:

\[ \frac{1}{r^2} \]

(B) \( \frac{1}{r^2} \) (Chosen option)

Question No.39

The relativistic formula for kinetic energy is:

(A) \( T = (\text{m}-m_0)c^2 \) (Chosen option)

\( T = (\text{m}-m_0)c^2 \)
Question No.40

1.00

Woodworth suggests that, when an attitude is inactive it may be called as __________.

(A) distraction

(B) inattention

(C) disposition

(D) disinterest

(Chosen option)

2.00

Question No.41

1.00

If ‘p’ is the space charge per unit volume, then the variation of potential along x, \( \frac{d^2\phi}{dx^2} = -4\pi p \) gives _________ equation.

(B) Poisson (Chosen option)

3.00

Question No.42

1.00

At Neel temperature:

(C) susceptibility is maximum (Chosen option)

4.00

Question No.43

1.00

The energy density of a radiation (photons) is given by: (symbols carry their usual meanings)

(C) \( \text{symbols carry their usual meanings} \)
Question No. 44

In a.c. Josephson's effect, the supercurrent is given by the relation:

\[ J = J_0 \sin \left( \delta(0) - \frac{2eVt}{h} \right) \]  

(C) \[ J = J_0 \sin \left( \delta(0) - \frac{2eVt}{h} \right) \]  

Question No. 45

Permanent dipole moment consists of the following angular momentum:

(A) Orbital angular momentum of electron

(B) All of these  

(Chosen option)
Question No. 48

The variation method yields:

(A) upper limit to the ground state energy (Chosen option)

தேர்க்கிறது கைற்புற முதலில் அருட்பு (வரையறுக்கப்பட்டு) முறையே முன்னணி.

Question No. 49

What is the value of the Lande g factor for an energy state

with L=1, J = \frac{3}{2} ?

அதக்கு மதில் L = 1 மற்றும் J = \frac{3}{2} முறையே வாங்கின்ற g -சாதத்திலிருந்து முன்னணி

சொல்லுங்கள்?
Question No.50

In sodium, the Fermi energy is 3.1 eV. What is its Fermi temperature? \( (K_B=1.38 \times 10^{-23} \text{ J/K}) \)

\( \text{(B)} \quad 3.6 \times 10^4 \text{K (Chosen option)} \)

3.6 \times 10^4 \text{K}

Question No.51

The inverse operation in 3d space is given by the matrix:

\[
\begin{pmatrix}
-1 & 0 & 0 \\
0 & -1 & 0 \\
0 & 0 & -1 \\
-1 & 0 & 0 \\
0 & -1 & 0 \\
0 & 0 & -1
\end{pmatrix}
\]

\( \text{(B)} \quad \begin{pmatrix}
-1 & 0 & 0 \\
0 & -1 & 0 \\
0 & 0 & -1 \\
-1 & 0 & 0 \\
0 & -1 & 0 \\
0 & 0 & -1
\end{pmatrix} \quad \text{(Chosen option)}
\)

Question No.52

In a Canonical ensemble, system shall allow:

\( \text{(A)} \quad \text{Exchange energy only but not particles (Chosen option)} \)
Question No.53
If the mobility of electrons in a metal increases, the resistivity:
(A) decreases
(B) increases
(C) remains constant
(D) none of these

Question No.54
Corresponding to every matrix A of rank 'r', there exist non singular matrices P and Q such that PAQ =

(B) \[
\begin{pmatrix}
1 & 0 \\
0 & 1 \\
\end{pmatrix}
\]

Question No.55
In which region c = 0 stretching occur in IR spectrum:
(A) 3640 - 3250 cm\(^{-1}\)
(B) 2300 - 2100 cm\(^{-1}\)
(C) 1900 - 1650 cm\(^{-1}\)

Question No.56
1.00
Bookmark
The energy gap in the Dirac free electron energy spectrum is:

(A) $2mc^2$  
(B) $2mc$  
(C) $mc^2$  
(D) $0$

Question No.57

According to Gamow's theory of alpha decay, the relation between disintegration constant $\lambda$, frequency of a-particle collision with the walls $\nu$ and the probability of transmission $P$ in each collision is:

\[ \lambda = \frac{\nu}{P} \]

(A) $P = \lambda \nu$  
(B) $P = \lambda \nu$  
(C) $P = \lambda \nu$  
(D) $P = \lambda \nu$

Question No.58

If the determinant of unitary matrices of order $n$ is $+1$, then the subgroup is denoted by:

\[ SU(n) \]  
\[ \text{or} \]  
\[ \text{or} \]

(A) $SU(n)$ (Chosen option)  
(B) $SU(n)$  
(C) $SU(n)$  
(D) $SU(n)$

Question No.59

Two groups $G$ and $G'$ of same order having one to one correspondence between their elements is called:

(A) Homomorphism  
(B) Isomorphism (Chosen option)  
(C) Automorphism  
(D) None of these

Question No.60

According to Gamow's theory of alpha decay, the relation between disintegration constant $\lambda$, frequency of a-particle collision with the walls $\nu$ and the probability of transmission $P$ in each collision is:

\[ \lambda = \frac{\nu}{P} \]

(A) $P = \lambda \nu$  
(B) $P = \lambda \nu$  
(C) $P = \lambda \nu$  
(D) $P = \lambda \nu$

Select the correct choice for each question.
The expectation value of momentum a particle constrained to move along x-axis in a domain \(0 \leq x \leq L\) with a wave function \(\psi(x) = \sin\left(\frac{n\pi x}{L}\right)\) is:

\[\mathcal{P}_x = \int_{0}^{L} x |\psi(x)|^2 dx\]

(B) \(\bigcirc\) zero (Chosen option)

Question No.62

The internal organization in D RAM is:

- 8 bit wide devices
- 1 bit wide devices
- None of these
- 4 bit wide devices

(B) \(\bigcirc\) 1 bit wide devices

Question No.63

Which of these is a Hamilton's canonical equation of motion?

- None of these
- Any of these
- All of these
- One of these

None of these
Question No. 64

The intensity ratio of Stokes to Anti-Stokes is:

\[ \frac{I_{\text{Stokes}}}{I_{\text{Anti-Stokes}}} = \frac{(v_0 - v_m)^4}{(v_0 + v_m)^4} \exp \left( \frac{\hbar v_m}{kT} \right) \]

(B) \( \frac{\hbar v_m}{kT} \) (Chosen option)

Question No. 65

Three cards are drawn at random from an ordinary pack. Find the chance that they are a king, a queen and a jack.

\( \frac{16}{5525} \) (Chosen option)
**Question No.66**

If the symbols carry their usual meanings, the maximum value of Maxwell’s probability distribution function is:

\[
\left(\frac{m}{h\pi} \right)^{\frac{1}{2}} \]

- (A)
- (B)
- (C)
- (D)

**Answer:** (C)

---

**Question No.67**

__________ philosophy of education considers education as a spiritual need.

- (A) Realism
- (B) Idealism
- (C) Naturalism (Chosen option)
- (D) Pragmatism

**Answer:** (C)

---

**Question No.68**

The experiment which first detects the spin of electron is:

- (A) Michelson - Morley
- (B) Stern and Gerlach (Chosen option)
- (C) Padasalai
- (D) Pragmatism

**Answer:** (B) Stern and Gerlach
Question No. 69

Which instruction is not used for clearing the accumulator?

(C) MOV A, 00H
MOV A, 00H

Question No. 70

Ohm's law relates the electric field \( \vec{E} \), conductivity \( \sigma \) and current density \( \vec{J} \) as:

(D) \( \vec{J} = \sigma \vec{E} \) (Chosen option)

\( \vec{J} = \sigma \vec{E} \)

Question No. 71

If the differential voltage gain and the common mode voltage gain of a differential amplifier are 48 dB and 2 dB respectively then its common mode rejection ratio is:

(A) 24 dB (Chosen option)
24 dB
The wave function of hydrogen like atoms is proportional to $a_0$ is a positive constant:

$$\exp\left(-\frac{r}{a_0}\right)$$

Which one of the following is not a mode of use in computer aided instruction?

(A) Drill and Practice

(B) Test agenda

(C) Author mode

(D) Problem solving
Question No. 78

At a surface at which there is an infinite potential step, the wave function becomes:

(A) $\infty$ $\infty$

Question No. 79

Which of this is the equation of continuity?

(A) $\Delta \rho = \nabla \cdot \mathbf{j}$

(B) $\rho \frac{\partial \mathbf{j}}{\partial t} + \nabla \cdot (\mathbf{j} \rho) = 0$

(C) $\rho \frac{\partial \mathbf{j}}{\partial t} + \nabla \cdot \mathbf{j} = 0$

(D) $\rho \frac{\partial \mathbf{j}}{\partial t} = -\nabla \cdot \mathbf{j}$
If OP-amp is ideal and $V_i$ is triangular wave then $V_o$ will be:

\[
\text{(B) Square wave (Chosen option)}
\]

\[
\begin{align*}
\text{(A) } & \quad \text{Triangular wave} \\
\text{(C) } & \quad \text{Parabolic wave} \\
\text{(D) } & \quad \text{Sine wave}
\end{align*}
\]
Question No.83

Which metal have highest melting point?

(A) Copper (Chosen option)

Question No.84

The energy released in one nuclear fission of $^{235}_9$U is:

(C) 206.7 MeV (Chosen option)

Question No.85

The number $(100101)_2$ is equivalent to octal ________.

(D) $45$ (Chosen option)

Question No.86

The expression for the probability current density for a relativistic particle is:

(C) identical to the corresponding non-relativistic expression (Chosen option)
A superconducting material when placed in a magnetic field will:

(D) repel all the magnetic lines of forces passing through it (Chosen option)

The correct order of different types of energies is:

(D) $E_{el} >> E_{vib} >> E_{rot} >> E_{tr}$ (Chosen option)

Cooper pairs are formed:

(A) at very low temperatures

Two vectors $\vec{x}$ and $\vec{y}$ are said to be orthogonal if

$\vec{x} \cdot \vec{y} = 0$

(B) 0
Question No. 93

Given \( m_p = 1.007876 \text{ amu} \) and \( m_n = 1.008665 \text{ amu} \). Calculate the binding energy of an \( \alpha \)-particle if 1 amu = 931.3 MeV. [Mass of the \( \alpha \)-particle is 4.0028 amu]

\[
\text{Mass of } \alpha \text{-particle} = m_\alpha = 4.0028 \text{ amu}.
\]

(A) 28.29 MeV (Chosen option)

28.29 MeV

Question No. 94

The content of accumulator before CMA instruction is 89 H. Its content after instruction:

CMA தொடர்களுக்கு முன் அக்குல்லன் முதல் குறுக்கு 89 H இருந்து, குறுக்கு வருக்கு பிறகு அக்குல்லன் முதல் குறுக்கு நேர்மாறிக்

(A) 76 H (Chosen option)

76 H
The rank of the given matrix \( A = \begin{bmatrix} 1 & 2 & 3 \\ 2 & 4 & 6 \\ -3 & -6 & -9 \end{bmatrix} \) is:

\[ \begin{align*}
A &= \begin{bmatrix} 1 & 2 & 3 \\ 2 & 4 & 6 \\ -3 & -6 & -9 \end{bmatrix} \\
\text{(D) } 1 \text{ (Chosen option)}
\end{align*} \]

**Question No.96**

The range of the first Brillouin zone of a linear lattice are:

\[ \begin{align*}
&\quad -\pi/a \leq K \leq 0 \\
&\quad 0 \leq K \leq \pi/a
\end{align*} \]

\[ \quad (\text{Closen option}) \]

**Question No.97**

In case same lines are obtained in both infra-red and Raman spectra, then the molecule should have:

\[ \begin{align*}
&\quad \text{no centre of symmetry}
\end{align*} \]

\[ \quad \text{(D) no centre of symmetry} \]

**Question No.98**

The life of an electronic device has a mean of 300 hours and a standard deviation of 25 hours. Assuming normal distribution of life times, find the probability that any one of these devices will have a life time of more than 350 hours.

\[ \begin{align*}
&\quad \text{Assuming normal distribution of life times, find the probability that any one of these devices will have a life time of more than 350 hours.}
\end{align*} \]

\[ \begin{align*}
&\quad \text{Assuming normal distribution of life times, find the probability that any one of these devices will have a life time of more than 350 hours.}
\end{align*} \]
Question No.99

Find the output $Y_1, Y_2$. When $A = 0$, $B = 1$ :

(A) 0 0 (Chosen option)
0.0228

0.0228

(B) 1' (Chosen option)
1'

Question No.100

Dulong - Petit’s law is valid at room temperature for many metals while it fails for light elements such as boron, beryllium because :

(A) the Debye temperature of these elements is very low
(B) the Debye temperature of these elements is very high (Chosen option)

An energy eigen value $E$ is said to be degenerate when :

(A) many eigen functions for one eigen value
(B) one eigen function has many eigen values (Chosen option)
For paramagnetic materials, the relative magnetic permeability $\mu_r$ at room temperature is nearly:

1. (A) $\frac{1}{10}$ (Chosen option)
2. (B) Zero
3. (C) $\frac{1}{10}$

Klein - Gordon equation

$$-\hbar^2 \frac{\partial^2 \psi \left(\vec{r}, t\right)}{\partial t^2} = -\hbar^2 c^2 \nabla^2 \psi \left(\vec{r}, t\right) + m^2 c^4 \psi \left(\vec{r}, t\right)$$

(B) (Chosen option)

Four dice are thrown. What is the probability that the sum of the numbers appearing on the dice is 18?

$$\text{(B) } \frac{1}{18}$$
Question No.106

Magnetic materials having relative permeability < 1 are called _______ materials.

(C) Diamagnetic (Chosen option)

Question No.108

In spherical harmonics, if \( Y_{lm}(\theta, \phi) \) are the eigen functions of \( L^2 \), then the eigen values are:

- (A) \( l(l+1) \)
- (B) \( l(l+1)^2 \)
- (C) \( l(l+1) \) (Chosen option)
- (D) \( 2l(l+1) \)

all options are wrong
\( l(l+1)h \) cross square
The relation between thermodynamical entropy 'S' and statistical entropy 'σ' is : (K - Boltzmann's constant)

\[ S = k \ln \Omega \]

\[ \sigma = \frac{N!}{(N-n)!n!} \]

where \( \Omega \) is the number of microstates, \( N \) is the number of particles, \( n \) is the number of particles in a particular state, and \( k \) is Boltzmann's constant. Therefore, the correct answer is (B).

Question No. 111

1 Bohr magneton is :

(A) \( 5.29 x 10^{-24} \) amp m²

(B) \( 9.27 x 10^{-24} \) amp m² (Chosen option)

(C) \( 2.27 x 10^{-24} \) amp m²

(D) \( 2.27 x 10^{-24} \) amp m²

Question No. 112

The relation between thermodynamical entropy 'S' and statistical entropy 'σ' is : (K - Boltzmann's constant)

\[ S = k \ln \Omega \]

\[ \sigma = \frac{N!}{(N-n)!n!} \]

The correct answer is (B).
(C) $S=K\sigma$ (Chosen option)
$S=K\sigma$

Question No.114
1.00
Bookmark

When a student learns to link 'cat' with 'dog' more easily than 'cat' with 'inch' or 'cat' with 'buckle', then it is an example of __________.

(A) Paired-associate learning
(B) Synchronous learning (Chosen option)
(C) Motivated learning
(D) Physical learning

Question No.115
1.00
Bookmark

__________ principle states that "what was being done in the past in the presence of a set of stimuli will tend to be done next when the stimulus combination occurs".

(A) Recency
(B) Dark 'Ghetto'
(C) Association (Chosen option)
(D) Extinction

Question No.116
1.00
Bookmark

The orthogonality relation satisfied by associated Legendre polynomial in spherical polar co-ordinates takes the form

$$\int_{0}^{\pi} P_{m}^{p}(\cos\theta) P_{m}^{q}(\cos\theta) \sin\theta \, d\theta =$$

What is the orthogonality relation?
Question No.117

According to Lorentz transformation, when an observer S' moves with constant velocity 'v' along positive x axis, his position co-
ordinate is \( x' = \frac{2}{2q + 1} \frac{|q + m|!}{|q - m|!} \delta_{pq} \). What is the expression for \( x' \)?

\[ \frac{x - vt}{\sqrt{1 - \frac{v^2}{c^2}}} \]

(C) \( \frac{x - vt}{\sqrt{1 - \frac{v^2}{c^2}}} \) (Chosen option)

Question No.118

For what combination of atomic number 'Z' and mass number 'A' is the pairing energy 'δ' considered negative in the semi empirical
mass formula?

(A) odd Z, odd N (Chosen option)

Chosen option: odd Z, odd N
Question No.119
Every finite group is isomorphic with a subgroup of _______ group.
(A) permutation (Chosen option)

Question No.120
The normal curve of binomial distribution in terms of standard deviation 'σ' is written as :
(A) y = e−\frac{x^2}{2σ^2}
(B) y = e−\frac{x^2}{σ^2}
(C) y = e−\frac{x^2}{2σ^2}

Question No.121
What is the nature of I in the products of inertia associated with corresponding co-ordinate planes, if
I_{xz} = I_{xz} = -\sum m_i z_i x_i
I_{xz} = I_{xz} = -\sum m_i z_i x_i
(C) symmetric tensor (Chosen option)

(D) asymmetric tensor
Question No.122

In an 8085 microprocessor, the instruction CMP B has been executed while the content of the accumulator is less than that of register B as a result:

8085 - மேல்வரிசைப்பில் இரு கதாபயதி ஏழுக்காலத்தான் மறாவும், முன்னேறும் பிரயாதிக் சுழற்சி B –ன் சுழற்சி குறுக்கம் மிகமுடன் இருந்து, CMP B சோதனை முடுகும் இலவசமாகும்:

(C) ☐ Carry flag will be set but zero flag will be reset (Chosen option)

Question No.123

In NMR spectrum of CH₃CHO the number of lines obtained:

CH₃CHO – உடன் நீர்மக்கவுண்டியில் கண்டுபிடித்து வரிக்கும் விளக்கங்கள்:

(B) ☐ 2 (Chosen option)

Question No.124

The uncertainty in the energy of a system that has a finite life time \( t \) is given by:

\[ h_{\tilde{\tau}} \geq \frac{\hbar}{\tau} \]

\( h_{\tilde{\tau}} \geq \frac{\hbar}{\tau} \)

(B) ☐ \[ \frac{h_{\tilde{\tau}}}{\tau} \] (Chosen option)

Question No.125

Find the unit vector perpendicular to the surface \( x^2+y^2-z^2=11 \) at the point (4, 2, 3).

(4, 2, 3) காட்சியில் பரிசையில், \( x^2+y^2-z^2=11 \) காட்சியில் வரிக்கும் விளக்கம் விளக்கம் நீக்கும் வரிக்கிக்கான:

(A) ☐ \[ \frac{8i + 4j - 6k}{\sqrt{78}} \] (Chosen option)
Question No.126

According to Franck - Condon Principle:

(A) Vibrating molecule does not change its inter-nuclear distance (Chosen option)

(B) Rotating molecule does not change its inter-nuclear distance

(C) Vibrating molecule changes its inter-nuclear distance

(D) Rotating molecule changes its inter-nuclear distance

Question No.128

The probability current density \( \mathbf{s}(\mathbf{r}, t) \) also called flux vector, is represented by:

- real part of \( \left( \frac{\hbar}{im} \nabla \Psi \right) \)

(A) \( \left( \Psi^* \frac{\hbar}{im} \nabla \Psi \right) \) (Chosen option)

(B) \( \left( \Psi^* \frac{\hbar}{im} \nabla \Psi \right) \)
Question No. 129

Evaluate \( \int_{0}^{1} \frac{1}{\sqrt{\log x}} \, dx \) using Gamma function.

\( \frac{1}{\sqrt{\pi}} \) (Chosen option)

Question No. 130

The relation between rotational constant (B) and centrifugal distortion constant (D) is:

(A) \( D = \frac{4B^3}{c^2} \) (Chosen option)
Question No.132

When does Lorentz transformation reduce to Galilean transformation?

- (B) When \( V \ll C \) (Chosen option)
- \( V \ll C \) தரைதிலிருந்து

Question No.133

The proton synchrotron accelerates protons to very high energy of the order of _______ eV.

- (B) billion (Chosen option)

\[ \text{ leased } 0 \text{ eV } - \text{ குடி } \]

Question No.135

The units of magnetic permeability are:

- (B) henry/metre (Chosen option)

\[ \text{ேதாத } \text{ெஹற}/\text{மீட} \]
Question No.137

Strength of which magnet can be changed?
(A) Electromagnet (Chosen option)

(D) Bar magnet

Question No.138

A problem in Physics is given to three students A, B and C whose chances of solving it are $\frac{1}{2}$, $\frac{1}{3}$ and $\frac{1}{4}$ respectively.

What is the probability that the problem is solved?

(A) $\frac{1}{2}$

(C) $\frac{3}{4}$ (Chosen option)

(D) $\frac{3}{4}$
Question No.140

Two nuclei having same number of nucleons but the number of protons in one of them is equal to the number of ________ in the other are called mirror nuclei.

(C) neutrons (Chosen option)

Question No.141

A circular coil having 50 turns has a radius of 0.1 m. What is the magnetic induction at the centre of coil when a current of 0.1A flows in it?

0.1 m, 50 turns, 50 turns
(A) $3.14 \times 10^{-5}$ Tesla
(B) $2.14 \times 10^{-5}$ Tesla

Question No.142

If the total number of nucleons in a nucleus is 'A', then the surface effect reduces its binding energy, by a factor directly proportional to:

$\frac{A}{2}$

(B) $\frac{A}{2}$

Question No.143

The divergence of magnetic vector potential $\mathbf{A}$ is given by $\nabla \cdot \mathbf{A}$. In the nuclear reactor $A = \ldots$ and the magnetic field $A = \ldots$
Question No.144

Under the Constitution of India, which one of the following is not a Fundamental Duty?

(A) To develop the scientific temper

(B) To abide by the Constitution and respect its ideals

(C) To safeguard public property

(D) To vote in Public Elections

Chosen option: (C)

Question No.145

If ‘r’ is coefficient of correlation and ‘N’ is the total number of observations. Then standard error is defined as:

(A) $\frac{1 - r^2}{\sqrt{N}}$

(B) $\frac{1 - r^2}{N}$

(C) $\frac{1 - r^2}{\sqrt{N}}$

(D) $\frac{1 - r^2}{N}$

Chosen option: (D)
Question No.147

For copper, the resultant spin in Bohr magneton is:

\[ \text{(A)} \ 3 \] 

\[ \text{(B)} \ 2 \] 

\[ \text{(C)} \ 0 \] 

\[ \text{(D)} \ 1 \] 

(C) 0 (Chosen option)

Question No.148

The Hermite polynomial of degree n, for n being a positive integer is:

\[ n \ \text{th} \ \text{Hermite polynomial is} \]

\[ \text{Chosen option} \]

\[ 0 \]
Question No.149

The coherence length of the paired electrons is:

- (A) 0.25 nm
- (B) 250 nm
- (C) 0.001 nm
- (D) 0.01 nm

Chosen option: (B) 0.25 nm

Question No.150

Perturbation method can be applied to:

- (A) All problems (systems)
- (B) When the perturbation is small and the ground state properties are known
- (C) When the perturbation is small and the ground state properties are not known
- (D) Systems with large perturbation

Chosen option: (B) When the perturbation is small and the ground state properties are known