4. ELECTROMAGNETIC RADIATION

SOLUTIONS

TEACHING TASK

1. Which of the following statements is not correct regarding electromagnetic spectrum?
   A) The velocity of X-rays is more than that of microwaves
   B) Infra-red radiations have larger wavelength than cosmic rays
   C) The frequency of microwaves is less than that of ultra - violet rays
   D) X-rays have larger wave number than micro waves

Answer:A

Solution:All electromagnetic waves (X-rays, microwaves, etc.) travel at the same speed (speed of light, c) in a vacuum.

2. Which type of radiation is not emitted by the electronic structure of atoms :
   A) Ultraviolet light B) X-rays C) Visible light D) g-rays

Answer:D

Solution: γ-rays are emitted from the nucleus, not electron transitions.

3. The increasing order of energy of electromagnetic radiation can be represented as
   A) microwave < infrared < visible < X-ray
   B) X-ray < visible < infrared < microwave
   C) microwave < infrared < visible < radiowaves
   D) X-ray < infrared < visible < microwave

Answer:A

Solution:Energy order: Radio $\rightarrow$ Microwave $\rightarrow$IR $\rightarrow$ Visible $\rightarrow$ UV $\rightarrow$ X-ray $\rightarrow$ γ-rays.

4. If λ_1 and λ_2 are the wavelength of characteristic X-rays and gamma rays respectively, then the relation between them is

   A) $\lambda_1 = \frac{1}{\lambda_2}$ B) $\lambda_1 = \lambda_2$ C) $\lambda_1 > \lambda_2$ D) $\lambda_1 < \lambda_2$

Answer:C

Solution:X-rays have longer wavelengths than γ-rays (higher energy = shorter).

5. Neon gas emits at 616 nm. The distance travelled by this radiaton in 30 sec is.

   A) $9\times10^{7}m$ B) $9\times10^{9}m$ C) $4.5\times10^{9}m$ D) $7\times10^{9}m$

Answer:B

Solution:Distance=C X t =3 x10 ^{8} x30=9 x 10 ^{9}

6. Which of the following statements is incorrect?
   A) Particle nature of radiations can be experimentally demonstrated by Compton effect
   B) Wave nature of electrons can be experimentally demonstrated by diffraction experiment
   C) distance travelled by one wave in one second is equal to velocity
   D) Intensity of light is directly proportional to its frequency.

Answer:D

Solution:Intensity depends on amplitude (number of photons), not frequency.

7. Electromagnetic radiatiations of frequency 'v' consists of a stream of energy packets. Which of the following statements is / are true about energy packets :
   A) as the frequency increases, the number of energy packets in the beam increases.
   B) as the intensity of light increases ' the number of energy packets in the beam increases.
   C) the number of energy packets in the beam are dependent of frequency
   D) the number of energy packets in the beam are independent of the intensity of light.

Answer:B

Solution:Intensity α Number of photons (packets).
Frequency determines energy per photon ($E=h\upsilon$), not the number.

8. Which of the following statement is true
   A) γ – rays, cosmic rays, cathode rays are electromagnetic radiation
   B) All electromagnetic radiations travel with different velocities.
   C) Electromagnetic waves do not require any medium and can travel in vaccum
   D) All are correct

Answer:C

Solution:EM waves (e.g., light, X-rays) propagate without a medium.

9. Which of the following statements are not correct about frequency
   A) Distance travelled by one wave in one second = hv
   B) Relation between Frequency and Wavelength = $\nu \alpha \frac{1}{\lambda}$
   C) Expressed in terms of cycles (or waves) per second (cps) or hertz (Hz) or cm^{-1}
   D) number of waves which pass through a point in one second

Answer:A

Solution:Distance travelled in one second = wavelength (λ), not $h\upsilon$.

10. Electromagnetic radiation, which of the following has greater wavelength than visible light
    A) U.V rays B) I.R rays C) Gamma rays D) X-rays

Answer:B

Solution:Wavelength order: Radio > Microwave > IR > Visible > UV > X-ray > γ – ray.

11. Which of the following statement is incorrect
    i) The height of crest or depth of trough is called the wavelength
    ii) Amplitude determines the intensity of the radiation.
    iii) Wave number is the number of wave lengths per meter
    A) only iii B) ii and iii C) i and iii D) only i

Answer:D

Solution:The height of crest/depth of trough is called the amplitude (not wavelength).

12. Which of the following relation is correct
    A) $1cm = 10^8\ \mathring{A} = 10^4\ \mu = 10^7\ nm$ B) $1\mathring{A} = 10^{-8}\ cm = 10^{-10}\ m$
    C) $1\mu = 10^{-4}\ cm = 10^{-6}\ m$ D) All are correct

Answer:D

Solution:1 cm = 10^{-2} m

1 Å (angstrom) = 10^{-10} m = 10^{-8} cm
1 μm (micrometer) = 10^{-6} m = 10^{-4} cm
1 nm (nanometer) = 10^{-9} m = 10^{-7} cm
1 μm = 10^{3} nm

MULTIPLE CORRECT ANSWER TYPE

13. The incorrect relation (s) about the velocity of charged particle in electromagnetic radiation is (are)
    A) dependent on its wavelength
    B) Depend on its intensity C) equal to cube of its ampliture
    D) independent of its wavelength

Answer:A,B,C

Solution:The velocity of electromagnetic radiation (light) is constant ($c=3\times10^{8}$m/s) in a vacuum and does not depend on:Wavelength ,Intensity,Amplitude.

14. In a hydrogen like sample two different types of photons A and B are produced by electronic transition. Photon B has it's wavelength in infrared region if photon A has more energy than B, then the photon A may belong to the region.
    A) ultraviolet B) visible C) infrared D) None of these

Answer:A,B

Solution:Infrared (Photon B) has lower energy than visible and UV light.
Since Photon A has higher energy, it could be:
Ultraviolet (higher energy than visible/IR).
Visible (higher energy than IR but lower than UV).
Infrared (C) is incorrect (Photon A cannot be lower energy than B).

15. Which of the following sets of phenomena shown by radiation proves its dual nature ?
    A) Interference and diffraction
    B) Scintillation and interference
    C) Interference and photoelectric effect
    D) Diffraction and photoelectric effect

Answer:C,D

Solution: Wave nature is shown by:
Interference (e.g., double-slit experiment).
Diffraction (bending around obstacles).
Particle nature is shown by:
Photoelectric effect (photon energy $E=h\upsilon$).
Correct combinations:
C) Interference (wave) + Photoelectric effect (particle).
D) Diffraction (wave) + Photoelectric effect (particle).
Incorrect options:
A) Only wave nature (no particle evidence).
B) Scintillation is unrelated to wave-particle duality.

STATEMENT TYPE

A) Both statement I and II are correct and statement II is correct explanation of statement I.
B) Both statement I and II are correct and statement II is not correct explanation of statement I.

C) Statement I is correct and statement II is incorrect.

D) Statement I is incorrect and statement II is correct.

16 Statement I : The energy of ultraviolet radiation is greater than the energy of infrared radiation

Statement II : The velocity of ultraviolet radiation is greater than the velocity of infrared radiation.

Answer:C

Solution:Statement I is correct: UV radiation has higher energy than IR because $E=h\upsilon$ (energy α frequency), and UV has a higher frequency.

Statement II is incorrect: All electromagnetic waves (UV, IR, etc.) travel at the same speed

17 Statement I : VIBGYOR signifies the seven colour of visible light.

Statement II: Red colour corresponds to higher frequency and blue colour to lower frequency region.

Answer:C

Solution:Statement I is correct: VIBGYOR (Violet, Indigo, Blue, Green, Yellow, Orange, Red) represents the visible spectrum.

Statement II is incorrect:

Red has the lowest frequency (and longest wavelength).

Violet/Blue has the highest frequency (and shortest wavelength).

COMPREHENSION TYPE

COMPREHENSION-I

The frequency (ν), wavelength (λ) and velocity of light (c) are related by the equations $c = \nu\lambda$. The other commonly used quantity specially in spectroscopy is the wavenumber ($\bar{\nu}$).

18. Which of the following relations are correct?

A) Frequency × wavelength = Velocity of light B) $\bar{\nu} = \frac{1}{\lambda}$

C) $\lambda = \frac{c}{\nu}$ D) All of these

Answer:D

Solution:all options A, B, and C are correct,

19. The wave number of a radiation is 97540 cm^{-1}. Calculate its frequency.

A) $2.926 \times 10^{10} s^{-1}$ B) $2.926 \times 10^{15} s^{-1}$ 3C) $2.926 \times 10^{2} s^{-1}$ D) $2.926 \times 10^{20} s^{-1}$

Answer:B

Solution:Convert wave number to wavelength

$$\lambda = \frac{1}{\bar{\upsilon}} = \frac{1}{97540 cm^{-1}} = 1.025 \times 10^{-5} cm = 1.025 \times 10^{-7} m$$

Calculate frequency : $\upsilon = \frac{c}{\lambda} = \frac{3 \times 10^{8} m/s}{1.025 \times 10^{-7} m} = 2.926 \times 10^{15} s^{-1}$

COMPREHENSION-II

Light and other forms of radiant energy propagate without any medium in the space in the form of waves are known as *electromagnetic radiations*. These waves can be produced by a charged body moving in a magnetic field or a magnet in a electric field. e.g. γ – rays, cosmic rays, ordinary light rays etc.The arrangement of different electromagnetic radiations in the order of increasing wavelength or frequency is known as electromagnetic spectrum.

20. Which of the following is the correct Arrangement of the radiations in increasing order of wavelength

A) X-ray < infrared < visible < microwave

B) Microwave < Visibe < γ – rays < X-rays

C) X-rays < γ – rays < Radio waves < Microwave

D) γ – rays < infrared < Microwave < Radio waves

Answer:D

Solution:Standard Wavelength Order (increasing):"Gamma rays < X-rays < Ultraviolet < Visible < Infrared < Microwaves < Radio waves""

INTEGER TYPE

21. The frequency of a radiation having a wave number of $2\times10^{14}\,cm^{-1}$ will be $x\times10^{24}\,s^{-1}$. Then the value of x is _____

Answer:6

Solution:Given wave number of $2\times10^{14}\,cm^{-1}$,Freuency= $x\times10^{24}\,s^{-1}$.

$$\lambda=\frac{1}{\bar{\upsilon}}=\frac{1}{2\times10^{5}\,cm^{-1}}=5\times10^{-6}\,cm$$

Convert cm to meters (since the speed of light is in m/s): $\lambda=5\times10^{-6}\,cm=5\times10^{-8}\,m$

$$\upsilon=\frac{c}{\lambda}=\frac{3\times10^{8}\,m/s}{5\times10^{-8}\,m}=6\times10^{15}\,s^{-1}$$

x=6

22. Distance travelled by a wave in 10 sec. is 50m. If frequency of wave is 2 KHz then its wave length is____X 10^{-2}

Answer:25

Solution:

$$Velocity=\frac{Dis\tan ce}{Time}=\frac{50}{10}=5m/s$$

$$\lambda=\frac{velocity}{\upsilon}=\frac{5m/s}{2000Hz}=2.5\times10^{-3}m=25\times10^{-2}cm$$

23. 1 nano meter is _____ A^0

Answer:10

Solution:

$$1nm=10^{-9}m$$

$$1A^0=10^{-10}m$$

$$1nm=\frac{10^{-9}m}{10^{-10}m}=10A^0$$

24. 1 micro meter is = 1×10^{x} picometers, then the value of "x" is

Answer:6

Solution:

$1\mu m = 10^{-6} m$

$1pm = 10^{-12} m$

$1\mu m = \frac{10^{-6} m}{10^{-12} m / pm} = 10^{6} pm$

MATRIX MATCHING TYPE

25.

List - I	**List - II**
A) Ratio of Velocity of light and Frequency	1) Velocity of light
B) Product of Frequency and wavelength	2) Wave number
C) Ratio of Velocity of light and Wavelength	3) Wavelength
D) Ratio of Frequency and Velocity of light	4) Frequency

The correct match is

	A	**B**	**C**	**D**		**A**	**B**	**C**	**D**
A)	3	2	1	4	B)	3	1	2	4
C)	2	4	1	3	D)	3	1	4	2

Answer:D

Solution:

A) Ratio of Velocity of light and Frequency	3) Wavelength
B) Product of Frequency and wavelength	1) Velocity of light
C) Ratio of Velocity of light and Wavelength	4) Frequency
D) Ratio of Frequency and Velocity of light	2) Wave number

A) $\frac{c}{\nu} = \lambda \rightarrow$ Wavelength (3)

B) $\nu \times \lambda = c \rightarrow$ Velocity of light (1)

C) $\frac{c}{\lambda} = \nu \rightarrow$ Frequency (4)

D) $\frac{\nu}{c} = \frac{1}{\lambda} \rightarrow$ Wave number (2)

LEARNERS TASK

CONCEPTUAL UNDERSTANDING QUESTIONS (CUQ's)

1. All types of electromagnetic radiations possess same

A) Wave length B) Frequency

C)Energy D) Velocity when they passed through vacuum

Answer:D

Solution:All EM waves (radio, X-rays, visible light, etc.) travel at the speed of light

2. The radiation with highest wave number

A) Micro waves B) X–rays C) I.R.Radiations D) Radiowaves

Answer:B

Solution:: Wave number $\bar{\upsilon} = \frac{1}{\lambda}$

X-rays have the shortest wavelength (λ) $\rightarrow$ highest wave number.

Microwaves and radio waves have long wavelengths (low wave numbers)

3. The electromagnetic radiations are,

a) Visible light B) IR light C) UV light D) Micro waves

The correct order of increasing energy from lowest to highest is

A) $a > b > c > d$ B) $a < b < c < d$ C) $d < b < a < c$ D) $b < c < d < a$

Answer:C

Solution:The increasing order of energy for the given electromagnetic radiations is: Microwaves (d) < Infrared (b) < Visible light (a) < Ultraviolet (c)

4. Identify the incorrectly matched set from the following

list I	**list II**
A) Wavelength	Nanometers
B) Frequency	Hertz
C) Wavenumber	m^{-1}
D) Velocity	ergs

Answer:D

Solution:Velocity is measured in m/s (not ergs, which is a unit of energy).

5. The product of which of the following is equal to the velocity of light

A) Wave length and wave number B) Wave length and frequency

C) Frequency and wave number D) Wave length and amplitude

Answer:B

Solution: $c = \lambda \times \upsilon$

6. The frequency of a wave light is $1.0 \times 10^6\ sec^{-1}$. The wave length for this wave is

A) 3×10^4 cm B) 3×10^{-4} cm C) 6×10^4 cm D) 6×10^6 cm

Answer:A

Solution: $\lambda = \frac{c}{\upsilon}$

$$\lambda = \frac{3 \times 10^{10}}{10^6} = 3 \times 10^4$$

7. If the wavelength of green light is about $5000A^0$, then the frequency of its wave is

A) $16 \times 10^{14}\ sec^{-1}$ B) $16 \times 10^{-14}\ sec^{-1}$ C) $6 \times 10^{14}\ sec^{-1}$ D) $6 \times 10^{-14}\ sec^{-1}$

Answer:C

Solution: $\lambda = 5000A^0 = 5000 \times 10^{-10} m = 5 \times 10^{-7} m$

$$\upsilon = \frac{c}{\lambda} = \frac{3 \times 10^8 m/s}{5 \times 10^{-7} m} = 6 \times 10^{14} s^{-1}$$

8. Which of the following properties of a wave is independent of the other?

A) Wave number B) Wave length C) Frequency D) Amplitude

Answer:D

Solution:Amplitude (intensity) is unrelated to wavelength,frequency or wave number.

9. The wave length of light having wave number 4000 cm^{-1} is

A) 2.5μm B) 250μm C) 25μm D) 25nm

Answer:A

Solution: $\lambda = \frac{1}{\bar{\upsilon}} = \frac{1}{4000 cm^{-1}} = 2.5 \times 10^{-4} cm = 2.5 \mu m$

10. Which of the following is not an electromagnetic radiation?
A) Gamma rays B) Alpha rays C) Radio waves D) X-rays

Answer:B

Solution:Alpha rays are helium nuclei (particles), not EM waves.
Others (gamma, radio, X-rays) are EM radiations.

JEE MAIN LEVEL QUESTIONS

1 Calculate the wave-number of lines having the frequency of 5×10^{16} cycles per sec.
A) 1.666×10^{8} m^{-1} B) 0.666×10^{8} m^{-1}
C) 4.126×10^{6} m^{-1} D) 3.133×10^{4} m^{-1}

Answer:A

Solution: $\lambda = \frac{c}{\upsilon} = \frac{3 \times 10^{8} m/s}{5 \times 10^{16}} = 6 \times 10^{-9} s^{-1}$

$\bar{\upsilon} = \frac{1}{\lambda} = \frac{1}{6 \times 10^{-9} s^{-1}} = 1.66 \times 10^{8}$

2. The frequency of line spectrum of sodium is 5.09×10^{14} sec^{-1}. Its wave length (in nm) will be – [c = 3×10^{8} m/sec]
A) 510 nm B) 420 nm C) 589 nm D) 622 nm

Answer:C

Solution: $\lambda = \frac{c}{\upsilon} = \frac{3 \times 10^{8} m/s}{5.09 \times 10^{14}} = 5.89 \times 10^{-7} m = 589 nm$

3. Frequency ratio between violet (400 nm) and red (750 nm) radiations in the visible spectrum, is-
A) 8/15 B) 4/15 C) 15/8 D) None of these

Answer:C

Solution: $\lambda = \frac{c}{\upsilon}$

$\frac{\upsilon_{violet}}{\upsilon_{red}} = \frac{\lambda_{red}}{\lambda_{violet}} = \frac{750 nm}{400 nm} = \frac{15}{8}$

4. The time period of a light is $2.0 \times 10^{-10} s$. The wavelength for this wave is
A) 0.06m B) 6m C) 0.03m D) 0.3m

Answer:A

Solution: $\upsilon = \frac{1}{T} = \frac{1}{2 \times 10^{-10} s} = 5 \times 10^{9} Hz$

$$\lambda = \frac{c}{\upsilon} = \frac{3\times10^{8} m/s}{5\times10^{9}} = 0.06m$$

5. The wavelengths of two radiations are 200 & 300nm respectively. Then identify the correct statement

LIST - A	LIST - B
I) Ratio of their frequency	a) 1 : 1
II) Ratio of their velocity	b) 3 : 2
III) Ratio of their wave number	c) 2 : 9

A) I– c, II– a, III – b B) I – b, II – a, III – b
C) I – b, II – a, IIII – c D) I – b, II – a, III – a

Answer:B

Solution:I) Ratio of their frequency

$$\frac{\upsilon_1}{\upsilon_2} = \frac{\lambda_2}{\lambda_1} = \frac{300nm}{200nm} = \frac{3}{2}$$

II)Velocity ratio (II):All EM waves have the same velocity (c) in vacuum =1:1
III) Ratio of their wave number

$$\frac{\bar{\upsilon}_1}{\bar{\upsilon}_2} = \frac{\lambda_2}{\lambda_1} = \frac{300nm}{200nm} = \frac{3}{2}$$

6 Which of the following properties of a wave is independent of the other?
A) Wave number B) Wave length C) Frequency D) Amplitude

Answer:D

Solution:Amplitude determines the intensity/brightness of the wave but is independent of wavelength,wave number and frequency.

7. Human eye can detect only the radiations which fall in the visible region. Which of the following statement is/are correct about visible spectrum?

a) It consists of White light only b) Violet radiation have longer frequency
c) Red radiation have longer wavelength d) Violet radiation have shorter wavelength
A) Only a is correct B) Only a,b statements are correct
C) b,c,d are correct D) a,b,c,d are correct

Answer:C

Solution:a) Incorrect: Visible light consists of VIBGYOR (violet to red), not just white light (which is a mixture of all colors).
b) Correct: Violet has the highest frequency (and shortest wavelength) in the visible spectrum.
c) Correct: Red has the longest wavelength (and lowest frequency).
d) Correct: Violet has the shortest wavelength (as stated in b).

8. Which of the following is the correct match with Electromagnetic spectrum,

frequency,wavelength and Source

1. Visible - Frequency - 1 x 10^5 -1 x 10^9 - Electric bulbs, sun rays
2. *X*-Rays - Wavelength in A^0 - $150-0.1$ - radioactive decay
3. γ – Rays - Frequency - $3\times10^{19}-3\times10^{20}$ - radioactive decay

D)Infrared (IR) - Wavelength in A^0- 6 x 10^6 - 7600- Incandescent objects

Answer:D

Solution:Infrared (IR):

This portion of the electromagnetic spectrum has a longer wavelength compared to visible light and is associated with heat radiation from objects like warm bodies or burning objects.

ADVANCED LEVEL QUESTIONS

MULTIPLE CORRECT ANSWER TYPE

9. Which of the following relates to light as wave motion

A) Diffraction B) Interference C) Photo electric effect D) $E = mc^2$

Answer:A,B

Solution:Diffraction and interference are phenomena that demonstrate the wave-like nature of light, where waves bend around obstacles or overlap to create specific patterns.

10. Electromagnetic radiatiations of frequency 'v' consists of a stream of particles called photons. Which of the following statements is / are true about photons :

A) as the frequency increases, the number of photons in the beam increases.

B) as the intensity of light increases ' the number of photons in the beam increases.

C) the number of photons in the beam are independent of frequency

D) the number of photons in the beam are independent of the intensity of light.

Answer:B,C

Solution:

Energy per photon: $E=h\upsilon$ (depends on frequency).

Intensity: Total energy = Number of photons × Energy per photon.

Higher intensity → More photons (B is correct).

Number of photons does not depend on frequency

STATEMENT TYPE

A) Both statement I and II are correct and statement II is correct explanation of statement I.

B) Both statement I and II are correct and statement II is not correct explanation of statement I.

C) Statement I is correct and statement II is incorrect.

D) Statement I is incorrect and statement II is correct.

11. **Statement I**: Electromagnetic radiations around 10^{15} Hz are called as visible light.
Statement II: This is the only part of electromagnetic radiation which is visible to eyes.

Answer:A

Solution:The range of electromagnetic frequencies around 10^{15} Hz corresponds to visible light.Visible light is indeed the only part of the EM spectrum detectable by the human eye.

COMPREHENSION TYPE

COMPREHENSION-I

The frequency (ν), wavelength (λ) and velocity of light (c) are related by the equations $c = \nu\lambda$. The other commonly used quantity specially in spectroscopy is the wavenumber ($\bar{\nu}$).

12. Light or any electro magnetic radiation travels in vaccum or air with a speed of :
A) 3×10^8 m/s B) 3×10^2 m/s C) 2×10^8 m/s D) 1×10^8 m/s

Answer:A

Solution:Light or any electro magnetic radiation travels in vaccum or air with a speed of 3×10^8 m/s

COMPREHENSION-II

Light and other forms of radiant energy propagate without any medium in the space in the form of waves are known as *electromagnetic radiations*. These waves can be produced by a charged body moving in a magnetic field or a magnet in a electric field. e.g. γ – rays, cosmic rays, ordinary light rays etc.The arrangement of different electromagnetic radiations in the order of increasing wavelength or frequency is known as electromagnetic spectrum.

13. Which of the following statement is correct
A) Lamps with mercury vapours produces IR rays
B) Radio waves are produced from alternate current of low frequency
C) X- rays are produced by striking metal plate with Alpha rays D) All are incorrect

Answer:B

Solution: Radio waves are produced by low-frequency alternating currents (typically in antennas). These are usually frequencies from a few kHz up to GHz range.

14. If the wavelength of X-Rays is $2\times10^{-14}cm$, then wave length of Infrared rays is equal to

A) $5\times10^{-12}cm$ B) $8\times10^{-15}cm$ C) $15\times10^{-18}cm$ D) $25\times10^{-18}cm$

Answer:A

Solution:Infrared rays have much longer wavelengths than X-rays.““So, the wavelength of infrared must be much larger than $2\times10^{-14}cm$

$5\times10^{-12}cm > 2\times10^{-14}cm$

INTEGER TYPE

15. If the Radiowave is having a frequency of 6000 Hz and Microwave of frequency 2000 Hz, then how many times the frequency of Microwaves is greater than frequency of Radiwave

Answer:3

Solution: $\text{Ratio} = \frac{f_{\text{radio}}}{f_{\text{micro}}} = \frac{6000}{2000} = 3$

MATRIX MATCHING TYPE

16. List - I **List - II**

I) Wave number a) ms^{-1}

II) Frequency b) nm

III) Wavelength c) s^{-1}

IV) Velocity d) m^{-1}

The correct match is

	I	II	III	IV		I	II	III	IV
A)	a	b	c	d	B)	d	c	b	a
C)	b	c	d	a	D)	c	d	b	a

Answer:B

Solution:

I) Wave number d) m^{-1}

II) Frequency c) s^{-1}

III) Wavelength b) nm

IV) Velocity a) ms^{-1}

KEY

Teaching Task

1	2	3	4	5	6	7	8	9	10
A	D	A	C	B	D	B	C	A	B
11	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**
D	D	ABC	AB	CD	C	C	D	B	D
21	**22**	**23**	**24**	**25**					
6	25	10	6	D					

Learners Task

CONCEPTUAL UNDERSTANDING QUESTIONS (CUQ's)

1	2	3	4	5	6	7	8	9	10
D	B	C	D	B	A	C	D	A	B

JEE MAIN AND ADVANCED LEVEL

1	2	3	4	5	6	7	8	9	10
A	C	C	A	B	D	C	D	AB	BC
11	**12**	**13**	**14**	**15**	**16**				
A	A	B	A	3	B				