P13-17

Resonance®
Educating for better tomorrow

Code
0

ADVANCED PATTERN PART TEST-5(APT-5)

TARGET : JEE (MAIN+ADVANCED) 2018

SUBJECT : PHYSICS COURSE : VIJAY (01JR)

Date : 11-02-2018 **Time: 2 Hours** **Maximum Marks : 160**

Please read the instructions carefully. You are allotted 5 minutes specifically for this purpose.

GENERAL :

1. The sealed booklet is your Question Paper. Do not break the seal till you are instructed to do so.
2. The question paper CODE is printed on the right hand top corner of this sheet.
3. Use the Optical Response Sheet (ORS) provided separately for answering the question.
4. Blank spaces are provided within this booklet for rough work.
5. Write your Name and Roll Number in the space provided on the below cover.
6. After the open booklet, verify that the booklet contains all the **40** questions along with the options are legible.

QUESTION PAPER FORMAT AND MARKING SCHEME :

7. This questions paper consists of **Two sections**.
8. Each section as detailed in the following table :

Section	Question Type	Number of Questions	Category-wise Marks for Each Question				Maximum Marks of the Section
			Full Marks	Partial Marks	Zero Marks	Negative Marks	
1	One or More Correct Option(s)	20	+4 If only the bubble(s) corresponding to all the correct option(s) is(are) darkened	+1 For darkening a bubble corresponding to each correct option, provided NO incorrect option is darkened	0 If none of the bubbles is darkened	–2 In all other cases	80
2	Comprehension (One or More Correct Option(s))	20	+4 If only the bubble(s) corresponding to all the correct option(s) is(are) darkened	–	0 If none of the bubbles is darkened	–2 In all other cases	80

OPTICAL RESPONSE SHEET :

9. Darken the appropriate bubbles on the original by applying sufficient pressure.
10. The original is machine-gradable and will be collected by the invigilator at the end of the examination.
11. Do not tamper with or mutilate the ORS.
12. Write your name, roll number and the name of the examination centre and sign with pen in the space provided for this purpose on the original. **Do not write any of these details anywhere else**. Darken the appropriate bubble under each digit of your roll number.

DARKENING THE BUBBLES ON THE ORS :

13. Use a **BLACK BALL POINT** to darken the bubbles in the upper sheet.
14. Darken the bubble **COMPLETELY.**
15. Darken the bubble **ONLY** if you are sure of the answer.
16. The correct way of darkening a bubble is as shown here : ●
17. There is **NO** way to erase or "un-darkened bubble.
18. The marking scheme given at the beginning of each section gives details of how darkened and **not darkened** bubbles are evaluated.

NAME OF THE CANDIDATE : ……………………………………………………………………………………………

ROLL NO. : ……………………………………………………

I have read all the instructions and shall abide by them

I have verified the identity, name and roll number of the candidate.

- -
Signature of the Candidate

- -
Signature of the Invigilator

DO NOT BREAK THE SEAL WITHOUT BEING INSTRUCTED TO DO SO BY THE INVIGILATOR

Resonance Eduventures Ltd.

CORPORATE OFFICE : CG Tower, A-46 & 52, IPIA, Near City Mall, Jhalawar Road, Kota (Raj.) - 324005

Ph.No. : +91-744-3012222, 6635555 **| Toll Free :** 1800 258 5555

Reg. Office : J-2, Jawahar Nagar, Main Road, Kota (Raj.) 324005 **| Ph. No.:** +91-744-3192222 **| FAX No. :** +91-022-39167222

Website : www.resonance.ac.in **| E-mail :** contact@resonance.ac.in | **CIN:** U80302RJ2007PLC024029

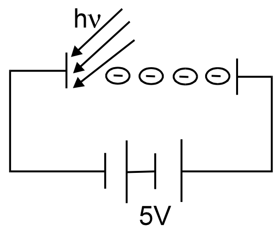
SECTION – 1: (Maximum Marks : 80)

- This section contains **TWENTY** questions
- Each question has **FOUR** options (A), (B), (C) and (D). **ONE OR MORE THAN ONE** of these four option(s) is(are) correct
- For each question, darken the bubble(s) corresponding to all the correct option(s) in the ORS
- For each question, marks will be awarded in one of the following categories :

Full Marks	:	+4	If only the bubble(s) corresponding to all the correct option(s) is(are) darkened.
Partial Marks	:	+1	For darkening a bubble corresponding to **each correct option,** provided NO incorrect option is darkened.
Zero Marks	:	0	If none of the bubbles is darkened.
Negative Marks	:	–2	In all other cases.

- For example, if (A), (C) and (D) are all the correct options for a question, darkening all these three will result in +4 marks ; darkening only (A) and (D) will result in +2 marks and darkening (A) and (B) will result in –2 marks, as a wrong option is also darkened.

1. Photons of energy 5 eV are incident on cathode. Electrons reaching the anode have kinetic energies varying from 5eV to 8eV.



(A) Work function of the metal is 2 eV
(B) Work function of the metal is 3 eV
(C) Current in the circuit is equal to saturation value.
(D) Current in the circuit is less than saturation value.

Space for Rough Work

2. An electron makes a transition from n = 2 to n = 1 state in a hydrogen like atom.

(A) magnetic field at the site of nucleus decreases by 16 times.

(B) magnetic field at the site of nucleus increases by 32 times

(C) angular momentum of electron will change

(D) none of these

3. X-ray from a tube with a target A of atomic number Z shows strong K_α lines for target A and two weak K_α lines for impurities. The wavelength of K_α lines is λ_0 for target A and λ_1 and λ_2 for two impurities respectively. $\frac{\lambda_0}{\lambda_1} = 4$ and $\frac{\lambda_0}{\lambda_2} = \frac{1}{4}$. The screening constant of K_α lines is unity. Select the correct alternative(s) :

(A) The atomic number of first impurity is 2Z – 1

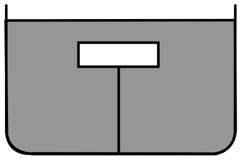
(B) The atomic number of first impurity is 2Z + 1

(C) The atomic number of second impurity is $\frac{Z+1}{2}$

(D) The atomic number of second impurity is $\frac{Z}{2} + 1$

Space for Rough Work

4. A string is holding a solid block below the surface of the liquid as shown in figure. If the system is given an upward acceleration a, then as compared to previous state.



(A) Tension is string will be $\left(1+\frac{a}{g}\right)$ times

(B) Tension in string will be $\left(1-\frac{a}{g}\right)$ times

(C) Upthrust force on block become $\left(1+\frac{a}{g}\right)$ times

(D) Upthrust force on block becomes $\left(1-\frac{a}{g}\right)$ times

Space for Rough Work

5. Two radioactive materials A & B have decay constant 3λ and 2λ respectively. At t = 0, the numbers of nuclei of A and B are $4N_0$ and $2N_0$ respectively, then

(A) Their number of radioactive nuclei will be equal at $t = \frac{\ell n2}{\lambda}$

(B) Their decay rate will be equals at $t = \frac{\ell n4}{\lambda}$

(C) Their decay rate will be equal at $t = \frac{\ell n3}{\lambda}$

(D) At $t = \frac{\ell n4}{\lambda}$ the decay rate of A will be greater than that of B.

6. A container of large uniform cross sectional area A resting on a horizontal surface holds two immiscible non-viscous and incompressible liquids of density d and 3d each of height H/2. The lower density liquid is open to the atmosphere having pressure P_o. A tiny hole of area a (a<<A) is punched on the vertical side of the container at a height of h (0 < h < H/2) from the bottom of container for which range is maximum.

(A) h = H/3

(B) Range $R = \frac{2H}{3}$

(C) Range $R = \frac{3H}{2}$

(D) Velocity of efflux $v = \sqrt{\frac{2}{3}gH}$

7. In a radioactive decay reaction :

$$A \xrightarrow[2\lambda]{} B \xrightarrow[9\lambda]{} C$$

Select correct alternative/s at the instant the number of the particles of B is maximum :

(A) Activity of A is equal to activity of B

(B) No of atoms of A is 4.5 times of B

(C) Activity of A is more then activity of B

(D) Activity of A is minimum

Space for Rough Work

8. A fusion reaction consists of combining four protons into an α–particle. The mass of He atom is 4.002603u and that of proton is 1.007825u

(A) the equation $4p_1^1 \rightarrow He_2^4$ does not satisfy conservation of charge

(B) the correct reaction equation may be $4p_1^1 \rightarrow He_2^4 + 2\beta^+ + 2\upsilon$ where β^+ is positron and υ is the neutrino (negligible rest mass and uncharged)

(C) loss of mass of the reaction is 0.028697 u

(D) the energy equivalent of the mass defect is 26.7 MeV

9. In an α decay the parent nucleus X^{200} decays into daughter nucleus Y.

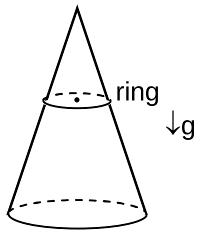
(A) The mass number of Y is less than that of X by 4.

(B) The atomic number of Y is less than that of X by 2.

(C) If the Q value of the reaction is 200 MeV, and the daughter nucleus is in ground state, the Kinetic energy of the α particle is approximately 196 MeV.

(D) The Q value of the reation decreases if the daughter nucleus is formed in excited state.

10. An elastic ring of mass 'm' and force constant k (stiffness) is released from rest in a smooth cone of semi vertex angle θ from horizontal position as shown in figure. Initially the ring was in natural length :



(A) initial acceleration of any point on circumference of ring is g

(B) initial acceleration of centre of ring is g $\cos^2\theta$

(C) maximum vertical displacement of centre of ring is $\dfrac{mg\cot^2\theta}{2\pi^2 k}$

(D) at the moment maximum vertical displacement acceleration of centre of ring is zero.

Space for Rough Work

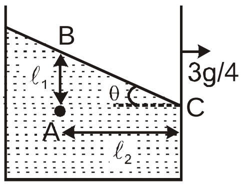
11. In Young double slit experiment λ = 1000 nm, d = 1mm and D = 1m. If both the slits are having equal intensities. The distance(s) from central maxima at which intensity is half of maximum intensity is :

(A) 12.5×10^{-4} m (B) 2.5×10^{-4} m (C) 7.5×10^{-4} m (D) 1.25×10^{-4} m

12. Two slits emit equal to intensity of light. Now one of the slit in a standard YDSE apparatus is covered by a thin glass slab so that it transmits only one half of the light intensity of the other. Select correct alternatives :

(A) Resultant intensity at centre of screen will decrease
(B) Resultant intensity at dark fringe will increase
(C) The fringe width will remain unchanged
(D) The fringe pattern will shift toward the covered slit.

13. A container is filled with a liquid of density ρ. Container is accelerating on a horizontal surface with acceleration $\frac{3g}{4}$ towards right hand side and liquid is at rest with respect to container as shown in figure. If there is a point A in liquid then, which of the following is **correct** : (assume atmospheric pressure is zero and AB is vertical and AC is horizontal line)



(A) Pressure at A is $\rho g \ell_1$

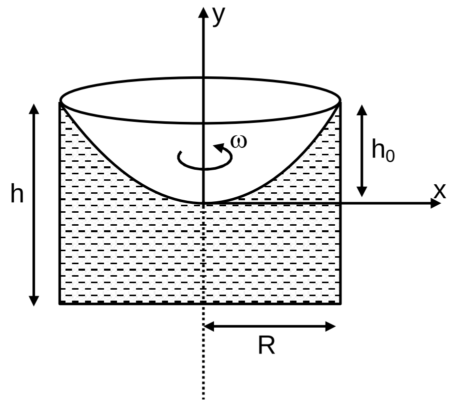
(B) Pressure at A is $\rho \frac{3g}{4} \ell_2$

(C) $\theta = \tan^{-1} \left(\frac{3}{4}\right)$

(D) $\rho g \ell_1 = \rho g \ell_2$

Space for Rough Work

14. Ideal liquid of density ρ is filled in a cylindrical container upto $(3/4)^{th}$ height. Now the liquid is being rotated about vertical axis passing through its axis of symmetry with constant angular velocity ω, such that liquid is on the verge of falling out of the container and free surface of liquid forms a paraboloid. Whole situation is shown in the figure. Choose the correct option(s).



(A) $h_0 = \frac{h}{4}$ (B) $\omega = \sqrt{\frac{gh}{R^2}}$ (C) $\frac{dp}{dx} = \rho\omega^2 x$ (D) $\frac{dp}{dy} = -\rho g$

15. Wavelength and intensity of monocromatic light falling on a photoelectric cell as a function of time is given by $\lambda = 10000\, e^{-t/10}$ Å and $I = 1000\,(1 - e^{-t/10})$. The threshold wave length of metal used in cell is 3700 Å.

(A) Work function of metal plate is equal to 3.35 eV.

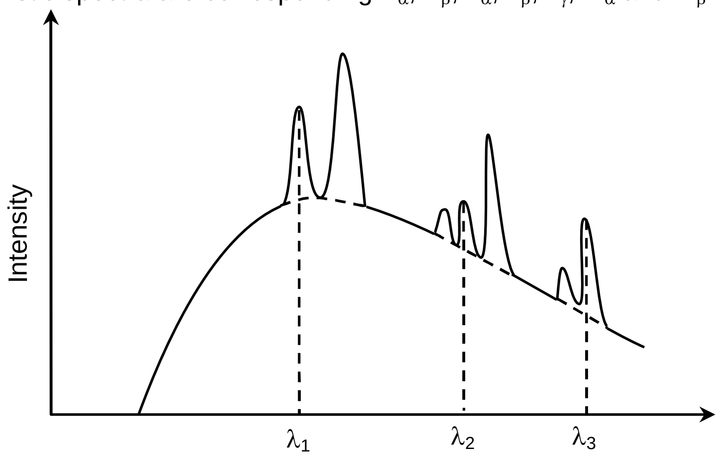
(B) At t = 0 sec photo current is zero.

(C) At t = 5 sec photo current is zero.

(D) At t = 20 sec photo current is zero.

Space for Rough Work

16. Figure shows X-ray spectrum showing continuous and few characteristic spectra from an X-ray tube. Characteristic spectra are corresponding K_α, K_β, L_α, L_β, L_γ, M_α and M_β. The wave length-



(A) λ_1 corresponds to K_α
(B) λ_2 corresponds to L_β
(C) λ_3 corresponds to M_α
(D) λ_3 corresponds to K_β

17. The wavelength of K_α X-rays for lead isotopes Pb^{208}, Pb^{206} and Pb^{204} are λ_1, λ_2 and λ_3 respectively. Then according to Mosley's law :

(A) $\lambda_1 = \lambda_2 = \lambda_3$
(B) $\lambda_1 > \lambda_2 > \lambda_3$
(C) $\lambda_1 < \lambda_2 < \lambda_3$
(D) $\lambda_2 = \sqrt{\lambda_1\lambda_3}$

18. Consider an atom made up of a protons and a hypothetical particle of triple the mass of electron but having same charge as electron. Apply Bohr model and consider all possible transition of this hypothetical from second excited state to lower states. The possible wavelengths emitted is (are) (Given in term of the Rydberg constant R for the hydrogen atom)

(A) $\frac{8}{5R}$
(B) $\frac{3}{8R}$
(C) $\frac{4}{9R}$
(D) $\frac{12}{5R}$

Space for Rough Work

19. The electron in hydrogen atom makes a transition $n_1 \rightarrow n_2$ where n_1 and n_2 are the principal quantum number of two states. Assuming the Bohr model to be valid, the time period of the electron in the initial state is eight times that in the final state. The possible value of n_1 and n_2 are:

(A) $n_1 = 2$ And $n_2 = 1$

(B) $n_1 = 8$ and $n_2 = 2$

(C) $n_1 = 8$ And $n_2 = 1$

(D) $n_1 = 6$ and $n_2 = 3$

20. In young's double slit experiment, the interference pattern is found to have an intensity ratio between bright and dark fringes as 9. This means that

(A) the intensities at the screen due to the two slits are in the ratio 4 :1

(B) the intensities at the screen due to the two slits are in the ratio 5 : 4

(C) the amplitudes at the screen due to the two slits are in the ratio 2 : 1

(D) the amplitudes at the screen due to the slits are in the ratio $\sqrt{5}$: 2

Space for Rough Work

SECTION – 2 : (Maximum Marks : 80)

- This section contains **TEN** paragraphs
- Based on each paragraph, there will be **TWO** questions.
- Each question has **FOUR** options (A), (B), (C) and (D). **ONE OR MORE THAN ONE** of these four option(s) is(are) correct.
- For each question, darken the bubble(s) corresponding to all the correct option(s) in the ORS
- Marking scheme :

  +4 If the bubbles corresponding to the answers are darkened

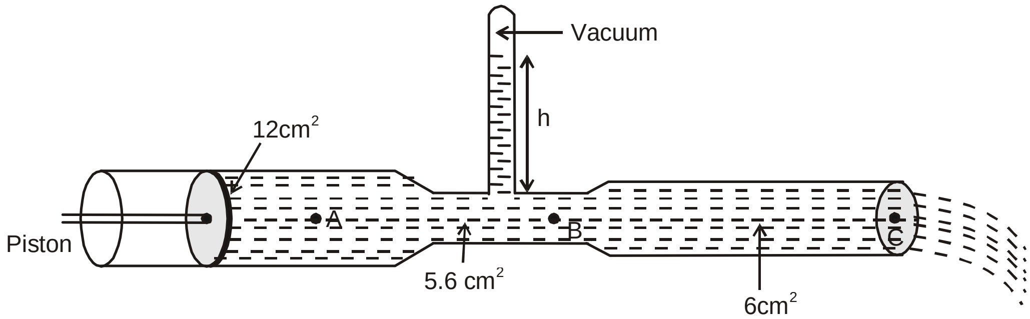
  0 If none of the bubbles is darkened

  –2 In all other cases

Space for Rough Work

Paragraph for Question Nos. 21 to 22

A glass tube has three different cross sectional areas with the values indicated in the figure. A piston at the left end of the tube exerts pressure so that the mercury within the tube flows from the right end with a speed of 8.0 m/s. Three points within the tube are labeled A, B and C. The atmospheric pressure is 1.01×10^5 N/m^2; and the density of mercury is 1.36×10^4 kg/m^3. (use g = 10 m/s^2)



21. Choose the correct option(s) :

(A) The speed of mercury flowing at the point A is 4.0 m/s.

(B) The speed of mercury flowing at the point A is 8.0 m/s.

(C) The speed of mercury flowing at the point B is 4.0 m/s.

(D) The speed of mercury flowing at the point B is 12.0 m/s.

22. Choose the correct option(s) :

(A) The pressure at point A is nearly equal to 4.27×10^5 Pa.

(B) The pressure at point A is nearly equal to 1.01×10^5 Pa.

(C) The pressure at point C is nearly equal to 1.01×10^5 Pa.

(D) The pressure at point C is nearly equal to 4.27×10^5 Pa.

Space for Rough Work

Paragraph for Question Nos. 23 to 24

The mass of a nucleus $^{A}_{Z}X$ is less that the sum of the masses of (A – Z) number of neutrons and Z number of protons in the nucleus. The energy equivalent to the corresponding mass difference is known as the binding energy of the nucleus. A heavy nucleus of mass M can break into two light nuclei of masses m_1 and m_2 only if $(m_1 + m_2) < M$. Also two light nuclei of masses m_3 and m_4 can undergo complete fusion and form a heavy nucleus of mass M' only if $(m_3 + m_4) > M'$. The masses of some neutral atoms are given in the table below :

$^{1}_{1}H$	1.007825u	$^{2}_{1}H$	2.014102u	$^{3}_{1}H$	3.016050u	$^{4}_{2}He$	4.002603u
$^{6}_{3}Li$	6.015123u	$^{7}_{3}Li$	7.016004u	$^{70}_{30}Zn$	69.925325u	$^{82}_{34}Se$	81.916709u
$^{152}_{64}Gd$	151.919803u	$^{206}_{82}Pb$	205.974455u	$^{209}_{83}Bi$	208.980388u	$^{210}_{84}Po$	209.982876u

23. The incorrect statement is/are :

(A) The nucleus $^{6}_{3}Li$ can emit an alpha particle

(B) The nucleus $^{210}_{84}P_0$ can not emit a proton

(C) Deuteron and alpha particle can undergo complete fusion.

(D) The nuclei $^{70}_{30}Zn$ and $^{82}_{34}Se$ can undergo complete fusion.

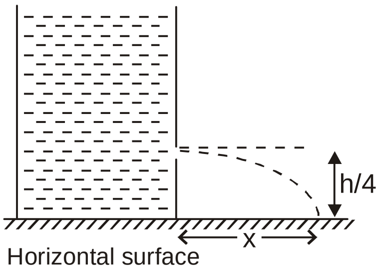
24. The kinetic energy (in keV) of the alpha particle, when the nucleus $^{210}_{84}P_0$ at rest undergoes alpha decay, is:

(A) 5319 (B) 5422 (C) 5707 (D) 5818

Space for Rough Work

Paragraph for Question Nos. 25 to 26

Water is filled to a height h in a fixed vertical cylinder placed on horizontal surface. At time t = 0 a small hole is drilled at a height h/4 from bottom of cylinder as shown. The cross section area of hole is a and the cross-section area of cylinder is A such that A >> a.



25. Let the value of horizontal distance of point where the water fall on horizontal surface from bottom of cylinder be x as shown. Then from time t = 0 till water comes out of hole, pick the correct statement:

(A) x increases with time.

(B) x decreases with time.

(C) As long as water comes out of hole, the time taken by a water particle starting from hole to reach the horizontal surface remains constant.

(D) As long as water comes out of hole, the time taken by a water particle starting from hole to reach the horizontal surface decreases.

26. The duration of time for which water flows out of hole is:

(A) $\frac{A}{a}\sqrt{\frac{3h}{2g}}$ (B) $\frac{a}{A}\sqrt{\frac{3h}{2g}}$ (C) $\frac{A}{a}\sqrt{\frac{2h}{3g}}$ (D) None of these

Space for Rough Work

Paragraph for Question Nos. 27 to 28

A sample contains two radioactive nuclei X and Y with half lives 2 hr and 1 hr respectively. The nucleus X-decays into the nucleus Y and Y decays into a stable nucleus Z. At time t = 0 the activities of the components in the sample were equal and were each equal to A_0

$$X \xrightarrow{T_{1/2} = 2\text{ hr}} Y \xrightarrow{T_{1/2} = 1\text{ hr}} Z$$

Suppose that N_X, N_Y are the number of nuclei of X and Y, respectively, at time t. It is given that

$$\lambda_Y N_Y = \lambda_X (N_X + N_Y) + C_1\ e^{-\lambda_Y . t}$$

where λ_X, λ_Y are the decay constants of X and Y; C_1 is an arbitrary constant.

27. Select correct alternatives. The Value of C_1 is

(A) $C_1 = -\frac{A_0}{2}$

(B) $C_1 = -A_0$

(C) Number of nuclei of Y at time t is equal to (t is in hour) $\frac{A_0}{\ell n2}[2^{(2-t)/2} - 2^{-t}]$

(D) Number of nuclei of Y at time t is equal to (t is in hour) $\frac{A_0}{\ell n2}[2^{t} - 2^{-t}]$

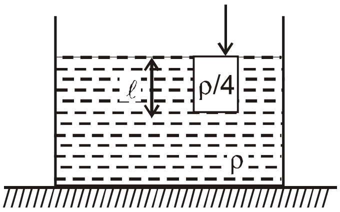
28. The ratio of active nuclei of Y at t = 4 h to that at t = 0 is

(A) $\frac{2}{3}$ (B) $\frac{3}{4}$ (C) $\frac{8}{15}$ (D) $\frac{7}{16}$

Space for Rough Work

Paragraph for Question Nos. 29 to 30

A large tank of cross-section area A contains liquid of density ρ. A cylinder of density $\rho / 4$ and length ℓ, and cross- ssection area a (a <<A) is kept in equilibrium by applying an external vertically downward force as shown. The cylinder is just submerged in liquid. At t = 0 the external force is removed instantaneously. Assume that water level in the tank remains constant.



29. The acceleration of cylinder immediately after the external force is removed is
(A) g (B) 2g (C) 3g (D) zero

30. Choose the **CORRECT** option(s) :

(A) The speed of the cylinder when it reaches its equlibrium position is $\frac{3}{2}\sqrt{g\ell}$

(B) The speed of the cylinder when it reaches its equlibrium position is $\frac{1}{2}\sqrt{g\ell}$ b

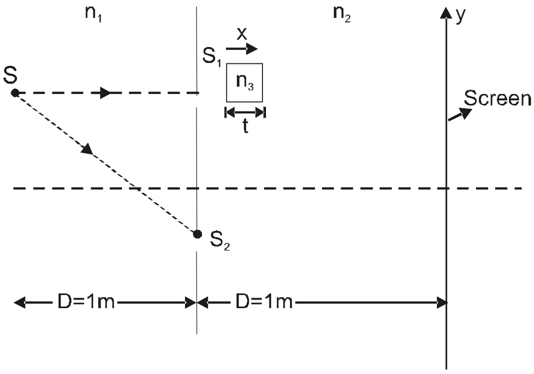
(C) After its release at t = 0, the time taken by cylinder to reach its equilibrium position for the first time is $\frac{\pi}{4}\sqrt{\frac{\ell}{g}}$

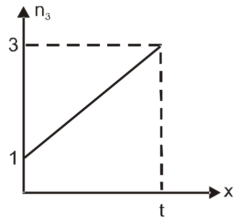
(D) After its release at t = 0, the time taken by cylinder to reach its equilibrium position for the first time is $\frac{\pi}{8}\sqrt{\frac{\ell}{g}}$

Space for Rough Work

Paragraph for Question Nos. 31 to 32

In YDSE arrangement as shown in figure, fringes are seen on screen using monochromatic source S having wavelength 3000 Å (in air). S_1 and S_2 are two slits seperated by d = 1 mm and D = 1m. Left of slits S_1 and S_2 medium of refractive index n_1 = 2 is present and to the right of S_1 and S_2 medium of n_2 = 3/2, is present. A thin slab of thickness 't' is placed in front of S_1 . The refractive index of n_3 of the slab varies with distance from it's starting face as shown in figure.





31. Chose the **CORRECT** option(s) :

(A) Fringe width on the screen is 0.2 mm.

(B) Fringe width on the screen is 0.3 mm

(C) In order to get central maxima at the centre of screen, the thickness of slab required is 2 μm

(D) In order to get central maxima at the centre of screen, the thickness of slab required is 1.5 μm

32. If thickness of the slab is selected 1 μm, then position of central maxima will be : (y–coordinate)

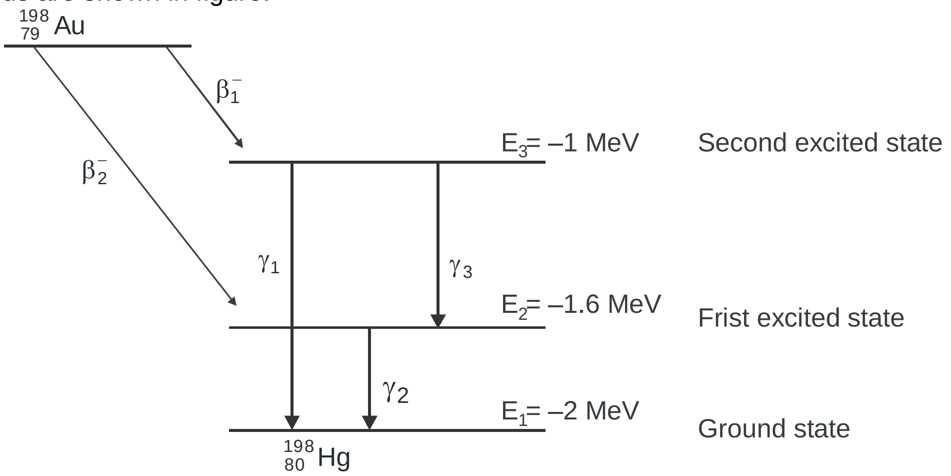
(A) $\frac{1}{3}$mm (B) $-\frac{1}{3}$mm (C) $\frac{1}{6}$mm (D) $-\frac{1}{6}$mm

Space for Rough Work

Paragraph for Question Nos. 33 to 34

Gold Nucleus ($_{79}Au^{198}$) can decay into mercury nucleus ($_{80}Hg^{198}$) by two decay schemes shown in figure. (i) It can emit a β particle (β_1) and come to ground state by either emitting one γ ray(γ_1) or emitting two γ rays (γ_3 & γ_2)

(ii) It can emit one β particle (β_2) and come to ground state by emitting γ_2 ray. Atomic masses : ^{198}Au = 197.9682 amu, ^{198}Hg = 197.9662 amu, 1 amu = 930 MeV/c^2. The energy levels of the nucleus are shown in figure.



33. Choose the **CORRECT** option(s) :

(A) the maximum kinetic energy of emitted β_2 particles is 1.86 MeV

(B) the maximum kinetic energy of emitted β_2 particles is 1.46 MeV

(C) the maximum kinetic energy of emitted β_1 particle is 1.86 MeV

(D) the maximum kinetic energy of emitted β_1 particle is 0.86 MeV

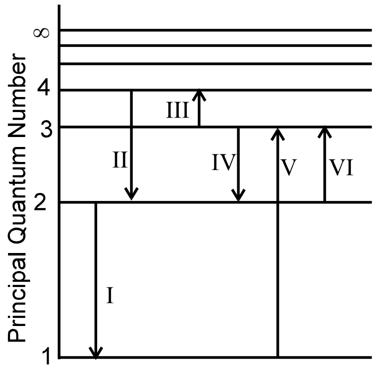
34. The wave length of emitted γ rays are in the order -

(A) $\lambda_{\gamma_2} > \lambda_{\gamma_3} > \lambda_{\gamma_1}$ (B) $\lambda_{\gamma_3} > \lambda_{\gamma_2} > \lambda_{\gamma_1}$ (C) $\lambda_{\gamma_1} > \lambda_{\gamma_2} > \lambda_{\gamma_3}$ (D) $\lambda_{\gamma_3} = \lambda_{\gamma_2} = \lambda_{\gamma_1}$

Space for Rough Work

Paragraph for Question Nos. 35 to 36

The figure shows an energy level diagram for the hydrogen atom. Several transitions are marked as I, II, III, _______ . The diagram is only indicative and not to scale.



35. Select corrent statement(s)

(A) In VI transition is a Balmer series photon absorbed.

(B) In III transition is a Balmer series photon absorbed.

(C) The wavelength of the radiation involved in transition II is 291 nm

(D) The wavelength of the radiation involved in transition II is 487 nm

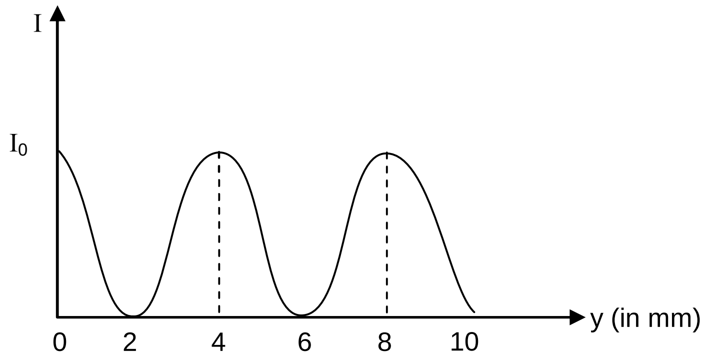
36. Which transition involves the longest wavelength line in the visible portion of the hydrogen spectrum ?

(A) I (B) III (C) VI (D) IV

Space for Rough Work

Paragraph for Question Nos. 37 to 38

In standard YDSE the intensity on screen varies with position according to following graph as we move away from the central maxima :



Wave length of light used is 400 nm and distance between the two slits is 1 mm.

37. If the distance between two slits is reduce to 0.5 mm then the intensity :

(A) will become zero at y = 4 mm

(B) will remain same I_0 at y = 4 mm

(C) will become zero at y = 8 mm

(D) will remain same I_0 at y = 8 mm

38. If the distance between the two slits is kept 1 mm and then a thin film of refractive index 1.5 and thickness 2.2 μm is used to cover the one of the slit. What will be intensity at y = 2 mm.

(A) $I_0/2$ (B) I_0 (C) $I_0/4$ (D) zero

Space for Rough Work

Paragraph for Question Nos. 39 to 40

A light of wavelength λ is incident on a metal sheet of work function ϕ = 2eV. The wavelength λ varies with time as $\lambda = 3000 + 40t$, where λ is in Å and t is in second. The power incident on metal sheet is constant at 100 W. This signal is switched on and off for time intervals of 2 minutes and 1 minute respectively. Each time the signal is switched on, the λ start from initial value of 3000Å. The metal plate is grounded and electron clouding is negligible. The efficiency of photoemission

is 1% (hc = 12400 eVÅ).

39. The time after which photoemission will stop is :

(A) 79 s (B) 80 s (C) 81 s (D) 78 s

40. Choose the **CORRECT** option(s) :

(A) total number of photoelectrons ejected in three minutes is 1.855×10^{20}

(B) total number of photoelectrons ejected in three minutes is 3.71×10^{23}.

(C) total number of photoelectrons ejected in one hour is 1.855×10^{20}

(D) total number of photoelectrons ejected in one hour is 3.71×10^{21}.

Space for Rough Work