



JINDAL ADARSH GRAMYA BHARTI

HR. SEC. SCHOOL, KIRODIMAL

NAGAR

SUMMER VACATION HOMEWORK -

INTELLECTUAL

PERSISTENCE

2026

EXCELLENCE

CLASS - XII

CBSE

SUBJECT – ENGLISH

J.A.G.B. SCHOOL, KIRODIMAL NAGAR

Project Report Portfolio 2026-27



Class-12 (M+B+C)

12th Com → Role of Youth in Economic Growth

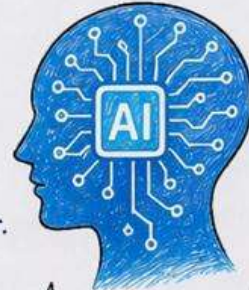
12 Maths → Artificial Intelligence and Future Jobs

12 Bio → Climate Change and Youth Responsibility



Project Report may include the following details –

1. Cover page – Title, school details, details of student (Name, Class, section and Roll no.)
2. Index
3. Acknowledgement
4. Certificate of completion under the guidance of the teacher.
5. Statement of purpose/objective
6. Action plan for the project.
7. Materials – questionnaires for interview, report
8. 800 – 1000 words report
9. Student reflection
10. Support your project with suitably labelled pictures/photographs /graphs/ drawings
11. Bibliography / list of resources.



1. Number of pages expected in the project 20.



Note –

- 1) Cover page should be Handmade in A4 size sheet.
- 2) Colourful sheet may use.
- 3) Decoration / Creativity should be according to the subject.
- 4) All Writing work should be hand written.

= Homework =

Complete the following homework in your notebook neatly.

1. Your school is holding a summer camp for training students in Hockey & Basketball. Write a notice for the school notice board of Anand PraKash Vidyalaya, Allahabad. You are the sports Secretary of the school (word limit 50 words)
2. Write extract based questions of “The Last Lesson” and “My Mother at Sixty Six”.



3. Solve Unseen Passage from previous year question paper. (Any 5)



ASSINGMENT



EXTRACT BASED QUESTIONS



Read the extract given below and answer the following questions by choosing the correct option.

- 1** Driving from my parent's home to Cochin last Friday morning, I saw my mother, beside me, doze, open mouthed, her face ashen like that of a corpse and realised with pain that she was as old as she looked but soon put that thought away...

All India 2013

- (i) Choose the option that best applies to the given extract.
1. a conversation
 2. an argument
 3. a piece of advice
 4. a strategy
 5. a recollection
 6. a suggestion
- (a) 1, 3 and 6 (b) 2, 4 and 5
(c) Only 5 (d) Only 1
- (ii) Choose the book title that perfectly describes the condition of the poet's mother.
1. **Title 1** You're Only Old Once! by Dr. Seuss
 2. **Title 2** The Gift of Years by Joan Chittister
 3. **Title 3** Somewhere Towards the End by Diana Athill
 4. **Title 4** The Book You Wish Your Parents Had Read by Philippa Perry
- (a) Title 1 (b) Title 2
(c) Title 3 (d) Title 4

- (i) What is the most likely reason the poet capitalised 'Young Trees'? This was to
- convey a clearer meaning.
 - highlight the adj.-noun combination.
 - enhance the contrast.
 - draw a connection with the title.
- (ii) Choose the option that appropriately describes the relationship between the two statements given below.
- Statement 1** The poet knows her mother has aged.
Statement 2 The poet feels the pain of separation.
- Beginning-Ending
 - Cause-Effect
 - Question-Answer
 - Introduction-Conclusion
- (iii) Choose the option that completes the sentence given below.
- Just as the brightness of the winter's moon is veiled behind the haze and mist, similarly,
- the pain of separation has shaded mother's expression.
 - age has fogged mother's youthful appearance.
 - growing up has developed a seasoned maturity in the poet.
 - memories warm the heart like the pale moon in winter.
- (iv) Choose the correct option out of the ones given below.

1.	Simile the merry children spilling	Metaphor old familiar ache
2.	Metaphor pale as a late winter's moon	Imagery young trees sprinting
3.	Imagery all did was smile	Personification the merry children spilling
4.	Personification young trees sprinting	Simile pale as a late winter's moon

- (a) Option 1 (b) Option 2
(c) Option 3 (d) Option 4

- (iii) Choose the option that applies correctly to the two statements given below.
- Assertion** : The poet wards off the thought of her mother getting old quickly.
Reason : The poet didn't want to confront the inevitability of fate that was to dawn upon her mother.
- Assertion can be inferred but the Reason cannot be inferred.
 - Assertion cannot be inferred but the Reason can be inferred.
 - Both Assertion and Reason can be inferred.
 - Both Assertion and Reason cannot be inferred.
- (iv) Choose the option that displays the same literary device as in the given lines of the extract.
- her face ashen like that of a corpse ...
- Just as I had this thought, she appeared and ...
 - My thoughts were as heavy as lead that evening when ...
 - I think like everyone else who ...
 - I like to think aloud when ...
- (v) What is the significance of comparing the mother's face to that of a corpse?
- (vi) Why did the poet put the thought away?
- Ans**
- (i) (c) Only 5
 - (ii) (c) Title 3 Somewhere Towards the End by Diana Athill
 - (iii) (c) Both Assertion and Reason can be inferred.
 - (iv) (b) My thoughts were as heavy as lead that evening when ...
 - (v) By comparing the mother's face to that of a corpse, the poet highlights the old age and the fact that her mother is nearing death.
 - (vi) The poet put the thought away because she could not stand the pain of the thought.

- 2** I saw my mother beside me doze, open mouthed, her face ashen like that of a corpse and realised with pain that she was as old as she looked but soon put that thought away, and looked out at Young Trees sprinting, the merry children spilling out of their homes. CBSE Term I 2021, Modified
- (i) Which amongst the following options has used the same poetic device in its underlined phrase as used in the expression 'ashen like that of a corpse'?
- He was a lion in the battle.
 - The flood swallowed more than a dozen villages.
 - He walked as slow as a snail.
 - The tree blocks the free flow of water.
- (ii) Choose the correct option that best explains the reason for the poet 'to put that thought away'.
- The mother's face was pale and ugly.
 - It was unbearable for her to see her mother sleeping.
 - She was troubled by the thought of her mother's perpetual state of exhaustion.
 - She was deeply pained by the thought of the mother's imminent death.

- (v) What is purpose of image of merry children?
(vi) What does the phrase 'old familiar ache' indicate?
- Ans**
- (i) (c) enhance the contrast.
 - (ii) (b) Cause-Effect
 - (iii) (b) age has fogged mother's youthful appearance.
 - (iv) (d) Option 4
 - (v) The image of merry children is a contrast to the frail and dull old age of the poet's mother.
 - (vi) The 'old familiar ache' indicates that the fear felt by the poet is not new. She had felt it when she was young.

- 4** "But after the airport's security check, standing a few yards away, I looked again at her, wan, pale as a late winter's moon."
- (i) Why did the poet look her mother again?
- To see if she was sleeping
 - To check if she was well
 - To bid her good bye
 - To say something to her
- (ii) Mother's face has been compared to
- full moon brightness
 - late winter's moon and its paleness
 - young children
 - young tree
- (iii) What were the reasons of mother's pale face?
- Mother's old age
 - Mother's depleting energy
 - Mother's illness
 - Both (a) and (b)
- (iv) Which figure of speech has been used in the lines "the young trees sprinting?"
(v) What do you think the poet is feeling in the extract?
(vi) Explain the significance of the late winter's moon.
- Ans**
- (i) (c) To bid her good bye
 - (ii) (b) late winter's moon and its paleness
 - (iii) (d) Both (a) and (b)
 - (iv) Personification is used in given lines.
 - (v) The poet is feeling a dilemma in the extract. She wants to stay with her mother and take care of her but at the same time, she has to go back and take over her responsibilities.
 - (vi) The late winter's moon resembles a dying moon which is hazy and pale. Just like this moon, the poet's mother is nearing her death.

- (iii) What do the expressions 'doze' 'open mouthed' describe about the poet's mother?
- She is sleeping and relaxing.
 - She is aged and exhausted.
 - She is tired of travelling.
 - She is not in a mood to talk to her daughter.
- (iv) Select the correct option to fill in the blank. The poet uses the image of sprinting trees to emphasize the to the ageing mother.
- comparison
 - difference
 - contrast
 - similarity
- (v) What mood does the expression 'merry children spilling' bring in ?
- Happiness and enthusiasm
 - Innocence and playfulness
 - Laziness
 - Joy
- (vi) What is the poet feeling in the given lines?

- Ans**
- (i) (c) He walked as slow as a snail.
 - (ii) (d) She was deeply pained by the thought of the mother's imminent death.
 - (iii) (b) She is aged and exhausted.
 - (iv) (c) contrast
 - (v) (a) The expression 'Merry children spilling' brings in mood of happiness and enthusiasm
 - (vi) The poet is feeling sad and sorrowful due to her mother's old age in the given extract. She does not want to accept the fact that her mother is nearing death.

QUICK ANSWER KEY

Section 1

- (i) (c) Only 5
- (ii) (c) Title 3
- (iii) (c) Both A and R
- (iv) (b) My thoughts were as heavy as lead ...
- (v) See answer
- (vi) See answer

Section 2

- (i) (c) He walked as slow as a snail.
- (ii) (d) She was deeply pained by the thought of the mother's imminent death.
- (iii) (b) She is aged and exhausted.
- (iv) (c) contrast
- (v) (a) Happiness and enthusiasm
- (vi) See answer

Section 4

- (i) (c) To bid her good bye
- (ii) (b) late winter's moon and its paleness
- (iii) (d) Both (a) and (b)
- (iv) Personification
- (v) See answer
- (vi) See answer

SHORT ANSWER HINTS

- 'Doze' suggests she is weak, tired and aged.
- The poet feels pain because she realises her mother is growing old.
- Comparison with a 'corpse' shows lifelessness and nearing death.
- Emotions: fear, sadness, love, anxiety, helplessness.
- Message: We should love and care for our parents while we can.

SUBJECT - MATHS

Your Turn

(Complete the Answer Stems)

1. If for a square matrix A , $A^2 - A + I = 0$, then A^{-1} equals
 (A) A (B) $A + I$ (C) $I - A$ (D) $A - I$

ANS. Correct option is:

EXPLANATION: Start solution by multiplying by A^{-1} on the both sides of the given equation as

2. For the matrix $X = \begin{bmatrix} 0 & 1 & 1 \\ 1 & 0 & 1 \\ 1 & 1 & 0 \end{bmatrix}$, $(X^2 - X)$ is

- (A) $2I$ (B) $3I$ (C) I (D) $5I$

ANS. Correct option is:

EXPLANATION: Calculate :

$$X^2 = \begin{bmatrix} 0 & 1 & 1 \\ 1 & 0 & 1 \\ 1 & 1 & 0 \end{bmatrix} \begin{bmatrix} 0 & 1 & 1 \\ 1 & 0 & 1 \\ 1 & 1 & 0 \end{bmatrix} =$$

Now, $X^2 - X =$

3. If A is a square matrix such that $A^2 = A$, then $(I - A)^3 + A$ is equal to:

- (A) I (B) 0 (C) $I - A$ (D) $I + A$

ANS. Correct option is:

EXPLANATION: Start solution by applying formula: $(A - B)^3 = A^3 - B^3 - 3A^2B + 3AB^2$

4. Show that $A'A$ and AA' are both symmetric matrices for any matrix A .

SOL. Given : A is a square matrix of any order.

To prove: $A'A$ and AA' are both

Construct the idea: If A is symmetric matrix, then $A' = A$.

Explanation:

Start solution by assuming: $P = A'A$

Now, find P' =

So, AA' is a

Now, assume: $Q = AA'$

Now, find Q' =

So, AA' is a

Conclusion: Hence, for any square matrix A , $A'A$ and AA' are both

5. If $A = \begin{bmatrix} 1 & 3 & 2 \\ 2 & 0 & -1 \\ 1 & 2 & 3 \end{bmatrix}$, then show that $A^3 - 4A^2 - 3A + 11I = 0$, Hence find A^{-1} .

Concept Applied: Properties of multiplication of two matrices

Explanation: Start solution by substituting $x = \cos \theta$ in LHS

Conclusion: Hence, $\sin^{-1}(2x\sqrt{1-x^2}) =$

5. Prove that: $\frac{9\pi}{8} - \frac{9}{4}\sin^{-1}\left(\frac{1}{3}\right) = \frac{9}{4}\sin^{-1}\left(\frac{2\sqrt{2}}{3}\right)$

SOL To Prove:

Construct the idea:

$$\sin^{-1}(x) + \cos^{-1}(x) = \frac{\pi}{2} \text{ and } \cos^{-1}x = \sin^{-1}\sqrt{1-x^2}$$

Explanation: Start solution by substituting $\frac{\pi}{2} - \sin^{-1}(x) = \cos^{-1}(x)$ in LHS

Conclusion: Hence, $\frac{9\pi}{8} - \frac{9}{4}\sin^{-1}\left(\frac{1}{3}\right) =$

6. Express $\sin^{-1}\left(\frac{\sin x + \cos x}{\sqrt{2}}\right)$, where $-\frac{\pi}{4} < x < \frac{\pi}{4}$ in the simplest form.

SOL To find the simplest form of , where

Construct the idea:

$$\sin(A + B) = \sin A \cos B + \cos A \sin B$$

Explanation: Start solution by writing

$$\sin^{-1}\left(\frac{\sin x + \cos x}{\sqrt{2}}\right) = \sin^{-1}\left(\sin x \cos \frac{\pi}{4} + \cos x \sin \frac{\pi}{4}\right)$$

Conclusion: Hence, the simplest form of $\sin^{-1}\left(\frac{\sin x + \cos x}{\sqrt{2}}\right)$ is

7. Prove that: $\cos^{-1}(x) + \cos^{-1}\left(\frac{x}{2} + \frac{\sqrt{3-3x^2}}{2}\right) = \frac{\pi}{3}$.

SOL To Prove:

Construct the idea:

$$\cos(A - B) = \cos A \cos B + \sin A \sin B$$

Explanation: Start solution by substituting $x = \cos \alpha$ in LHS

Conclusion: Hence, $\cos^{-1}(x) + \cos^{-1}\left(\frac{x}{2} + \frac{\sqrt{3-3x^2}}{2}\right) =$

Your Turn

(Complete the Answer Stems)

1. If for a square matrix A , $A^2 - A + I = 0$, then A^{-1} equals

- (A) A (B) $A + I$ (C) $I - A$ (D) $A - I$

ANS. Correct option is:

EXPLANATION: Start solution by multiplying by A^{-1} on the both sides of the given equation as

2. For the matrix $X = \begin{bmatrix} 0 & 1 & 1 \\ 1 & 0 & 1 \\ 1 & 1 & 0 \end{bmatrix}$, $(X^2 - X)$ is

- (A) $2I$ (B) $3I$ (C) I (D) $5I$

ANS. Correct option is:

EXPLANATION: Calculate :

$$X^2 = \begin{bmatrix} 0 & 1 & 1 \\ 1 & 0 & 1 \\ 1 & 1 & 0 \end{bmatrix} \begin{bmatrix} 0 & 1 & 1 \\ 1 & 0 & 1 \\ 1 & 1 & 0 \end{bmatrix} =$$

Now, $X^2 - X =$

3. If A is a square matrix such that $A^2 = A$, then $(I - A)^2 + A$ is equal to:

- (A) I (B) 0 (C) $I - A$ (D) $I + A$

ANS. Correct option is:

EXPLANATION: Start solution by applying formula: $(A - B)^2 = A^2 - B^2 - 2AB + 2BA$

4. Show that $A'A$ and AA' are both symmetric matrices for any matrix A .

SOL. Given : A is a square matrix of any order.

To prove: $A'A$ and AA' are both

Construct the idea: If A is symmetric matrix, then $A' = A$.

Explanation:

Start solution by assuming: $P = A'A$

Now, find P' =

So, AA' is a

Now, assume: $Q = AA'$

Now, find Q' =

So, AA' is a

Conclusion: Hence, for any square matrix A , $A'A$ and AA' are both

5. If $A = \begin{bmatrix} 1 & 3 & 2 \\ 2 & 0 & -1 \\ 1 & 2 & 3 \end{bmatrix}$, then show that $A^3 - 4A^2 - 3A + 11I = 0$, Hence find A^{-1} .

Concept Applied: Properties of multiplication of two matrices

SOL Given: $A = \begin{bmatrix} 1 & 3 & 2 \\ 2 & 0 & -1 \\ 1 & 2 & 3 \end{bmatrix}$

To show:

Explanation:

Calculate :

$$A^2 = \begin{bmatrix} 1 & 3 & 2 \\ 2 & 0 & -1 \\ 1 & 2 & 3 \end{bmatrix} \begin{bmatrix} 1 & 3 & 2 \\ 2 & 0 & -1 \\ 1 & 2 & 3 \end{bmatrix} = \dots\dots\dots$$

Now, calculate :

$$A^3 = A^2 A = \dots\dots\dots$$

Finally, substitute values of A^2 and A^3 in the LHS of given equation, i.e.,

$$A^3 - 4A^2 - 3A + 11I = \dots\dots\dots$$

Hence, calculate A^{-1} by using relation, i.e.,

$$A^{-1} = -\frac{1}{11}(A^2 - 4A - 3I)$$

Conclusion:

$$\text{Thus, } A^{-1} = \dots\dots\dots$$

Class 12 Holiday Homework – Chemistry

Study these chapters of 11th –

- General organic chemistry
- Hydrocarbons

12th haloalkanes and halo arenes

Solve these questions in your notebook –

- A) Which one of the following has the highest dipole moment?
(i) CH_2Cl_2 (ii) CHCl_3 (iii) CCl_4
- B) A hydrocarbon C_5H_{10} does not react with chlorine in dark but gives a single monochloro compound $\text{C}_5\text{H}_9\text{Cl}$ in bright sunlight. Identify the hydrocarbon.
- C) Write the isomers of the compound having formula $\text{C}_4\text{H}_9\text{Br}$.
- D) Write the equations for the preparation of 1-iodobutane from
(i) 1-butanol (ii) 1-chlorobutane (iii) but-1-ene.
- E) What are ambident nucleophiles? Explain with an example.

A few suggested Projects

- Checking the bacterial contamination in drinking water by testing sulphide ion
- Study of the methods of purification of water
- Testing the hardness, presence of Iron, Fluoride, Chloride, etc., depending upon the regional variation in drinking water and study of causes of presence of these ions above permissible limit (if any)
- Investigation of the foaming capacity of different washing soaps and the effect of addition of Sodium carbonate on it
- Study the acidity of different samples of tea leaves
- Determination of the rate of evaporation of different liquids
- Study the effect of acids and bases on the tensile strength of fibers
- Study of acidity of fruit and vegetable juices.

(Do not make Front page and bibliography yet)

SUBJECT - BIOLOGY

CLASS 12TH

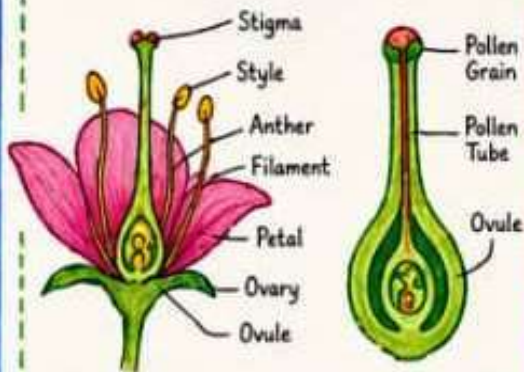
VACATION HOMEWORK

1. HOMEWORK

Solve NCERT exercise of chapter **SEXUAL REPRODUCTION IN FLOWERING PLANTS**.

INCLUDES:

- Very Short Answer Questions
- Short Answer Questions
- Long Answer Questions
- Diagram-based Questions
- Case Study Based Questions



Understand. Practice. Excel!

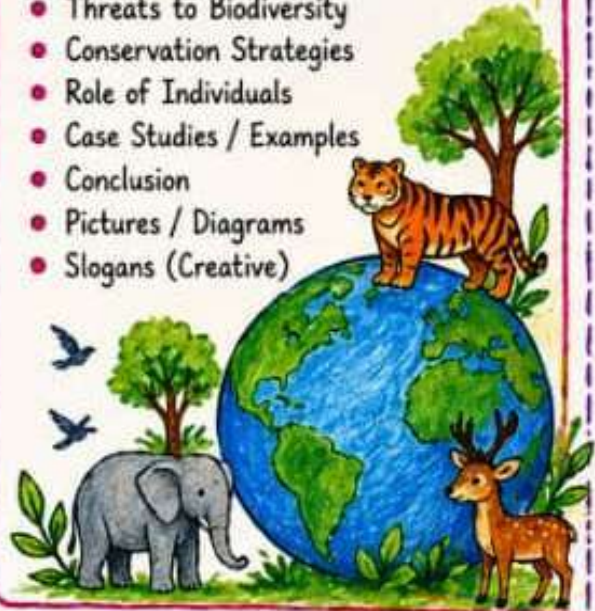
2. PROJECT WORK

TOPIC:

BIODIVERSITY CONSERVATION

POINTS TO INCLUDE:

- Introduction
- Importance of Biodiversity
- Threats to Biodiversity
- Conservation Strategies
- Role of Individuals
- Case Studies / Examples
- Conclusion
- Pictures / Diagrams
- Slogans (Creative)



SAVE NATURE
SAVE FUTURE

"Biodiversity is the wealth of nature; let's protect it for our future."



CLASS XII PHYSICAL EDUCATION: VACATION HOMEWORK



Unit 1



Unit 1

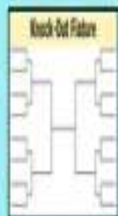


Unit 2

PART A: CASE-STUDY & ANALYTICAL TASKS (Competency-Based)

PART B: EXPERIENTIAL & ART-INTEGRATED ACTIVITIES

TASK 1: THE TOURNAMENT ARCHITECT (Unit 1)



• **The Challenge:** Draw a detailed Knock-out Fixture (11 teams) with Byes.

• **The Analysis:** Write a short brief (200 words) on "Post-program Committee" management: Equipment return & accurate Certificate distribution.



TASK 2: POSTURAL ASSESSMENT (Unit 2)

• **The Task:** Create a "Corrective Action Plan" for a student with two postural deformities.

• **The Requirement:** List 3 specific Asanas/activities for each deformity, with biomechanical explanations for correction.

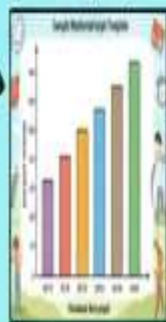


TASK 3: COMMUNITY FITNESS SURVEY (Unit 2)



• **The Goal:** Investigate physical activity participation of 5 females across age groups (e.g., teen, middle-aged, senior, senior).

• **The Output:** Create a Bar Graph (Art-Integration) representing daily active minutes.



• **Reflection:** 100-word summary on "Sociological barriers" observed preventing regular exercise.

TASK 4: THE 'FIT-INDIA' INFOGRAPHIC (Interdisciplinary)

Design a creative poster illustrating the **FEMALE ATHLETE TRIAD**.



TASK 5: Complete Physical Education notes up to Unit 2.

SUBMISSION GUIDELINES & FORMAT

- Compile in an A4 size creative file.
- Acknowledge Originality & Personal observation.
- Deadline: Tuesday, 16th June

★ Be Creative! Have Fun!



★ INFORMATICS PRACTICES ASSIGNMENT ★

CLASS XII



Write Python programs for the following questions.
Show proper logic and output clearly.



1

What is a Pandas Series?
How is it different from
a NumPy array?



2

Write a program to create
a Series from a list of 10
integers with custom
index labels.



3

Explain the role of index
in a Series with
an example.



4

Write code to create
a Series using a dictionary
of student marks.



5

How can you access the
third element of a Series
using both positional
indexing and label indexing?



6

Write a Python program to
display only those elements
of a Series that are
greater than 50.



DO YOUR BEST — CODING IS FUN WHEN YOU TRY YOUR BEST!



7 Write a program to replace all even numbers in a Series with 0.

Logic: Use `.where()` or `.mask()` to replace even numbers with 0.

8 Write a program to count the total number of elements in a Series.

Logic: Use `len()` to get the number of elements in the Series.

9 Write a program to add a constant value to every element of a Series.

Logic: Add the constant to the Series using vectorized operation.

10 Write a program to find the sum of all elements in a Series.

Logic: Use the `sum()` function.

11 Write a program to find the mean of all elements in a Series.

Logic: Use the `mean()` function.

12 Write a program to sort a Series in ascending order.

Logic: Use `sort_values()`.

13 Write a program to reverse the order of a Series.

Logic: Use the slicing step `-1`.

14 Write a program to check if a given value exists in a Series.

Logic: Use the `'in'` keyword.

15 Write a program to drop NaN (missing) values from a Series.

Logic: Use `dropna()` to remove NaN values.

PRACTICE PAPER 13 (2024-25)

CHAPTER 13 NUCLEI

SUBJECT: PHYSICS

CLASS : XII

MAX. MARKS : 40

DURATION : 1½ hrs

General Instructions:

- (i). All questions are compulsory.
- (ii). This question paper contains 20 questions divided into five Sections A, B, C, D and E.
- (iii). Section A comprises of 10 MCQs of 1 mark each. Section B comprises of 4 questions of 2 marks each. Section C comprises of 3 questions of 3 marks each. Section D comprises of 1 question of 5 marks each and Section E comprises of 2 Case Study Based Questions of 4 marks each.
- (iv). There is no overall choice.
- (v). Use of Calculators is not permitted

SECTION – A

Questions 1 to 10 carry 1 mark each.

1. The curve of binding energy per nucleon as a function of atomic mass number has a sharp peak for helium nucleus. This implies that helium nucleus is:
 - (a) radioactive
 - (b) unstable
 - (c) easily fissionable
 - (d) more stable nucleus than its neighbours.
2. Which of the following statement about nuclear forces is NOT true?
 - (a) The nuclear force between two nucleons falls rapidly to zero as their distance is more than a few femtometres.
 - (b) The nuclear force is much weaker than the Coulomb force.
 - (c) The force is attractive for distances larger than 0.8 fm and repulsive if they are separated by distances less than 0.8 fm.
 - (d) The nuclear force between neutron-neutron, proton-neutron and proton-proton is approximately the same.
3. When two nuclei ($A \leq 10$) fuse together to form a heavier nucleus, the:
 - (a) binding energy per nucleon increases
 - (b) binding energy per nucleon decreases
 - (c) binding energy per nucleon does not change
 - (d) total binding energy decreases.
4. Fusion reaction takes place at high temperature because:
 - (a) atoms get ionised at high temperature.
 - (b) kinetic energy is high enough to overcome the coulombic repulsion between nuclei.
 - (c) molecules break up at high temperature.
 - (d) nuclei break up at high temperature.
5. The ratio of order of magnitudes for nuclear density of Copper (Cu) ($A = 63$) and Aluminum ($A = 27$) is: ($m_p = 1.67 \times 10^{-27}$ kg)
 - (a) 9 : 1
 - (b) 1 : 9
 - (c) 1 : 1
 - (d) 1 : 3
6. Which of the following statements are NOT true about binding energy?
 - (I) Binding energy per nucleon increases linearly with the mass number.
 - (II) The larger value of binding energy means the nucleus is unstable.
 - (III) Binding energy per nucleon is maximum for iron ($A = 56$).
 - (a) (I) only
 - (b) (II) only
 - (c) (I) and (III) only
 - (d) (I) and (II) only.



7. If the number of nucleons increases, then binding energy per nucleon of the nucleus:
- first increases and then decreases with mass number
 - continuously increases with mass number
 - continuously decreases with mass number
 - remains constant with mass number
8. Consider a proton moving towards a stationary alpha particle with speed v . Which of the following statements is NOT true?
- Kinetic energy of the proton will get converted into the potential energy and it will stop at a distance from the alpha particle.
 - The force responsible for proton stopping is the repulsive nuclear force.
 - The nuclear force is attractive for distances larger than 0.8 fm and repulsive for distances shorter than 0.8 fm.
 - None of the above.

In the following questions 9 and 10, a statement of assertion (A) is followed by a statement of reason (R). Mark the correct choice as:

- Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).
- Both assertion (A) and reason (R) are true but reason (R) is not the correct explanation of assertion (A).
- Assertion (A) is true but reason (R) is false.
- Assertion (A) is false but reason (R) is true.

9. **Assertion (A):** The nucleus ${}^7_3\text{X}$ is more stable than the nucleus ${}^4_3\text{Y}$.

Reason (R): ${}^7_3\text{X}$ contains more number of protons.

10. **Assertion (A):** The curve between the binding energy per nucleon versus mass number drops at high mass number ($A > 170$) as well as at low mass numbers ($A < 30$).

Reason (R): Nuclei with middle mass numbers ($30 < A < 170$) have higher binding energy per nucleon.

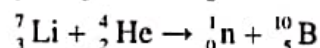
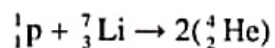
SECTION – B

Questions 11 to 14 carry 2 marks each.

11. How is the size of a nucleus found experimentally? Write the relation between the radius and mass number of a nucleus.

OR

Identify if the two nuclear reactions mentioned below are endothermic or exothermic. Show your calculations.



Use the information below to answer the question:

${}^1_1\text{p} = 1.00728$ amu, ${}^7_3\text{Li} = 7.0160$ amu, ${}^4_2\text{He} = 4.0026$ amu, ${}^1_0\text{n} = 1.0087$ amu and ${}^{10}_5\text{B} = 10.01294$ amu

12. Define ionization energy. How would the ionization energy change when electron in hydrogen atom is replaced by a particle of mass 200 times that of the electron but having the same charge?

OR

Calculate the binding energy of an alpha particle in MeV. Given:

Mass of a proton = 1.007825 u

Mass of a neutron = 1.008665 u

Mass of He nucleus = 4.002800 u

1u = 931 MeV/c².



13. (i) What characteristic property of nuclear force explains the constancy of binding energy per nucleon (BE/A) in the range of mass number 'A' lying $30 < A < 170$?
(ii) Show that the density of nucleus over a wide range of nuclei is constant independent of mass number A.

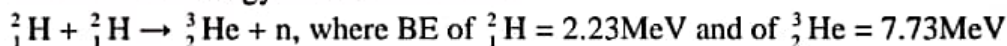
OR

Prove that the density of a nucleus is independent of its mass number.

14. Define the term, mass defect. How is it related to stability of the nucleus?

OR

Calculate the energy in fusion reaction:



SECTION – C

Questions 15 to 17 carry 3 marks each.

15. Explain the processes of nuclear fission and nuclear fusion by using the plot of binding energy per nucleon $\left(\frac{BE}{A}\right)$ versus the mass number A.

16. (a) Distinguish between nuclear fission and fusion giving an example of each.
(b) Explain the release of energy in nuclear fission and fusion on the basis of binding energy per nucleon curve.

OR

- (a) State two distinguishing features of nuclear force.
(b) Draw a plot showing the variation of potential energy of a pair of nucleons as a function of their separation. Mark the regions on the graph where the force is:
(i) attractive, and (ii) repulsive.

17. A given coin has a mass of 3.0 g. Calculate the nuclear energy that would be required to separate all the neutrons and protons from each other. For simplicity assume that the coin is entirely made of ${}^{63}_{29}\text{Cu}$ atoms (of mass 62.92960 u).

OR

- (i) Briefly discuss three characteristics of the forces between nucleons.
(ii) Which out of ${}^8_4\text{X}$ and ${}^5_3\text{Y}$ nuclei is more stable and why?

SECTION – D

Questions 18 carry 5 marks.

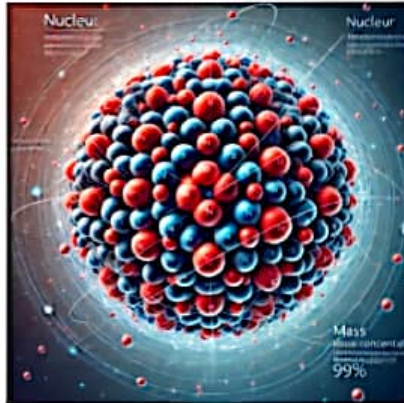
18. Asha's mother read an article in the newspaper about a disaster that took place at Chernobyl. She could not understand much from the article and asked a few questions from Asha regarding the article. Asha tried to answer her mother's questions based on what she learnt in Class XII Physics.
(a) What was the installation at Chernobyl where the disaster took place? What, according to you, was the cause of this disaster?
(b) Explain the process of release of energy in the installation at Chernobyl.
(c) A nucleus with mass number $A = 240$ and $BE/A = 7.6 \text{ MeV}$ breaks into two fragments each of $A = 120$ with $BE/A = 8.5 \text{ MeV}$. Calculate the released energy.



SECTION – E (Case Study Based Questions)

Questions 19 to 20 carry 4 marks each.

- 19. Nuclear Force:** Neutrons and protons are identical particle in the sense that their masses are nearly the same and the force, called nuclear force, does into distinguish them. Nuclear force is the strongest force. Stability of nucleus is determined by the neutron proton ratio or mass defect or packing fraction. Shape of nucleus is calculated by quadrupole moment and spin of nucleus depends on even or odd mass number. Volume of nucleus depends on the mass number. Whole mass of the atom (nearly 99%) is centred at the nucleus.

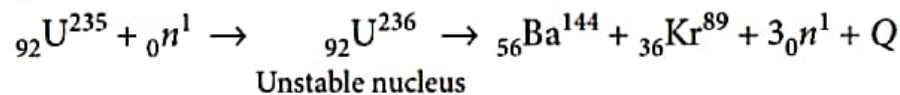


- (i) The correct statements about the nuclear force is/are
(a) change independent (b) short range force
(c) non-conservative force (d) all of these.
- (ii) The range of nuclear force is the order of
(a) 2×10^{-10} m (b) 1.5×10^{-20} m (c) 1.2×10^{-4} m (d) 1.4×10^{-15} m
- (iii) A force between two protons is same as the force between proton and neutron. The nature of the force is
(a) electrical force (b) weak nuclear force (c) gravitational force (d) strong nuclear force.
- (iv) Two protons are kept at a separation of 40 \AA . F_n is the nuclear force and F_e is the electrostatic force between them. Then
(a) $F_n \ll F_e$ (b) $F_n = F_e$ (c) $F_n \gg F_e$ (d) $F_n \approx F_e$
- OR**
- (v) All the nucleons in an atom are held by
(a) nuclear forces (b) van der Waal's forces
(c) tensor forces (d) coulomb forces

- 20. Nuclear Fission:** In the year 1939, German scientist Otto Hahn and Strassmann discovered that when an uranium isotope was bombarded with a neutron, it breaks into two intermediate mass fragments.



It was observed that, the sum of the masses of new fragments formed were less than the mass of the original nuclei. This difference in the mass appeared as the energy released in the process. Thus, the phenomenon of splitting of a heavy nucleus (usually $A > 230$) into two or more lighter nuclei by the bombardment of proton, neutron, α -particle, etc with liberation of energy is called nuclear fission.



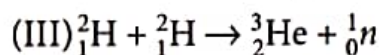
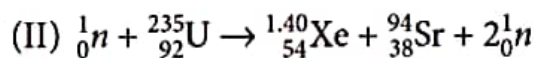
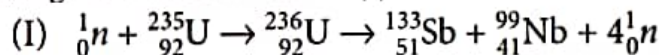
(i) Nuclear fission can be explained on the basis of

- (a) Millikan's oil drop method (b) Liquid drop model
(c) Shell model (d) Bohr's model.

(ii) For sustaining the nuclear fission chain reaction in a sample (of small size) of ${}_{92}^{235}\text{U}$, it is desirable to slow down fast neutrons by

- (a) friction (b) elastic damping/scattering
(c) absorption (d) none of these.

(iii) Which of the following is/are fission reaction(s)?



- (a) Both II and III (b) Both I and III (c) Only II (d) Both I and II

(iv) On an average, the number of neutrons and the energy of a neutron released per fission of a uranium atom are respectively

- (a) 2.5 and 2 keV (b) 3 and 1 keV (c) 2.5 and 2 MeV (d) 2 and 2 keV

OR

(v) In any fission process, ratio of mass of daughter nucleus to mass of parent nucleus is

- (a) less than 1 (b) greater than 1
(c) equal to 1 (d) depends on the mass of parent nucleus.



PRACTICE PAPER 12 (2024-25)

CHAPTER 12 ATOMS (ANSWERS)

SUBJECT: PHYSICS
CLASS : XII

MAX. MARKS : 40
DURATION : 1½ hrs

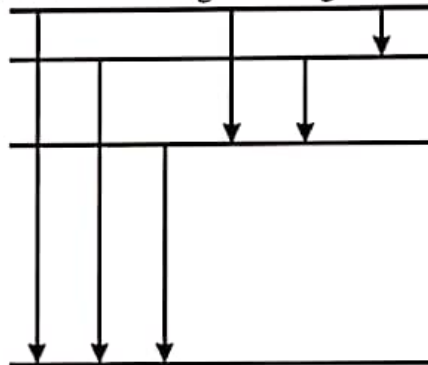
General Instructions:

- All questions are compulsory.
- This question paper contains 20 questions divided into five Sections A, B, C, D and E.
- Section A comprises of 10 MCQs of 1 mark each. Section B comprises of 4 questions of 2 marks each. Section C comprises of 3 questions of 3 marks each. Section D comprises of 1 question of 5 marks each and Section E comprises of 2 Case Study Based Questions of 4 marks each.
- There is no overall choice.
- Use of Calculators is not permitted

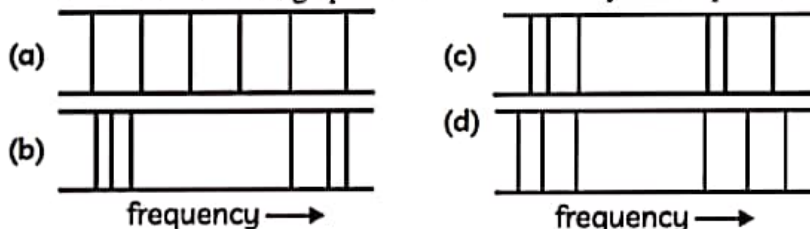
SECTION – A

Questions 1 to 10 carry 1 mark each.

1. The emission spectrum of an element is the spectrum of frequencies of EM radiations emitted due to electrons making a transition from a higher energy state to a lower energy state. The given diagram shows electron transitioning from higher energy states to lower energy states.



Which of the following spectrums most closely corresponds to the above transitions?



Ans. (c)

The transitions given belong to Lyman, Balmer and Paschen series. The figure (c) correctly depicts these transitions.

2. In Balmer series of hydrogen atom, as the wavelength of spectral lines decreases, they appear:
- equally spaced and equally intense.
 - further apart and stronger in intensity.
 - closer together and stronger in intensity.
 - closer together and weaker in intensity.

Ans. (d) closer together and weaker in intensity.

As wavelength of spectral lines in Balmer series decreases, energy increases. The spectral lines are emitted when electron transitions from higher energy level to lower energy level. Higher energy levels are closer together. Hence, as wavelength decreases the spectral lines converge together.

Since electrons in higher levels vary rarely compared to lower level. Intensity of the spectral lines decreases as wavelength decreases.

3. The radius (r_n) of n th orbit in Bohr model of hydrogen atom varies with n as:
(a) $r_n \propto n$ (b) $r_n \propto 1/n$ (c) $r_n \propto n^2$ (d) $r_n \propto 1/n^2$

Ans. (c) $r_n \propto n^2$

4. Specify the transition of electron in the wavelength of the line in the Bohr model of hydrogen atom which gives rise to the spectral line of highest wavelength.

(a) $n = 3$ to $n = 1$ (b) $n = 3$ to $n = 2$ (c) $n = 4$ to $n = 1$ (d) $n = 4$ to $n = 2$

Ans. (b) $n = 3$ to $n = 2$

In the Bohr model of the hydrogen atom, the spectral line of highest wavelength is the Lyman-alpha line, which corresponds to the transition of an electron from the $n = 2$ energy level to the $n = 1$ energy level.

When an electron in a hydrogen atom transits from a higher energy level to a lower energy level, it releases energy in the form of a photon with a specific wavelength. The wavelength of the photon is determined by the energy difference between the two energy levels involved in the transition.

5. When alpha particles are sent through a thin gold foil, most of them go straight through the foil, because:

- (a) alpha particles are positively charged
(b) the mass of an alpha particle is more than the mass of an electron
(c) most of the part of an atom is empty space
(d) alpha particles move with high velocity

Ans. (c) most of the part of an atom is empty space

As the majority of an atom is empty space, the majority of alpha particles that are delivered through a thin metal foil, pass straight through the foil.

6. An electron with angular momentum L moving around the nucleus has a magnetic moment given by:

(a) $eL/2m$ (b) $eL/3m$ (c) $eL/4m$ (d) eL/m

Ans. (a) $eL/2m$

7. The energy of an electron in n th orbit of hydrogen atom is, $E_n = -13.6/n^2$ eV. The negative sign of energy indicates that:

- (a) electron is free to move.
(b) electron is bound to the nucleus.
(c) kinetic energy of electron is equal to potential energy of electron.
(d) atom is radiating energy.

Ans. (b) electron is bound to the nucleus.

The negative sign means that the energy of the electron in the atom is lower than the energy of a free electron at rest. A free electron at rest is an electron that is infinitely far away from the nucleus and is assigned the energy value zero.

8. Which of the following statements is NOT correct according to Rutherford model?

- (a) Most of the space inside an atom is empty.
(b) The electrons revolve around the nucleus under the influence of Coulomb force acting on them.
(c) Most part of the mass of the atom and its positive charge are concentrated at its centre.
(d) The stability of atom was established by this model.

Ans. (d) The stability of atom was established by this model.

The Rutherford model of the atom fails to explain atomic stability. When an electron moves in a circular path, it should accelerate and emit energy. As a result, the electron would lose energy continuously and eventually collapse into the nucleus.



$$\frac{1}{\lambda_B} = R_H \left(\frac{1}{2^2} - \frac{1}{\infty^2} \right) = \frac{1}{4} R_H$$

Now, required ratio is: $\frac{\lambda_L}{\lambda_B} = \frac{\frac{4}{3}}{\frac{4}{1}} = \frac{1}{3}$

SECTION – C

Questions 15 to 17 carry 3 marks each.

15. Calculate the de-Broglie wavelength associated with the electron revolving in the first excited state of hydrogen atom. The ground state energy of the hydrogen atom is -13.6 eV.
 Ans. Energy of the electron in the first excited state,

$$E_1 = \frac{13.6}{2^2} \text{ eV} = 3.4 \text{ eV} = -3.4 \times 1.6 \times 10^{-19} \text{ J} = -5.44 \times 10^{-19} \text{ J}$$

Associated kinetic energy = $-E_1$

$$K = 5.44 \times 10^{-19} \text{ J}$$

\therefore de-Broglie wavelength, $\lambda = h/p$

$$\lambda = \frac{h}{\sqrt{2mK}} = \frac{6.63 \times 10^{-34}}{(2 \times 9.1 \times 10^{-31} \times 5.44 \times 10^{-19})^{1/2}} \text{ m} = \frac{6.63 \times 10^{-34}}{(99.008)^{1/2} \times 10^{-25}} \text{ m}$$

$$\approx 0.663 \times 10^{-9} \text{ m} = 0.663 \text{ nm} = 6.63 \text{ \AA}$$

OR

(i) State Bohr postulate of hydrogen atom that gives the relationship for the frequency of emitted photon in a transition.

(ii) An electron jumps from fourth to first orbit in an atom. How many maximum number of spectral lines can be emitted by the atom? To which series these lines correspond?

Ans. (i) **Bohr's third postulate:** It states that an electron might make a transition from one of its specified non-radiating orbits to another of lower energy. When it does so, a photon is emitted having energy equal to the energy difference between the initial and final states.

The frequency of the emitted photon is given by

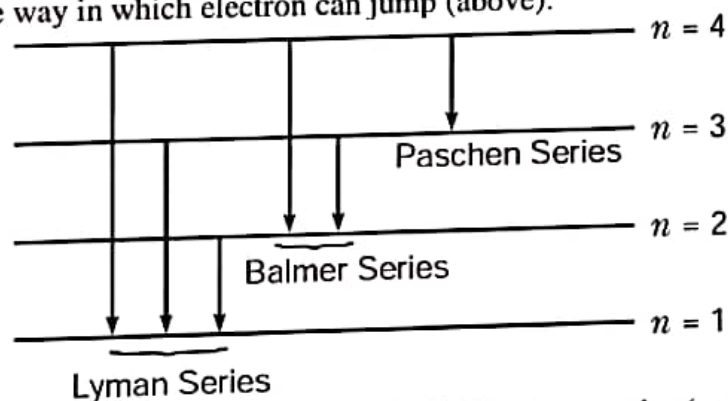
$$h\nu = E_i - E_f$$

where E_i and E_f are the energies of the initial and final states and $E_i > E_f$.

(ii) Electron jumps from fourth to first orbit in an atom

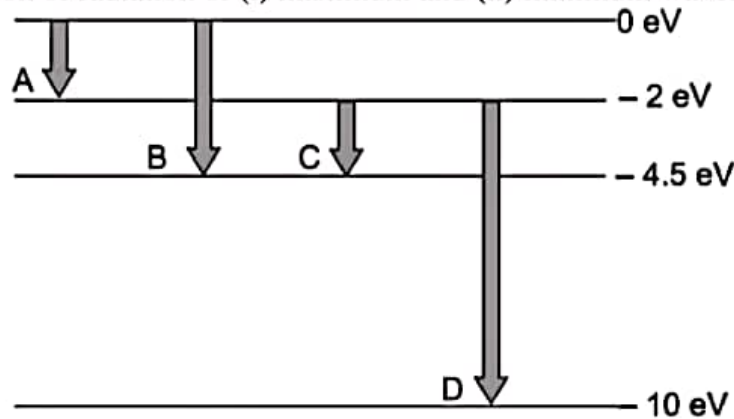
$$\therefore \text{Maximum number of spectral lines can be } {}^4C_2 = \frac{4!}{2!2!} = \frac{4 \times 3}{2} = 6$$

In diagram, possible way in which electron can jump (above).



The line responds to Lyman series (e^- jumps to 1st orbit), Balmer series (e^- jumps to 2nd orbit), Paschen series (e^- jumps to 3rd orbit).

16. The energy levels of a hypothetical atom are shown alongside. Which of the shown transitions will result in the emission of a photon of wavelength 275 nm? Which of these transitions correspond to emission of radiation of (i) maximum and (ii) minimum wavelength?



Ans:

Energy of photon wavelength 275 nm

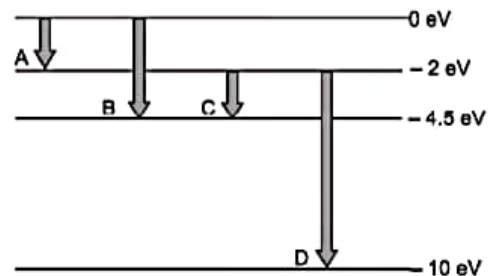
$$E = \frac{hc}{\lambda} = \frac{6.63 \times 10^{-34} \times 3 \times 10^8}{275 \times 10^{-9} \times 1.6 \times 10^{-19}} \text{ eV} = 4.5 \text{ eV.}$$

This corresponds to transition 'B'.

$$(i) \Delta E = \frac{hc}{\lambda} \Rightarrow \lambda = \frac{hc}{\Delta E}$$

For maximum wavelength ΔE should be minimum. This corresponds to transition A.

(ii) For minimum wavelength ΔE should be maximum. This corresponds to transition D.



OR

Determine the distance of closest approach when an alpha particle of kinetic energy 4.5 MeV strikes a nucleus of $Z = 80$, stops and reverses its direction.

Ans. Let r be the centre to centre distance between the alpha particle and the nucleus ($Z = 80$).

When the alpha particle is at the stopping point, then

$$K = \frac{1}{4\pi\epsilon_0} \frac{(Ze)(2e)}{r}$$

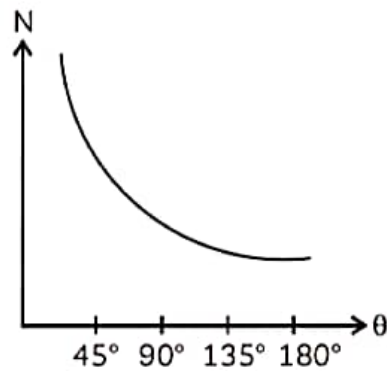
$$\text{or } r = \frac{1}{4\pi\epsilon_0} \frac{2Ze^2}{K} = \frac{9 \times 10^9 \times 2 \times 80 e^2}{4.5 \text{ MeV}}$$

$$= \frac{9 \times 10^9 \times 2 \times 80 \times (1.6 \times 10^{-19})^2}{4.5 \times 10^6 \times 1.6 \times 10^{-19}}$$

$$= \frac{9 \times 160 \times 1.6}{4.5} \times 10^{-16} = 512 \times 10^{-16} \text{ m} = 5.12 \times 10^{-14} \text{ m}$$

17. Draw the graph showing variation of scattered particles detected (N) with the scattering angle (θ) in Geiger-Marsden experiment. Write two conclusions that you can draw from this graph. Obtain the expression for the distance of closest approach in this experiment.

Ans. The graph showing the variation of scattered particles (N) versus the scattering angle (θ) is given by



The conclusion drawn from this graph are :

- (i) Very few particles are reflected back at $\theta = 180^\circ$ because almost all the mass of the foil is concentrated on certain points (nuclei) of atoms.
- (ii) Most of the α -particles pass undeviated through the gold foil.

Let the distance of closest approach be r then coulombic repulsion experienced by a-particle must overcome its kinetic energy.

$$\text{i.e. } \frac{Ze^2}{4\pi\epsilon_0 r} = \frac{1}{2}mv^2 \Rightarrow r = \frac{2Ze^2}{4\pi\epsilon_0 mv^2}$$

OR

Derive an expression for the frequency of radiation emitted when a hydrogen atom de-excites from level n to level $(n - 1)$. Also show that for large values of n , this frequency equals to classical frequency of revolution of an electron.

Ans. From Bohr's theory, the frequency f of the radiation emitted when an electron de - excites from level n_2 to level n_1 is given as

$$f = \frac{2\pi^2 mk^2 Z^2 e^4}{h^3} \left[\frac{1}{n_1^2} - \frac{1}{n_2^2} \right]$$

Given $n_1 = n - 1$, $n_2 = n$, derivation of it

$$f = \frac{2\pi^2 mk^2 Z^2 e^4}{h^3} \frac{(2n - 1)}{(n - 1)^2 n^2}$$

For large n , $2n - 1 = 2n$, $n - 1 = n$ and $Z = 1$.

$$\text{Thus, } f = \frac{4\pi^2 mk^2 e^4}{n^3 h^3}$$

which is same as orbital frequency of electron in n^{th} orbit.

$$f = \frac{v}{2\pi r} = \frac{4\pi^2 mk^2 e^4}{n^3 h^3}$$

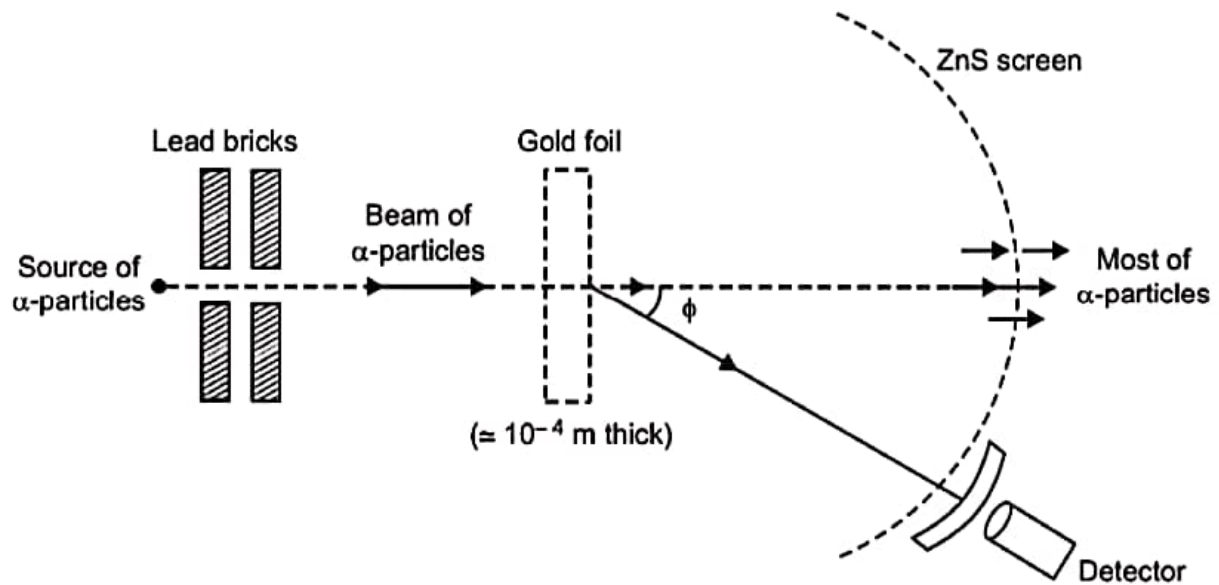
SECTION - D

Questions 18 carry 5 marks.

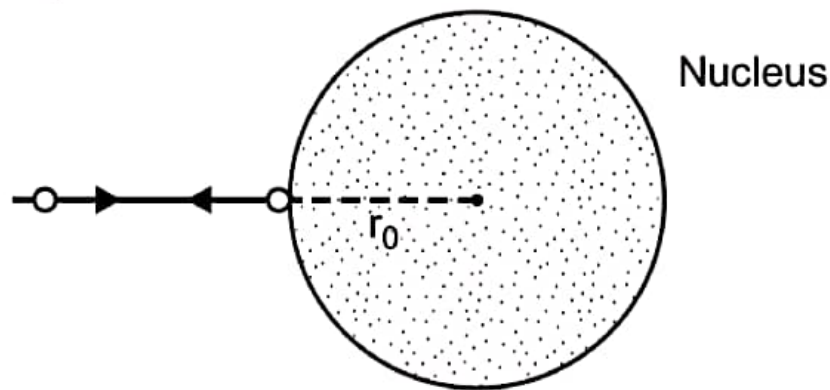
18. Draw a schematic arrangement of the Geiger-Marsden experiment. How did the scattering of α -particles of a thin foil of gold provide an important way to determine an upper limit on the size of the nucleus? Explain briefly.

Ans:

The Schematic arrangement of Geiger-Marsdon Experiment (also known as Rutherford Scattering Experiment) is shown in fig.



Observations: (i) Only a small fraction of number of α -particles rebound back. This shows that the number of α -particles undergoing head on collision is very small. The conclusion is that the entire positive charge of atom is concentrated in a small volume called the **nucleus**.



At the distance of head on approach, the entire kinetic energy of α -particle is converted into electrostatic potential energy. This distance of head on approach gives an upper limit of the size of nucleus (denoted by r_0) and is given by

$$E_k = \frac{1}{4\pi\epsilon_0} \frac{(Ze)(2e)}{r_0}$$

$$\Rightarrow r_0 = \frac{1}{4\pi\epsilon_0} \frac{2Ze^2}{E_k}$$

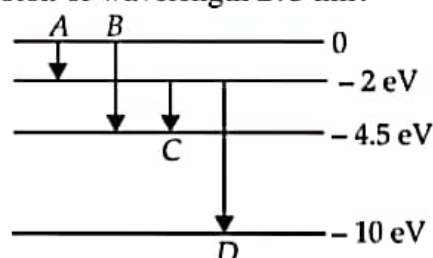
This is about 10^{-14} m.

OR

(a) State Bohr's postulate to define stable orbits in hydrogen atom. How does de Broglie's hypothesis explain the stability of these orbits?

(b) A hydrogen atom initially in the ground state absorbs a photon which excites it to the $n = 4$ level. Estimate the frequency of the photon.

(c) The energy levels of a hypothetical atom are given below. Which of the shown transitions will result in the emission of photon of wavelength 275 nm?



Ans: (a) Bohr's postulate, for stable orbits, states

"The electron, in an atom, revolves around the nucleus only in those orbits for which its angular momentum is an integral multiple of $h/2\pi$ ($h = \text{Planck's constant}$)."

As per de Broglie's hypothesis, $\lambda = \frac{h}{p} = \frac{h}{mv}$

For a stable orbit, we must have circumference of the orbit = $n\lambda$ ($n=1,2,3,\dots$)

$$\therefore 2\pi r = \frac{nh}{mv} \Rightarrow mvr = \frac{nh}{2\pi}$$

Thus de-Broglie showed that formation of stationary pattern for integral 'n' gives rise to stability of the atom.

This is nothing but the Bohr's postulate.

(b) Energy in the $n = 4$ level = $-E_0/4^2 = -E_0/16$

\therefore Energy required to take the electron from the ground state, to the

$$\begin{aligned} n = 4 \text{ level} &= \left(-\frac{E_0}{16}\right) - (-E_0) \\ &= \left(\frac{-1 + 16}{16}\right)E_0 = \frac{15}{16}E_0 \\ &= \frac{15}{16} \times 13.6 \times 1.6 \times 10^{-19} \text{ J} \end{aligned}$$

Let the frequency of the photon be ν , we have

$$h\nu = \frac{15}{16} \times 13.6 \times 1.6 \times 10^{-19}$$

$$\begin{aligned} \therefore \nu &= \frac{15 \times 13.6 \times 1.6 \times 10^{-19}}{16 \times 6.63 \times 10^{-34}} \text{ Hz} \\ &= 3.07 \times 10^{15} \text{ Hz} \end{aligned}$$

$$(c) \text{ Energy of photon} = \frac{hc}{\lambda} = \frac{6.63 \times 10^{-34} \times 3 \times 10^8}{275 \times 10^{-9} \times 1.6 \times 10^{-19}} \text{ eV} = 4.5 \text{ eV}$$

The corresponding transition is B.

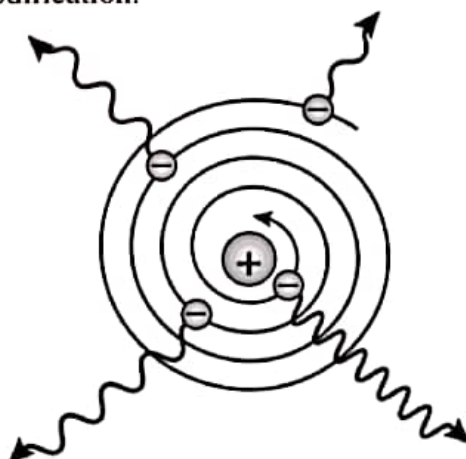
SECTION – E (Case Study Based Questions)

Questions 19 to 20 carry 4 marks each.

19. Case-Study 1: Read the following paragraph and answer the questions.

The Bohr Atom: Rutherford's model of the atom, although strongly supported by evidence for the nucleus, is inconsistent with classical physics. An electron moving in a circular orbit round a nucleus is accelerating and according to electromagnetic theory it should emit radiation continuously and so lose energy. If this happened the radius of the orbit would decrease and the electron would spiral into the nucleus. Evidently either this model of the atom or the classical theory of radiation requires modification.

10/13



In 1913, in an effort to overcome this paradox, Bohr, drawing inspiration from the success of the quantum theory in solving other problems involving radiation and atoms, made two revolutionary suggestions.

Electrons can revolve round the nucleus only in certain 'allowed orbits' and while they are in these orbits they do not emit radiation. An electron in an orbit has a definite amount of energy. It possesses kinetic energy because of its motion and potential energy on account of the attraction of the nucleus. Each allowed orbit is therefore associated with a certain quantity of energy, called the 'energy of the orbit', which equals the total energy of an electron in it.

An electron can 'jump' from one orbit of energy E_2 to another of lower energy E_1 and the energy difference is emitted as one quantum of radiation of frequency f given by Planck's equation $E_2 - E_1 = hf$.

(i) According to Bohr's model of hydrogen atom, an electron can revolve round a proton indefinitely, if its path is

- (a) a perfect circle of any radius (b) a circle of constantly decreasing radius
(c) a circle of an allowed radius (d) an ellipse

(ii) In Bohr model of hydrogen atom, which of the following is quantised?

- (a) Linear velocity of electron (b) Angular velocity of electron
(c) Linear momentum of electron (d) Angular momentum of electron

(iii) For an electron in the second orbit of hydrogen, what is the moment of momentum as per the Bohr's model?

- (a) $2ph$ (b) ph (c) h/p (d) $2h/p$

OR

An electron orbiting in H atom has energy level -3.4 eV. Its angular momentum will be

- (a) 2.1×10^{-34} Js (b) 2.1×10^{-20} Js (c) 4×10^{-20} Js (d) 4×10^{-34} Js

(iv) The Bohr's model is applicable to which kind of atoms?

- (a) Having one electron only (b) Having two electrons
(c) Having eight electrons (d) Having more than eight electrons

Ans. (i) (c) In Bohr's model of hydrogen atom, an electron can revolve around nucleus only in a circle of allowed radius.

(ii) (d) In Bohr model of hydrogen atom, angular momentum of electron is quantised.

(iii) (c) In second orbit of hydrogen, $n = 2$

$$L = 2 \left(\frac{h}{2\pi} \right) = \frac{h}{\pi}$$

OR

(a) The electron revolving in second orbit ($n = 2$) has energy equal to -3.4 eV. Therefore, its angular momentum is

$$L \cong 2 \left(\frac{h}{2\pi} \right) = \frac{h}{\pi} = \frac{6.63 \times 10^{-34}}{22/7} = 2.1 \times 10^{-34} \text{ Js}$$

(iv) (a) Bohr's model is applicable to hydrogen - like species *i.e.*, atoms having one electron only. Such species are also called hydrogen like species.

20. J. J. Thomson's "plum pudding" model was unable to account for some scientific findings about the atomic structure of elements. As a result, British scientist Ernest Rutherford conducted an experiment in 1909 and, based on the results, developed the Rutherford atomic model and the atomic structure of the elements. At the time, there was still no clear model that defined atoms. He conducts an experiment in which he bombards a thin sheet of gold with alpha particles, observing the interactions between the particles and the foil as well as their route. First, he noticed that the majority of α -particles that are fired at the gold sheet pass through the foil without being deflected, indicating that the majority of the space is vacant.



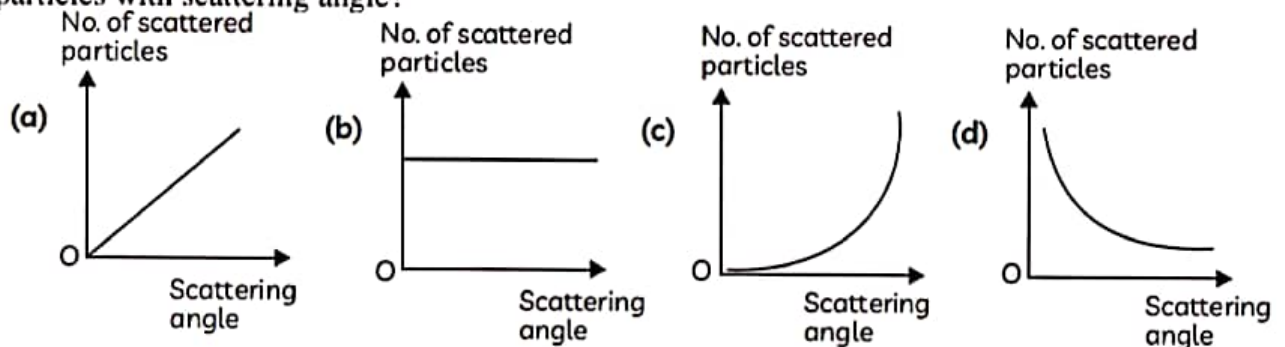


The fact that some of the α -particles were partially deflected through the gold sheet at extremely small angles indicates that the positive charge in an atom is not spread uniformly. In an atom, the positive charge is confined to a relatively small volume. Only a very small percentage of the alpha particles (1–2%) were redirected, meaning that only a very small fraction of α -particles deflected nearly 180 degrees. This demonstrates that, in comparison to the entire volume of an atom, the positively charged particles' volume is extremely small.

(i) Which of the following was not a conclusion drawn by Rutherford?

- (a) Most of the mass of atoms is concentrated at their center and it is known as the nucleus.
- (b) Nucleus consists of protons and neutrons (only the particles with significant mass).
- (c) Electrons revolve around the positively charged nucleus in parabolic orbits.
- (d) Coulomb's force provides the necessary centripetal acceleration for the electron.

(ii) Which of the following graph correctly represents the variation of number of scattered particles with scattering angle?



(iii) Which of the following is a limitation of Rutherford's model?

- (a) It cannot explain the charge distribution of the atom.
- (b) It cannot explain the stability of atoms.
- (c) It cannot explain the presence of electronic orbits.
- (d) It cannot explain the existence of a nucleus.

(iv) According to the Bohr's model of hydrogen atom, which of the following orbit will not be available for electron to revolve in?

- (a) Orbit A in which electrons have an angular momentum of $2h/\pi$.
- (b) Orbit B in which electrons have an angular momentum of $h/3\pi$.
- (c) Orbit C in which electrons have an angular momentum of $3h/\pi$.
- (d) Orbit D in which electrons have an angular momentum of $h/2\pi$.

Ans. (i) (c) Electrons revolve around the positively charged nucleus in parabolic orbits. Electrons revolve around the nucleus in circular orbits according to Rutherford.

(ii) (d)

The mass in gold foil is concentrated at the nuclei of sizes of a few femtometers. The alpha particle will mostly pass through the foil without any deflection. The few particles that encounter a nucleus will scatter but only slightly. Rarely, an alpha particle will approach a nucleus head on and bounce back to its original path at an angle of 180° . The variation of number of scattered particles with scattering angle is given in (d).

(iii) (b) It cannot explain the stability of atoms.

Objects moving in circular paths always have a positive acceleration. Also, accelerating charged particles should radiate energy. Accordingly, the electron in Rutherford's atomic model should radiate energy continuously and it should collapse on the nucleus when its energy is expended, disturbing the charge configuration of the nucleus and making it unstable. According to the calculations, Rutherford's atom should collapse in about 10^{-8} seconds.

(iv) (b) Orbit B in which electrons have an angular momentum of $h/3\pi$



General Instructions:

- (i). All questions are compulsory.
- (ii). This question paper contains 20 questions divided into five Sections A, B, C, D and E.
- (iii). **Section A** comprises of 10 MCQs of 1 mark each. **Section B** comprises of 4 questions of 2 marks each. **Section C** comprises of 3 questions of 3 marks each. **Section D** comprises of 1 question of 5 marks each and **Section E** comprises of 2 Case Study Based Questions of 4 marks each.
- (iv). There is no overall choice.
- (v). Use of Calculators is not permitted

SECTION – A

Questions 1 to 10 carry 1 mark each.

1. A pure Si crystal having 5×10^{28} atoms m^{-3} is doped with 1 ppm concentration of antimony. If the concentration of holes in the doped crystal is found to be $4.5 \times 10^9 m^{-3}$, the concentration (in m^{-3}) of intrinsic charge carriers in Si crystal is about
 (a) 1.2×10^{15} (b) 1.5×10^{16} (c) 3.0×10^{15} (d) 2.0×10^{16}

Ans. (b) 1.5×10^{16}

$$n_c = \frac{5 \times 10^{28}}{10^6} = 5 \times 10^{22} m^{-3}$$

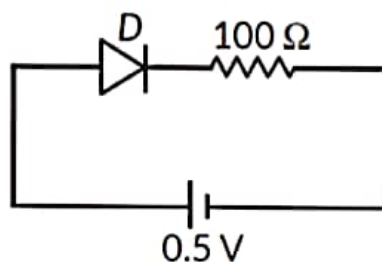
$$n_h = 4.5 \times 10^9 m^{-3}$$

$$\therefore n_i^2 = n_c \times n_h = 5 \times 10^{22} \times 4.5 \times 10^9$$

$$\therefore n_i = 1.5 \times 10^{16} m^{-3}$$

2. The energy required by an electron to jump the forbidden band in silicon at room temperature is about
 (a) 0.01 eV (b) 0.05 eV (c) 0.7 eV (d) 1.1 eV
 Ans. (d):For silicon it is 1.1 eV.

3. The threshold voltage for a p-n junction diode used in the circuit is 0.7 V. The type of biasing and current in the circuit are



- (a) Forward biasing, 0A (b) Reverse biasing, 0 A
 (c) Forward biasing, 5mA (d) Reverse biasing, 2 mA

Ans. (a) Forward biasing, 0A

Here, the applied voltage (0.5 V) is less than barrier potential (0.7 V).

Thus, it is an example of forward biasing and there is no flow of current.

So, answer is (a) forward biasing, 0 Amp.

4. In an extrinsic semiconductor, the number density of holes is $4 \times 10^{20} m^{-3}$. If the number density of intrinsic carriers is $1.2 \times 10^{15} m^{-3}$, the number density of electrons in it is:
 (a) $1.8 \times 10^9 m^{-3}$ (b) $2.4 \times 10^{10} m^{-3}$ (c) $3.6 \times 10^9 m^{-3}$ (d) $3.2 \times 10^{10} m^{-3}$

Ans. (c) $3.6 \times 10^9 \text{ m}^{-3}$

Given that the number density of holes in the extrinsic semiconductor is $4 \times 10^{20} \text{ m}^{-3}$, we can infer that it is a p-type semiconductor, where the majority carrier is holes.

The number density of intrinsic carriers, $n_i^2 = n_e n_h$

Where n_e is the number density of electrons, and n_h is the number density of holes.

Substituting the given values, we get:

$$(1.2 \times 10^{15})^2 = (4 \times 10^{20}) n_e$$

Solving for n , we get: $n_e = 3.6 \times 10^9 \text{ m}^{-3}$

5. The formation of depletion region in a p-n junction diode is due to:

- (a) movement of dopant atoms
- (b) diffusion of both electrons and holes
- (c) drift of electrons only
- (d) drift of holes only.

Ans. (b) diffusion of both electrons and holes.

The formation of a depletion region in a p-n junction diode is due to the diffusion of both electrons and holes.

6. Which one of the following elements will require the highest energy to take out an electron from them? Pb, Ge, C and Si

- (a) Ge
- (b) C
- (c) Si
- (d) Pb

Ans. (b) C

Energy gap of carbon is maximum; hence, it will require maximum energy to remove an electron from it.

7. At equilibrium, in a p-n junction diode the net current is:

- (a) due to diffusion of majority charge carriers
- (b) due to drift of minority charge carriers
- (c) zero as diffusion and drift currents are equal and opposite
- (d) zero as no charge carriers cross the junction.

Ans. (c) zero as diffusion and drift currents are equal and opposite.

At equilibrium, the p-n junction has the same number of majority and minority carriers moving in opposite directions. The net current is sum of drift and diffusion current. So, the net current will be zero as diffusion and drift currents are equal and opposite.

8. In an n-type semiconductor, the donor energy level lies:

- (a) at the centre of the energy gap
- (b) just below the conduction band
- (c) just above the valence band
- (d) in the conduction band.

Ans. (b) just below the conduction band

In the following questions 9 and 10, a statement of assertion (A) is followed by a statement of reason (R). Mark the correct choice as:

- (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).
- (b) Both assertion (A) and reason (R) are true but reason (R) is not the correct explanation of assertion (A).
- (c) Assertion (A) is true but reason (R) is false.
- (d) Assertion (A) is false but reason (R) is true.

9. **Assertion (A):** The temperature coefficient of resistance is positive for metals and negative for p-type semiconductors.

Reason (R): The charge carriers in metals are negatively charged, whereas the majority charge carriers in p-type semiconductors are positively charged.

Ans (b) Both Assertion and Reason are true and Reason is not the correct explanation of Assertion.



Temperature coefficient of metals is positive because higher temperature means more collisions between electrons and hence more resistivity whereas all semiconductors have negative temperature coefficient as number of free charge carriers increase with the temperature which means more conductivity.

10. **Assertion (A):** The electrical conductivity of a semiconductor increases on doping.
Reason (R): Doping always increases the number of electrons in the semiconductor.

Ans. (c) Assertion is true but Reason is false.

The conductivity of semiconductors is increased by adding an appropriate amount of suitable impurity or doping. Doping can be done with an impurity which is electron rich or electron deficient as compared to the intrinsic semiconductor, silicon or germanium. Such impurities introduce electronic defects in them. When silicon is doped with electron rich impurities the extra electron becomes delocalized.

SECTION – B

Questions 11 to 14 carry 2 marks each.

11. Answer the following giving reasons:

- (a) A p-n junction diode is damaged by a strong current.
 (b) Impurities are added in intrinsic semiconductors.

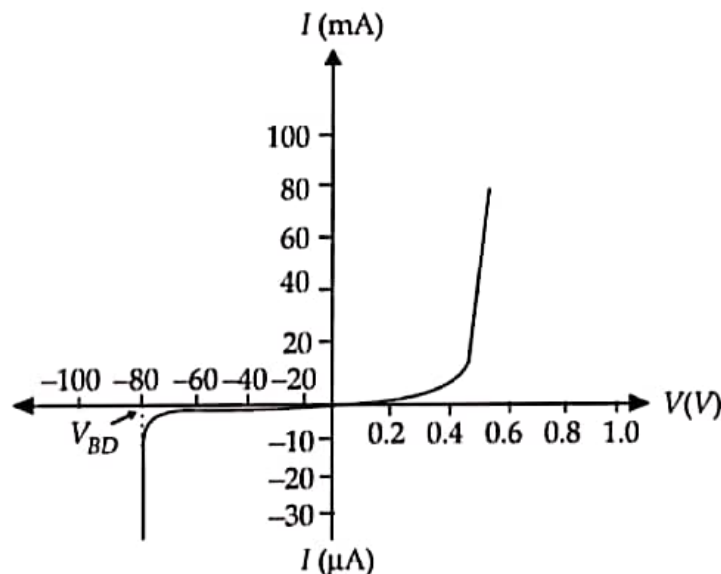
Ans. (a) A p-n junction diode can be damaged by a strong current due to excessive heating.

(b) Impurities are added to intrinsic semiconductors in a process called doping to increase their electrical conductivity.

OR

Draw V-I characteristics of a p-n junction diode. Explain, why the current under reverse bias is almost independent of the applied voltage up to the critical voltage.

Ans:



Since, reverse current is due to flow of minority charge carriers across the junction, it is limited due to the concentration of minority carriers on either side of the junction. It is therefore independent of the voltage applied.

12. Distinguish between an intrinsic semiconductor and p-type semiconductor.

Give reason, why p-type semiconductor crystal is electrically neutral, although $n_h \gg n_e$?

Ans. Intrinsic semiconductor is a pure semiconductor which is free from any impure atoms. p-type semiconductor: When a semiconductor is doped with a trivalent atoms like indium, boron or aluminium (acceptor atom) the resulting material has excess holes and is called p-type semiconductor. In p-type semiconductor $n_h \gg n_e$.

A p-type semiconductor is electrically neutral, because the charge of additional charge carries is just equal and opposite to that of the ionized cores in the lattice.

OR

(a) Carbon and silicon have the same lattice structure. Then why is carbon an insulator but silicon a semiconductor?

(b) What type of extrinsic semiconductor is formed when

(i) germanium is doped with indium?

(ii) silicon is doped with bismuth?

Ans. (a) The 4 bonding of electrons of C and Si lie respectively, in the second and third orbit. Hence energy required to take out an electron from their atoms will be much less than for C. Hence number of free e⁻ for conduction in Si significant but negligibly small for C.

(b) (i) Indium is trivalent, so germanium doped indium is a p-type semiconductor.

(ii) Bismuth is pentavalent, so silicon doped bismuth is an n-type semiconductor.

13. (a) Which charge carriers in intrinsic semiconductor will have conduction?

(b) How does the resistance of a semiconductor change when heated?

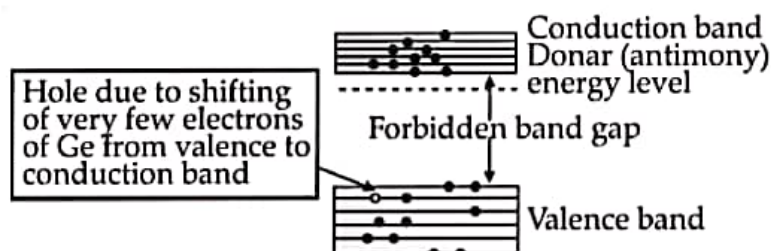
Ans: (a) Electrons and holes. These are the charge carriers which are responsible for conduction. In p type of semiconductor holes are majority charge carriers while in n-type, electrons are majority charge carriers.

(b) Resistance decreases. As with rise in temperature, number of free charge carriers increases due to breaking of more and more covalent bonds and hence its resistivity decreases.

OR

Draw the energy band diagram when intrinsic semiconductor (Ge) is doped with impurity atoms of Antimony (Sb). Name the extrinsic semiconductor so obtained and majority charge carriers in it.

Ans:



This is an n-type extrinsic semiconductor.

Majority carriers are electrons.

14. (a) Why a pure semiconductor behaves like an insulator at 0 K?

(b) Why is the energy gap much more in silicon than in germanium?

Ans: (a) The main cause for the conduction of any semiconductor is the number of free electrons in it. The free electrons has the kinetic energy which depends upon the temperature. As the temperature is 0 K, the kinetic energy will be zero and the free electrons are not available for conduction.

(b) The behaviour of semiconductor depends upon the extent of the energy gap between the valence band and conduction band. Thus, the valence electrons are quite tightly bound to the parent nuclei in case of silicon as compared to germanium.

OR

Answer the following questions.

(i) Can the potential barrier across a p-n junction be measured by simply connecting a voltmeter across the junction?

(ii) Why are elemental dopants for Silicon or Germanium usually chosen from group 13 or group 15?

Ans: (i) No, because the voltmeter must have a resistance very high compared to the junction resistance, then later being nearly infinite.

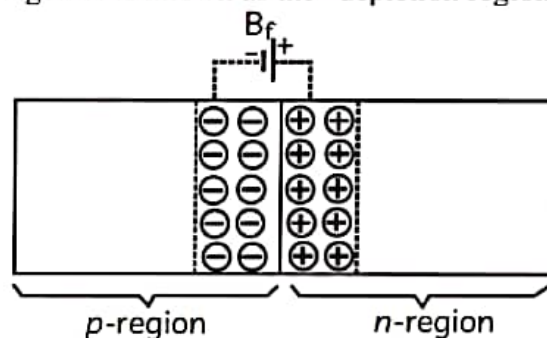
(ii) The size of dopant atoms should be such as not to distort the pure semiconductor lattice structure and yet easily contribute a charge carrier on forming covalent bonds with Si or Ge.

SECTION – C

Questions 15 to 17 carry 3 marks each.

15. Explain with the help of a diagram, how depletion region and potential barrier are formed in a junction diode. How does (a) an increase in the doping concentration, and (b) biasing across the junction, affect the width of the depletion layer?

Ans. Formation of depletion layer: When p-n junction is prepared, electrons from n-region diffuse into p-region and holes diffuse from p-region to n-region it leaves behind an ionized donor on n-side. This ionized donor (positive charge) is immobile as it is bonded to the surrounding atoms. Thus, due to diffusion of electrons from n-p, a layer of positive space charge is developed on n-side of the junction. Similarly due to diffusion of holes from p-n, a layer of negative space charge on the p-side of the junction is developed. This space charge region on either side of the junction together is known as the “depletion region” or “depletion layer”.



Barrier potential: Due to diffusion of holes from p-region to n-region and diffusion of electrons in the reverse direction, part of depletion layer on n-side of junction becomes positively charged and the part of depletion layer on p-type of junction becomes negatively charged. Thus, a junction potential is developed, which opposes further diffusion of holes/electrons. Hence, this potential acts as a barrier and is known as “barrier potential” V_B .

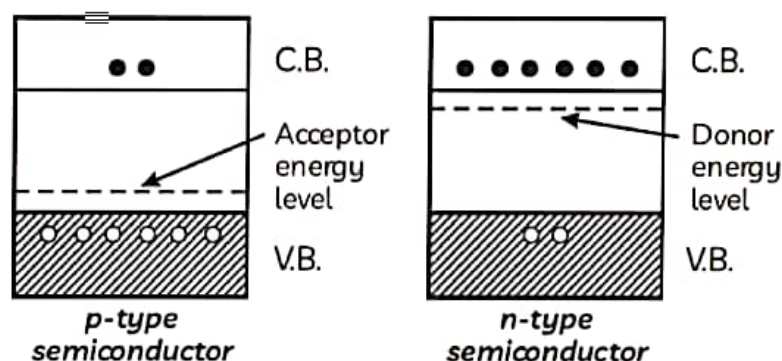
(a) The width of the depletion layer decreases on increasing the doping concentration.

(b) In forward biasing arrangement the width of depletion layer decreases but in reverse biasing the width of depletion layer increases.

OR

Draw energy band diagrams of n-type and p-type semiconductors at temperature $T > 0$ K, depicting the donor and acceptor energy levels. Mention the significance of these levels.

Ans.



Significance:

n-type semiconductors – small energy gap between donor level and conduction band which can be easily covered by thermally excited electrons.

p-type semiconductors – small energy gap between acceptor level and valence band which can be easily covered by thermally excited electrons.

16. Explain the following, giving reasons:

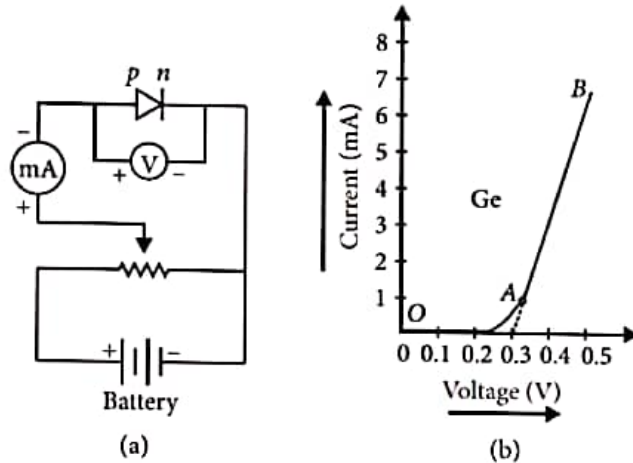
- (a) A doped semiconductor is electrically neutral.
 - (b) In a p - n junction under equilibrium, there is no net current.
 - (c) In a diode, the reverse current is practically not dependent on the applied voltage.
- Ans. (a) A doped semiconductor is electrically neutral because it has equal number of electrons as there are protons. By doping, only the conductivity of semiconductor increases.
- (b) In a p-n junction under equilibrium, there is no net current because diffusion current is exactly equal and opposite to the drift current for both carriers.
- (c) In a diode, the reverse current is practically not dependent on the applied voltage because the reverse current is due to the drifting of the minority charge carriers from one region to another through the junction. Hence a small amount of voltage is enough to carry on the sweeping of the minority charge carriers.

OR

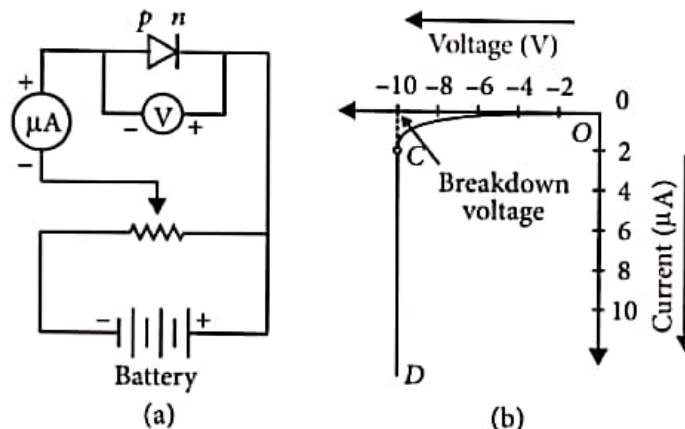
Explain briefly with the help of necessary diagrams, the forward and the reverse biasing of a p-n junction diode. Also draw their characteristic curves in the two cases.

Ans: **Forward biased characteristics:** The circuit diagram for studying forward biased characteristics is shown in the figure. Starting from a low value, forward bias voltage is increased step by step (measured by voltmeter) and forward current is noted (by ammeter). A graph is plotted between voltage and current. The curve so obtained is the forward characteristic of the diode.

At the start when applied voltage is low, the current through the diode is almost zero. It is because of the potential barrier, which opposes the applied voltage. Till the applied voltage exceeds the potential barrier, the current increases very slowly with increase in applied voltage (OA portion of the graph). With further increase in applied voltage, the current increases very rapidly (AB portion of the graph), in this situation, the diode behaves like a conductor. The forward voltage beyond which the current through the junction starts increasing rapidly with voltage is called threshold or cut-in voltage. If line AB is extended back, it cuts the voltage axis at potential barrier voltage.



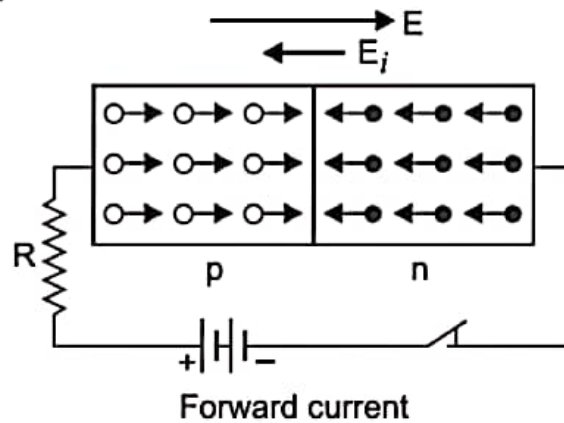
Reverse biased characteristics: The circuit diagram for studying reverse biased characteristics is shown in the figure.



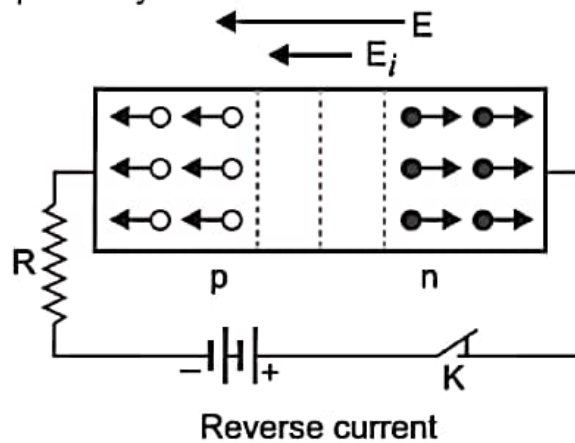
In reverse biased, the applied voltage supports the flow of minority charge carriers across the junction. So, a very small current flows across the junction due to minority charge carriers. Motion of minority charge carriers is also supported by internal potential barrier, so all the minority carriers cross over the junction. Therefore, the small reverse current remains almost constant over a sufficiently long range of reverse bias, increasing very little with increasing voltage (OC portion of the graph). This reverse current is voltage independent upto certain voltage known as breakdown voltage and this voltage independent current is called reverse saturation current.

17. What will the effect of (i) forward biasing, and (ii) reverse biasing be on the width of depletion layer in p-n junction diode?

Ans. (i) Under forward biasing the applied potential difference causes a field which acts opposite to the potential barrier. This results in reducing the potential barrier, and hence the width of depletion layer decreases.

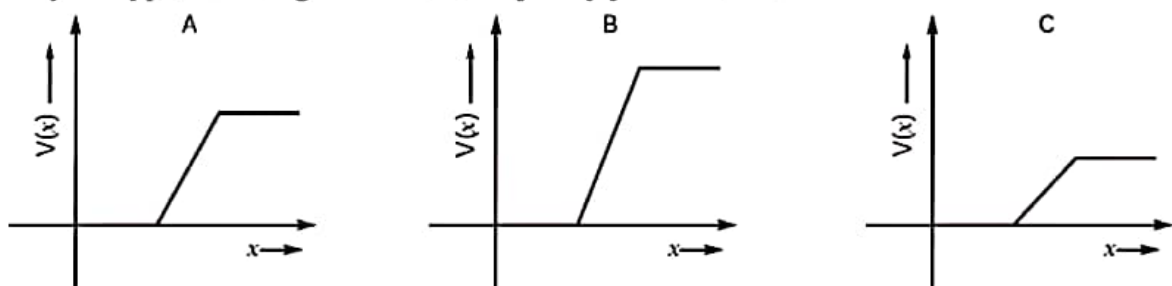


(ii) Under reverse biasing the applied potential difference causes a field which is in the same direction as the field due to internal potential barrier. This results in an increase in barrier voltage and hence the width of depletion layer increases.



OR

The graph of potential barrier versus width of depletion region for an unbiased diode is shown in A. In comparison to A, graphs B and C are obtained after biasing the diode in different ways. Identify the type of biasing in B and C and justify your answer.



Ans. B : Reverse biased

Justification: When an external voltage V is applied across the semiconductor diode such that n -side is positive and p -side is negative, the direction of applied voltage is same as the direction of barrier potential. As a result, the barrier height increases and the depletion region widens due to the change in the electric field. The effective barrier height under reverse bias is $(V_0 + V)$.

C : Forward biased

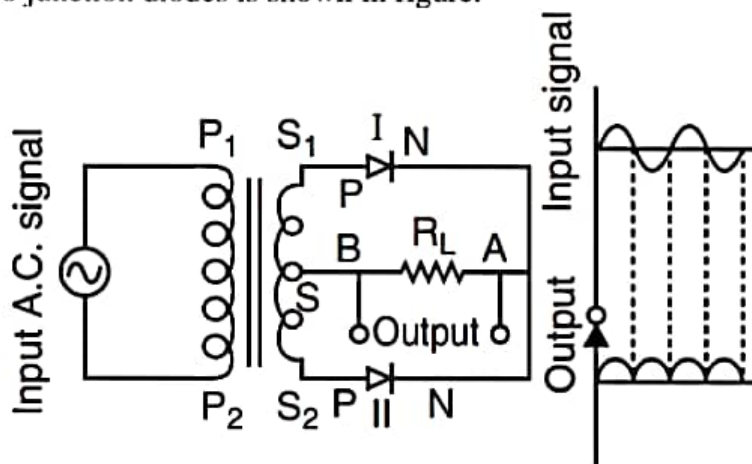
Justification: When an external voltage V is applied across a diode such that p -side is positive and n -side is negative, the direction of applied voltage (V) is opposite to the barrier potential (V_0). As a result, the depletion layer width decreases and the barrier height is reduced. The effective barrier height under forward bias is $(V_0 - V)$.

SECTION – D

Questions 18 carry 5 marks.

18. Draw a labelled circuit diagram of a full-wave rectifier and briefly explain its working principle. Give its input and output waveforms.

Ans: For full wave rectifier we use two junction diodes. The circuit diagram for full wave rectifier using two junction diodes is shown in figure.



Suppose during first half cycle of input ac signal the terminal S_1 is positive relative to S and S_2 is negative relative to S , then diode I is forward biased and diode II is reverse biased. Therefore current flows in diode I and not in diode II. The direction of current i_1 due to diode I in load resistance R_L is directed from A to B . In next half cycle, the terminal S_1 is negative relative to S and S_2 is positive relative to S . Then diode I is reverse biased and diode II is forward biased.

Therefore current flows in diode II and there is no current in diode I. The direction of current i_2 due to diode II in load resistance is again from A to B . Thus for input a.c. signal the output current is a continuous series of unidirectional pulses. This output current may be converted in fairly steady current by the use of suitable filters.

Input and output waveforms.

DPP

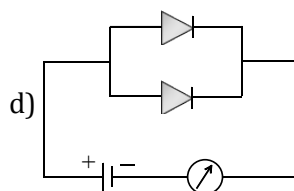
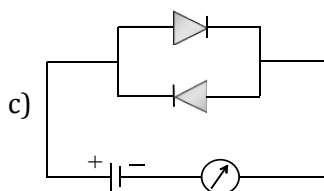
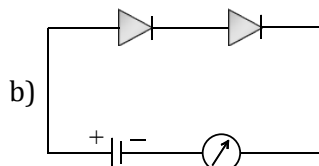
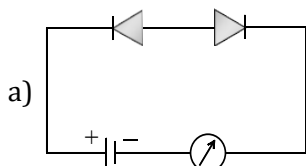
DAILY PRACTICE PROBLEMS

Class : XIIth
Date :

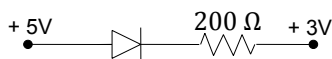
Subject : PHYSICS
DPP No. : 1

Topic :- SEMICONDUCTOR ELECTRONICS: MATERIALS, DEVICES AND SIMPLE CIRCUITS

- The grid in a triode valve is used
 - To increase the thermionic emission
 - To control the plate to cathode current
 - To reduce the inter-electrode capacity
 - To keep cathode at constant potential
- A transistor has $\beta = 40$. A change in base current of $100 \mu\text{A}$, produces change in collector current
 - $40 \times 100 \mu\text{A}$
 - $(100 - 40) \mu\text{A}$
 - $100 + 40 \mu\text{A}$
 - $100 \times 40 \mu\text{A}$
- In a fcc lattice structure, what is the effective number of atoms?
 - 4
 - 3
 - 2
 - 1
- The band gap in germanium and silicon in eV respectively is
 - 0.7, 1.1
 - 1.1, 0.7
 - 1.1, 0
 - 0, 1.1
- Which circuit will not show current in ammeter



- The value of current in the following diagram will be



- Zero
 - 10^{-2} A
 - 10 A
 - 0.025 A
- Radiowaves of constant amplitude can be generated with
 - FET
 - Filter
 - Rectifier
 - Oscillator
 - The plate current in a triode is given by

$$I_p = 0.004 (V_p + 10V_g)^{3/2} \text{ mA}$$

c) $\beta_{AC} = \left(\frac{\Delta I_C}{\Delta I_E}\right), V_C = \text{constant}$

d) $\beta_{AC} = \left(\frac{\Delta I_E}{\Delta I_C}\right), V_C = \text{constant}$

18. When boron is added as an impurity to silicon, the resulting material is
- a) *n*-type semiconductor
 - b) *n*-type conductor
 - c) *p*-type conductor
 - d) *p*-type semiconductor
19. Reverse bias applied to a *p-n* junction diode
- a) Lowers the potential barrier
 - b) Decreases the majority charge carries
 - c) Raises the potential barrier
 - d) Change the mass of *p-n* junction diode
20. The peak voltage in the output of a half-wave diode rectifier fed with a sinusoidal signal without filter is 10 V. The dc compound of the output voltage is
- a) $10/\sqrt{2}$ V
 - b) $10/\pi$ V
 - c) 10 V
 - d) $20/\pi$ V



JINDAL ADARSH GRAMYA BHARTI

HR. SEC. SCHOOL, KIRODIMAL

NAGAR

SUMMER VACATION HOMEWORK -

INTELLECTUAL

PERSISTENCE

2026

EXCELLENCE

CLASS - XII (COMMERCE)

CBSE

SUBJECT – ENGLISH

J. A. G. B. SCHOOL, KIRODIMAL NAGAR

(Session 2026-27)

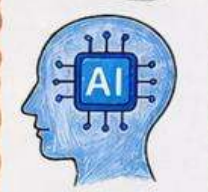
Project Report Portfolio

Class- 11 (M+B+C)

11th Com → Impact of Social Media on Business Growth

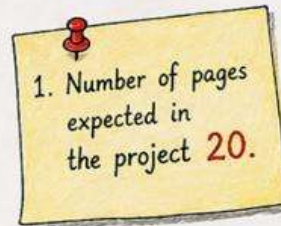
11 Maths → Impact of Artificial Intelligence on Human Life

11 Bio → Importance of Biodiversity Conservation.



Project Report may include the following details -

1. Cover page - Title, school details, details of student (Name, Class, section and Roll no.)
2. Index
3. Acknowledgement
4. Certificate of completion under the guidance of the teacher.
5. Statement of purpose/objective
6. Action plan for the project.
7. Materials - questionnaires for interview, report
8. 800 - 1000 words report
9. Student reflection
10. Support your project with suitably labelled pictures/photographs/graphs/drawings
11. Bibliography / list of resources.



Note -

- 1) Cover page should be Handmade in A4 size sheet.
- 2) Colourful sheet may use.
- 3) Decoration / Creativity should be according to the subject.
- 4) All Writing work should be hand written.



= Homework =

1. Revise all the topics which has done in the class .

I. Fill in the blanks with the correct forms of the words given in the brackets.

- a) Last Sunday, I _____ (go) to the market with my mother. We _____ (buy) fresh vegetables and fruits. While we _____ (walk) through the market, we _____ (see) a street performer. He _____ (sing) beautifully, and many people _____ (gather) around him.
- b) Now, I usually _____ (visit) the market every weekend because I _____ (enjoy) spending time with my family. My mother _____ (prefer) buying fresh items instead of packaged ones.
- c) Next Sunday, we _____ (plan) to visit a new supermarket. I _____ (help) my mother in selecting items, and we _____ (try) some new products. It _____ (be) a fun experience.

II. Rearrange the words to form meaningful sentences.

1. increasing / is / rapidly / pollution / cities / in / big / nowadays
2. students / should / focus / their / on / studies / regularly / and / avoid / distractions
3. technology / has / the / way / changed / we / communicate / completely
4. government / steps / should / strict / take / environment / protect / the / to
5. importance / people / are / becoming / aware / fitness / of / the / slowly

3. Read English newspaper and write 10 hard words / new words in your note book with synonyms everyday.





SUMMER HOLIDAY

HOMework

CLASS 12th BST

Learn
Think
Grow
Succeed



LONG ANSWER TYPE QUESTIONS

1. State any four points which highlight the importance of management.
OR
Explain any three reasons, which clarify that management is gaining importance day by day.
2. Discuss the social objectives of management.
3. "Both efficiency and effectiveness are needed in management"
Comment
4. There are different objectives of business and economics objectives are one among them. Explain these economic objectives.
5. State any four functions performed by Top Level Management.
6. "Science is a systematized body of knowledge that explains certain general truths or the operation of general laws"
In the light of this statement, describe whether management is Science.
7. How does management help in creating a dynamic organisation?
8. Management is a Profession like Accounting, Medicine and Law as it also has a well defined body of knowledge. Yet management does not qualify to be a full fledged profession. Why?
OR
Explain the features of management that do not establish it as a profession.
9. Management cannot be seen, but its presence can be felt: Do you agree?
10. Explain any four features of management.
11. Identify the level of management whose basic task is to integrate diverse elements and coordinate the activities of different departments according to the overall objectives of the organisation. State any two functions of the level of management identified.
12. How does efficient management help in development of society?
13. Give two examples each of positions of different levels of management.
14. What are the personnel objectives of the management?
15. Justify how coordination is:
(a) a continuous process; (b) an all-pervasive function.
16. State any three organisational objectives of management.
OR
Enumerate the three economic objectives of management.
17. "Management does not have some features of a profession. Explain those features.

CASE-BASED QUESTIONS

- Q.1** Kamal Khan and Devid are partners in a firm engaged in the distribution of dairy products in Maharashtra. Kamal is a holder of Senior Secondary School Certificate from Central Board of Education with Business Studies as one of his elective subjects. Khan had done his post-graduation in literature and Devid in Dairy Farming. One day, there was a serious discussion between Khan and Devid regarding the nature of Management as a Science. Khan argued that Management was art whereas, Devid was of the opinion that Management was a science. Kamal intervened and explained to both Khan and Devid about the nature of Management as a Science with the help of his knowledge of Business Studies. Explain, how Kamal would have been able to satisfy both Khan and Devid.
- Q.2** Dheeraj is working as Operations Manager in Tifco Ltd. Name the managerial level at which he is working. State any four functions he will perform as Operations Manager in this company.
- Q.3** Amar, Akbar and Anthony are working in a Pharmaceutical Company. There is a vast difference in the nature of functions performed by them:
a) Amar has to analyse the business environment and its implications for the survival of the firm.
b) Akbar's job is to ensure that their department has the necessary personnel.
c) Anthony's job is to ensure safe and proper working environment to workers.
On the basis of functions performed by the three personnel, identify the level of management at which they are working.
- Q.4** Chandrika Bhattacharya is working in Omax Ltd., a company manufacturing room heaters. She is responsible for all the activities of the business and for its impact on the society. Her job demands long hours and commitment to the organisation.
(a) Identify the level at which Chandrika Bhattacharya is working.
(b) State three more functions required to be performed by Chandrika Bhattacharya at this level.
- Q.5** Sachin determines the overall objectives and strategies for the organisation. He also interacts with business environment to analyse its implications. Name the managerial level at which Sachin is working. State any four of his basic functions.
- Q.6** "In an organisation, the objective of marketing department is to increase sales by 10% by offering discounts. However, the finance department is reluctant to offer discount as it means loss of revenue. One of the importance of coordination help to resolve this conflict. Identify and explain it.
- Q.7** 'Cortico Fabrics' was started by Ashish in 2001 to sell bed sheets, towels, comforters, pillows, cushions, bath mats etc. It is now a famous name and its branches are across India. To manage the work all over India, it has eight teams—two each for North, South, East and West India. Ashish spends a considerable amount of time to develop an orderly pattern of group efforts among different teams and to secure unity of action in pursuit of a common purpose. To ensure suitable allocation of tasks to the various members of the teams and to see that the tasks are performed with harmony among the members, he tries to balance the different teams at different locations.
(a) Identify and explain the concept of management discussed in the above para.
(b) Also, explain any one point of importance of the concept identified in (a) above.



GOOD MANAGEMENT
BUILDS BETTER
ORGANISATIONS
& BETTER SOCIETY



GENERAL INSTRUCTIONS
Write all the above
questions in your
BST COPY



SUBJECT -ACCOUNTANCY

SN. NAME OF STUDENTS

1. AADARSH
2. ANUSHKA
3. DEEPAK
4. GULSHAN
5. KRISHNA
6. ANKUSH
7. DHANWAN
8. FAIJAN
9. GARIMA
10. JHAROKHA

(ABOVE MENTIONED STUDENTS TOPIC FOR PROJECT IS ACCOUNTING RATIO)

SN. NAME OF THE STUDENTS

11. ARYAN
12. ARNOB
13. MAYUR
14. KALPANA
15. SEJAL
16. LAKSHYA
17. ANAMIKA
18. PAYAL
19. AAYUSHI
20. ANMOL
21. SNEHA

(ABOVE MENTIONED STUDENTS TOPIC FOR PROJECT IS CASH FLOW STATEMENT)

SN. NAME OF THE STUDENTS

22. ANJALI
23. ANJUSHREE
24. ARPAN
25. BHAVESH
26. BHAVISHYA
27. ROUNAK
28. KRITTIKA
29. MD TAHBEER
30. NAMAN
31. PRACHI

(ABOVE MENTIONED STUDENTS TOPIC FOR PROJECT IS COMAPRATIVE AND COMMON SIZE STATEMENT)

SN. NAME OF THE STUDENTS

32. ISHA
33. KHAN ABUSHAN
34. KIRAN
35. SUMIT SINGH
36. MONALISA
37. OM PRAKASH
38. OMKAR
39. RIYA
40. PREETI
41. PUSHPA

(ABOVE MENTIONED STUDENTS TOPIC FOR PROJECT IS ACCOUNTING RATIO)

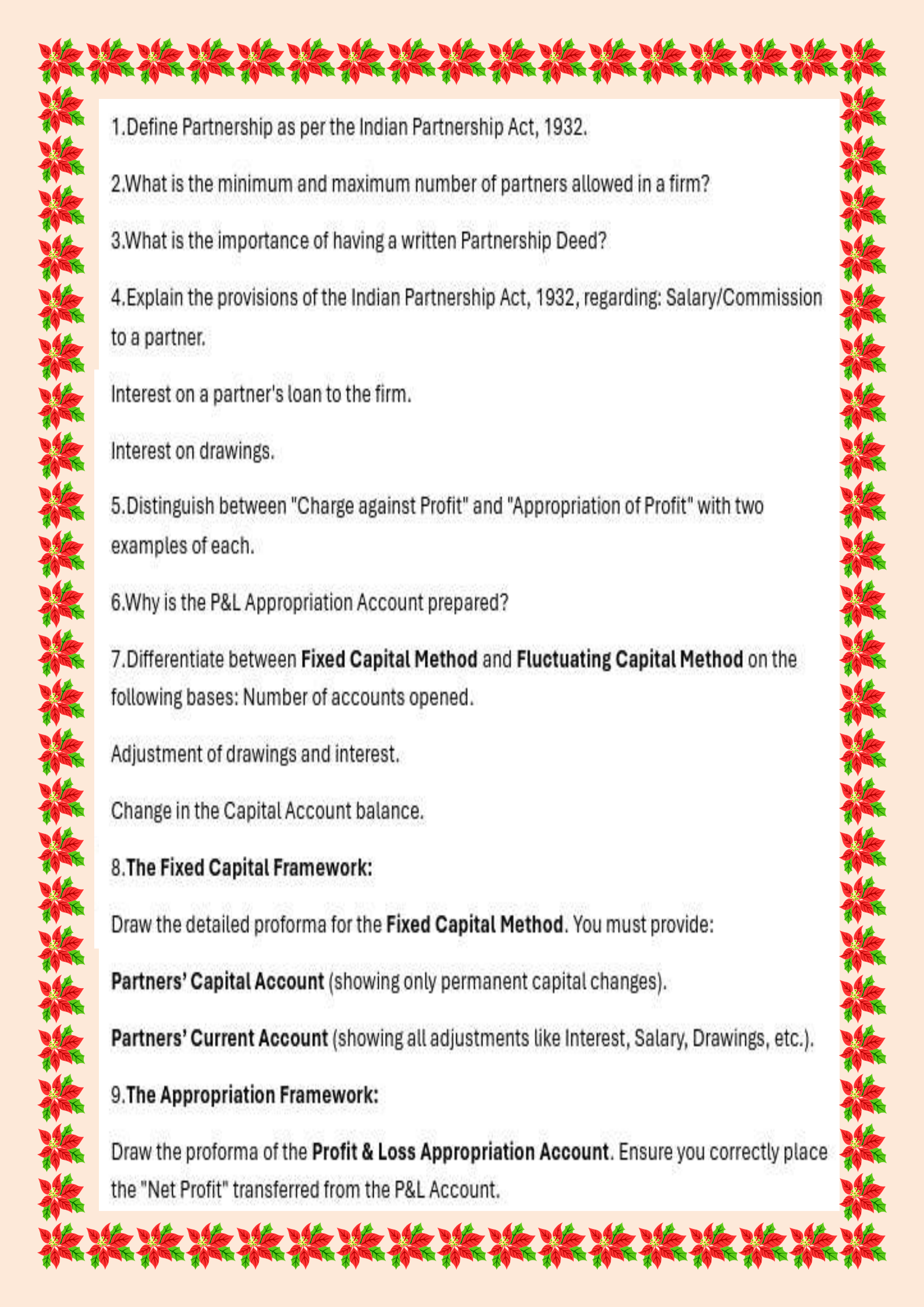
SN. NAME OF THE STUDENTS

42. SANJU
43. ROSHNI
44. SHANTANU
45. SHUBHAM RAJ
46. SOMNATH
47. PRINCE
48. RASHIKA
49. SHRUTI
50. SUMIT
52. SURBHI
53. VAIBHAV

(ABOVE MENTIONED STUDENTS TOPIC FOR PROJECT FILE IS COMPARATIVE AND COMMON SIZE STATEMENT)

Accountancy Project Guidelines (Class 12 - 2026)

1. Cover Page: Title, Name, Class, Roll No., School Name.
 2. Certificate: Signed by the teacher and principal.
 3. Acknowledgement: Acknowledging teacher/school support.
 4. Index: List of contents with page numbers.
 5. Introduction: Brief overview of the chosen company (Profile, Products).
- Objective of the Project: Why you chose this company/topic.**
6. Objective
 7. Importance
 8. Project related numerical problem
 9. Conclusion
 10. Bibliography



1. Define Partnership as per the Indian Partnership Act, 1932.

2. What is the minimum and maximum number of partners allowed in a firm?

3. What is the importance of having a written Partnership Deed?

4. Explain the provisions of the Indian Partnership Act, 1932, regarding: Salary/Commission to a partner.

Interest on a partner's loan to the firm.

Interest on drawings.

5. Distinguish between "Charge against Profit" and "Appropriation of Profit" with two examples of each.

6. Why is the P&L Appropriation Account prepared?

7. Differentiate between **Fixed Capital Method** and **Fluctuating Capital Method** on the following bases: Number of accounts opened.

Adjustment of drawings and interest.

Change in the Capital Account balance.

8. The Fixed Capital Framework:

Draw the detailed proforma for the **Fixed Capital Method**. You must provide:

Partners' Capital Account (showing only permanent capital changes).

Partners' Current Account (showing all adjustments like Interest, Salary, Drawings, etc.).

9. The Appropriation Framework:

Draw the proforma of the **Profit & Loss Appropriation Account**. Ensure you correctly place the "Net Profit" transferred from the P&L Account.

10. Shiv and Hari entered into partnership on 1st April 2023, contributing Rs. 5,00,000 and Rs. 2,00,000 respectively. Hari also introduced Rs. 1,00,000 as additional capital on 1st October 2023. They agreed to share profits in the ratio of 3:2.

Shiv is allowed a salary of Rs. 5,000 per quarter.

Interest on capital is to be allowed @ 8% p.a.

Net profit for the year ended 31st March 2024 was Rs. 1,96,000. **Task:** Prepare the **Profit & Loss Appropriation Account** and **Partners' Current Accounts** (assuming capitals are Fixed).

11. Calculate interest on drawings of Mr. Gupta @ 10% p.a. for the year ended 31st March 2024 in each of the following alternative cases:

Case A: If he withdrew Rs. 30,000 on 1st October 2023 (Date is specific).

Case B: If he withdrew Rs. 2,500 p.m. at the **beginning** of every month.

Case C: If he withdrew Rs. 2,500 p.m. at the **end** of every month.

Case D: If he withdrew Rs. 7,500 during the **middle of each quarter**.

12. After the accounts of a partnership have been closed, it is discovered that interest on capital @ 8% p.a. as provided in the partnership deed has been **omitted** to be recorded. Their fixed capitals were: A Rs. 4,00,000; B Rs. 3,00,000; and C Rs. 2,00,000. The profit-sharing ratio was 2:1:1.

Task: Pass the necessary **Rectifying Journal Entry** and show your workings clearly in an **Adjustment Table**.



VACATION HOMEWORK

CLASS 12TH COMMERCE

SUBJECT – ECONOMICS



National Income and Related Aggregates



LEARNING OUTCOME: To understand the fundamental concepts of Macroeconomics and calculate National Income using various methods while applying them to real-life scenarios.

PHASE 1: THE “ECONOMIC DETECTIVE” (EXPERIENTIAL LEARNING)

1 CIRCULAR FLOW OBSERVATION

Identify three “Real Flows” and three “Money Flows” that occurred in your house over the last week.

Example: You buying milk (Money Flow) vs. the shopkeeper providing the milk (Real Flow).

REAL FLOWS (Goods/Services)

- ✓ Milk provided by shopkeeper
- ✓ Electricity supplied to our house
- ✓ Vegetables delivered by vendor



MONEY FLOWS (Payments)

- ✓ Payment for milk
- ✓ Electricity bill payment
- ✓ Payment for vegetables

2 FACTOR vs. TRANSFER INCOME

List five payments made/received by your family. Categorize them into Factor Income (earned) or Transfer Income (unearned). Explain why Transfer Income is excluded from National Income.

FACTOR INCOME (EARNED)

- Salary earned by father
- Interest on savings
- Rent received from property

TRANSFER INCOME (UNEARNED)

- Pension received by grandfather
- Scholarship received
- Gift received from relative

Transfer Income is excluded from National Income because it does not arise from any current production or contribution to the production process.

3 THE “INTERMEDIATE” TRAP

Visit a local bakery. Identify three goods they use that are Intermediate Goods and one that could be a Final Good depending on who buys it.

INTERMEDIATE GOODS (Used in production)

- ✓ Flour (used to make bread and cake)
- ✓ Yeast (used in baking)
- ✓ Sugar (used in cake and biscuits)



POTENTIAL FINAL GOOD

Cake – Final good if purchased by a customer for consumption, but intermediate if used by another baker to prepare a dessert.

PHASE 2: ANALYTICAL & SITUATION-BASED QUESTIONS

1



SCENARIO A:

The Government of India increases expenditure on the “Digital India” initiative. How will this impact the Gross Domestic Product (GDP) and Gross National Product (GNP) if the technology is sourced from a foreign multinational corporation based in India?

ANSWER:

- GDP will increase because the expenditure is on final goods and services within the domestic territory.
- GNP will not increase by the full amount because the technology payment (profits) will be sent abroad to the foreign company. Thus, $GDP > GNP$ in this case.

2



SCENARIO B:

A group of Indian engineers moves to Germany to work on a short-term project for 6 months. Will their earnings be part of India's Domestic Product or National Product? Justify with the concept of “Normal Resident”.

ANSWER:

Their earnings will be part of India's National Product (GNP) but not Domestic Product (GDP). According to the concept of “Normal Resident”, a person is considered a resident of a country if he/she stays there for more than 6 months (or 182 days) in a year. Since they are in Germany for 6 months, they become residents of Germany during that period.

3



THE GREEN ACCOUNTING CHALLENGE:

If India's GDP grows by 8% but forest cover decreases by 5%, is the “Real GDP” a true indicator of welfare? Suggest an alternative measure.

ANSWER:

No, Real GDP is not a true indicator of welfare in this case because it does not account for environmental degradation and depletion of natural resources. Alternative measure: Genuine Progress Indicator (GPI) or Green GDP which adjusts for environmental costs and sustainable development.

★ SUBMISSION GUIDELINES ★



FORMAT:
Use an A4 size folder.



VISUALS:
Use flowcharts for the Circular Flow of Income and bar graphs for GDP data.



WORD LIMIT:
Keep explanations concise and data-driven (approx. 1500–2000 words total).



PRESENTATION:
Neat handwriting, proper headings, diagrams, graphs and relevant examples.



CLASS XII PHYSICAL EDUCATION: VACATION HOMEWORK



Unit 1



Unit 1

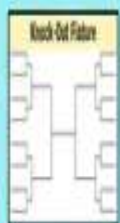


Unit 2

PART A: CASE-STUDY & ANALYTICAL TASKS (Competency-Based)

PART B: EXPERIENTIAL & ART-INTEGRATED ACTIVITIES

TASK 1: THE TOURNAMENT ARCHITECT (Unit 1)



The Challenge: Draw a detailed Knock-out Fixture (11 teams) with Byes.

The Analysis: Write a short brief (200 words) on "Post-program Committee" management: Equipment return & accurate Certificate distribution.



TASK 2: POSTURAL ASSESSMENT (Unit 2)

The Task: Create a "Corrective Action Plan" for a student with two postural deformities.



The Requirement: List 3 specific Asanas/activities for each deformity, with biomechanical explanations for correction.



TASK 3: COMMUNITY FITNESS SURVEY (Unit 2)



The Goal: Investigate physical activity participation of 5 females across age groups (e.g., teen, middle-aged, senior, senior).

The Output: Create a Bar Graph (Art-Integration) representing daily active minutes.



Reflection: 100-word summary on "Sociological barriers" observed preventing regular exercise.

TASK 4: THE 'FIT-INDIA' INFOGRAPHIC (Interdisciplinary)

Design a creative poster illustrating the FEMALE ATHLETE TRIAD.



TASK 5: Complete Physical Education notes up to Unit 2.

SUBMISSION GUIDELINES & FORMAT

- Compile in an A4 size creative file.
- Acknowledge Originality & Personal observation.
- Deadline: Tuesday, 16th June

★ Be Creative! Have Fun!



★ INFORMATICS PRACTICES ASSIGNMENT ★

CLASS XII



Write Python programs for the following questions.
Show proper logic and output clearly.



1 What is a Pandas Series?
How is it different from
a NumPy array?



2 Write a program to create
a Series from a list of 10
integers with custom
index labels.



3 Explain the role of index
in a Series with
an example.



4 Write code to create
a Series using a dictionary
of student marks.



5 How can you access the
third element of a Series
using both positional
indexing and label indexing?



6 Write a Python program to
display only those elements
of a Series that are
greater than 50.



★ DO YOUR BEST — CODING IS FUN WHEN YOU TRY YOUR BEST! ★



7 Write a program to replace all even numbers in a Series with 0.

Logic: Use `.where()` or `.mask()` to replace even numbers with 0.

8 Write a program to count the total number of elements in a Series.

Logic: Use `len()` to get the number of elements in the Series.

9 Write a program to add a constant value to every element of a Series.

Logic: Add the constant to the Series using vectorized operation.

10 Write a program to find the sum of all elements in a Series.

Logic: Use the `sum()` function.

11 Write a program to find the mean of all elements in a Series.

Logic: Use the `mean()` function.

12 Write a program to sort a Series in ascending order.

Logic: Use `sort_values()`.

13 Write a program to reverse the order of a Series.

Logic: Use the slicing step `-1`.

14 Write a program to check if a given value exists in a Series.

Logic: Use the `'in'` keyword.

15 Write a program to drop NaN (missing) values from a Series.

Logic: Use `dropna()` to remove NaN values.