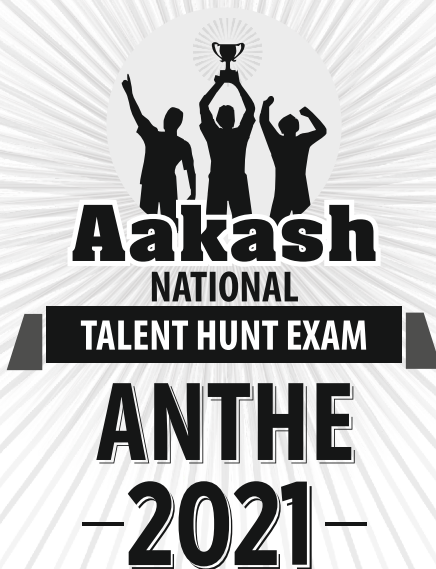


Sample Paper



(Class XI Studying Moving to Class XII)

Physics, Chemistry, Biology

INSTRUCTIONS FOR CANDIDATE

1. Duration of Test is 1 hr.
2. The Test booklet consists of **35** questions. The maximum marks are **90**. There is **no negative marking** for wrong answer.
3. Pattern of the questions are as under:
 - (i) This question paper consists of three parts i.e., Physics, Chemistry and Biology, each having **five sections**.
 - (ii) **Section-I:** This section contains **16** multiple choice questions, which have **only one** correct answer. Each question carries **+2 marks** for correct answer.
 - (iii) **Section-II:** This section contains **7** multiple choice questions, in which **more than one** answer may be correct. Each question carries **+4 marks** for correct answer.
 - (iv) **Section-III:** This section contains **6** multiple choice questions based on paragraphs, which have **only one** correct answer. Each question carries **+2 marks** for correct answer.
 - (v) **Section-IV:** This section contains **3** multiple choice questions based on assertion-reason type, which have **only one** correct answer. Each question carries **+2 marks** for correct answer.
 - (vi) **Section-V:** This section contains **3** matrix match type questions. Each question has two matching Columns. Column-I has four entries (A, B, C, D) and Column-II has four entries (P, Q, R, S). Each entry in Column-I may match with one or more entries in Column-II. Each question carries **+4 marks** for correct answer.



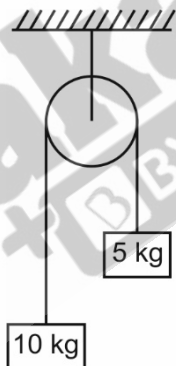
Aakash National Talent Hunt Exam 2021**Sample Paper***(Class XI Studying Moving to Class XII)*

(The questions given in sample paper are indicative of the level and pattern of questions that will be asked in ANTHE-2021)

Time : 1 Hour**MM : 90****PHYSICS****SECTION-I : SINGLE ANSWER TYPE**

This section contains 5 multiple choice questions. Each question has 4 choices (1), (2), (3) and (4) out of which **ONLY ONE** is correct.

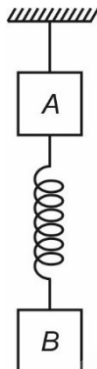
- The acceleration of a particle, starting its motion from rest, is function of velocity as per the equation, $a = 2 - 3v$, where v is the velocity. The velocity of the particle after a very long time will be
 - $\frac{2}{3}$ m/s
 - 2 m/s
 - 3 m/s
 - $\frac{3}{2}$ m/s
- Consider the following figure and assuming the pulley and string as ideal, find the acceleration of the masses



- 10 m/s²
- 2 m/s²
- 3.33 m/s²
- 4 m/s²

Space for Rough Work

3. Ravi is driving his car westward with a speed of 10 m/s and a truck 100 m south of car, is moving northward with same speed. The time after which the distance between them becomes shortest, is
- (1) $5\sqrt{2}$ s (2) $10\sqrt{2}$ s
(3) 5 s (4) 2 s
4. The acceleration of the block B immediately after the string is cut is



- (1) 10 m/s^2 (2) 5 m/s^2
(3) 20 m/s^2 (4) Zero
5. A light rigid rod is hinged at a point at a distance $L/3$ from one end. Here L is length of the rod. The end farther from the hinge has a mass attached to it and the system can oscillate in vertical plane. The minimum horizontal speed given to bottommost point for the system to complete vertical rotation is
- (1) $\sqrt{4gL}$ (2) $\sqrt{5gL}$
(3) $\sqrt{\frac{8}{3}gL}$ (4) $\sqrt{\frac{gL}{3}}$

SECTION-II : MORE THAN ONE ANSWER TYPE

This section contains 2 multiple choice questions. Each question has 4 choices (1), (2), (3) and (4) out of which **MORE THAN ONE** answer may be correct.

6. Work done by friction on an object
- (1) May be zero (2) May be positive
(3) May be negative (4) Is always negative
-

Space for Rough Work

7. Among the following physical quantities, choose the pair(s) with same dimensions.

- (1) Pressure and Force
- (2) Angle and Planck Constant
- (3) Torque and Elastic Potential Energy
- (4) Angular Speed and Frequency

SECTION-III : PARAGRAPH TYPE

This section contains a paragraph. Based upon this paragraph, 2 multiple choice questions have to be answered. Each question has 4 choices (1), (2), (3) and (4), out of which **ONLY ONE** is correct.

Paragraph for Q. Nos. 8 & 9

A body of mass 8 kg is projected from ground at an angle of 37° with the horizontal and with an initial speed 10 m/s. When the body is at the highest point of its trajectory, the body breaks into two parts such that mass of one is thrice the other. The lighter part retraces its path after the explosion.

8. The ratio of radial accelerations of both parts, just after the explosion, is

- (1) 1 : 4
- (2) 1 : 3
- (3) 2 : 3
- (4) 1 : 1

9. The distance between the two parts when they reach the ground, is

- (1) 9.6 m
- (2) 12.8 m
- (3) 10.5 m
- (4) None

SECTION-IV : ASSERTION-REASON TYPE

This section contains 1 Assertion-Reason type question, which has 4 choices (1), (2), (3) and (4) out of which **ONLY ONE** is correct.

10. **A** : Kinetic friction acting on an object can be greater than magnitude of static friction.

R : In circular motion, the change in velocity in one time period is always zero.

- (1) Both (A) and (R) are true and (R) is the correct explanation of (A)
- (2) Both (A) and (R) are true but (R) is not the correct explanation of (A)
- (3) (A) is true but (R) is false
- (4) (A) is false but (R) is true

Space for Rough Work

SECTION-V : MATRIX MATCH TYPE

This section contains 1 Matrix Match type question, which has 2 Columns (Column I and Column II). Column I has four entries (A), (B), (C) and (D), Column II has four entries (P), (Q), (R) and (S). Match the entries in Column I with the entries in Column II. Each entry in Column I may match with one or more entries in Column II.

For each entry in Column I, tick the boxes of all the matching entries in Column II. For example, if entry (A) in Column I matches with entries (P) & (S) in Column II, then tick the boxes (P) & (S). Similarly, tick the boxes for entries (B), (C) and (D).

	P	Q	R	S
A.	☒	☐	☐	☒
B.	☐	☐	☐	☐
C.	☐	☐	☐	☐
D.	☐	☐	☐	☐

11. Projectiles are projected with speed u , at an angle θ with horizontal. Match the entries in column-I with entries in column-II

Column-I**Column-II**

(A) $u = 4 \text{ m/s}, \theta = 30^\circ$

(P) $\text{Range} = \frac{4\sqrt{3}}{5} \text{ m}$

(B) $u = 4 \text{ m/s}, \theta = 60^\circ$

(Q) $\text{Height} = \frac{3}{5} \text{ m}$

(C) $u = 4\sqrt{3} \text{ m/s}, \theta = 30^\circ$

(R) $\text{Range} = \frac{12\sqrt{3}}{5} \text{ m}$

(D) $u = 2\sqrt{6} \text{ m/s}, \theta = 45^\circ$

(S) $\text{Height} = \frac{1}{5} \text{ m}$

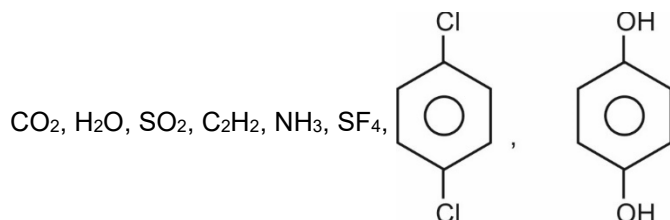
Space for Rough Work

CHEMISTRY

SECTION-I : SINGLE ANSWER TYPE

This section contains 5 multiple choice questions. Each question has 4 choices (1), (2), (3) and (4) out of which **ONLY ONE** is correct.

12. Consider the following species.



Total number of non-polar species is

- (1) 4 (2) 5
(3) 2 (4) 3
13. First, second and third ionisation enthalpies of aluminium are 5.99, 18.8 and 28.44 eV respectively. The amount of energy needed to convert all the atoms of Al into Al³⁺ ion present in 27 mg of aluminium vapours is
(1) 0.106 eV (2) 0.213 eV
(3) 0.018 eV (4) 0.053 eV
14. Common salt obtained from sea contains 95% NaCl formula by mass. The number of NaCl formula units in 50 g of salt is
(1) 7.2×10^{22} (2) 1.8×10^{21}
(3) 3.7×10^{22} (4) 4.9×10^{23}
15. Which of the following is a correct relation? (E_n = energy of n^{th} shell)
(1) $E_1(\text{H}) = 2E_2(\text{He}^+) = 3 \times E_3(\text{Li}^{2+})$ (2) $E_1(\text{H}) = E_2(\text{He}^+) = E_3(\text{Li}^{2+})$
(3) $E_1(\text{H}) = 4E_2(\text{He}^+) = 9E_3(\text{Li}^{2+})$ (4) $E_1(\text{H}) = \frac{1}{2}E_2(\text{He}^+) = \frac{1}{3}E_3(\text{Li}^{2+})$
16. Unit of van der Waals constants a and b respectively are
(1) $\text{atm L}^2 \text{mol}^{-2}$, $\text{L}^{-1} \text{mol}$ (2) $\text{atm L}^{-2} \text{mol}^2$, L mol^{-1}
(3) atm L^{-1} , $\text{mol}^{-1} \text{L}^{-1}$ (4) $\text{atm L}^2 \text{mol}^{-2}$, L mol^{-1}

Space for Rough Work

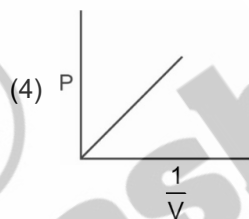
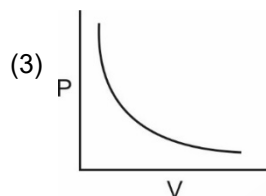
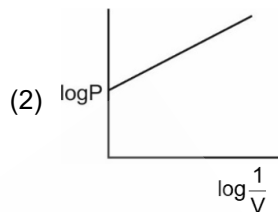
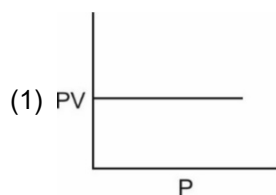
SECTION-II : MORE THAN ONE ANSWER TYPE

This section contains 2 multiple choice questions. Each question has 4 choices (1), (2), (3) and (4) out of which **MORE THAN ONE** answer may be correct.

17. Which of the following is/are correctly matched with the property indicated against them?

- (1) $\text{NH}_4^+ > \text{NH}_3 > \text{NH}_2^-$: Basic character
 (2) $\text{SF}_6 > \text{PCl}_5 > \text{XeF}_4$: Number of 90° bond angles
 (3) $\text{O}_2^+ > \text{O}_2 > \text{O}_2^- > \text{O}_2^{2-}$: Stability order
 (4) $\text{NO}_2^+ > \text{NO}_2 > \text{NO}_2^-$: Bond angle

18. Which of the following is/are correct graph(s) for Boyle's law?

**SECTION-III : PARAGRAPH TYPE**

This section contains a paragraph. Based upon this paragraph, 2 multiple choice questions have to be answered. Each question has 4 choices (1), (2), (3) and (4), out of which **ONLY ONE** is correct.

Paragraph for Q. Nos. 19 & 20

Empirical formula represents the simplest relative whole number ratio of atoms of each element present in the molecule of the substance. On the other hand, molecular formula of the compound is one which expresses as the actual number of atoms of each element present in one molecule. A compound may have same empirical and molecular formula. Both these formulae are calculated by using percentage composition of constituent elements.

19. Two metal oxides contain 36.78% and 50.45% oxygen respectively. If the formula of the first oxide is MO_2 , then that of the second oxide is

- (1) M_2O_7 (2) M_2O_5
 (3) M_3O_4 (4) M_2O_3

Space for Rough Work

20. Which of the following compounds have same empirical formula?

Glucose	Sucrose	Fructose	Formaldehyde	Acetic acid
$C_6H_{12}O_6$	$C_{12}H_{22}O_{11}$	$C_6H_{12}O_6$	HCHO	CH_3COOH
I	II	III	IV	V

(1) I, II and III only

(2) I, III, IV and V only

(3) I and III only

(4) III and IV only

SECTION-IV : ASSERTION-REASON TYPE

This section contains 1 Assertion-Reason type question, which has 4 choices (1), (2), (3) and (4) out of which **ONLY ONE** is correct.

21. **A** : $2p$ orbitals do not have any spherical node.

R : The total number of spherical nodes is equal to $(n - l - 1)$.

(1) Both (A) and (R) are true and (R) is the correct explanation of (A)

(2) Both (A) and (R) are true but (R) is not the correct explanation of (A)

(3) (A) is true but (R) is false

(4) (A) is false but (R) is true

SECTION-V : MATRIX MATCH TYPE

This section contains 1 Matrix Match type question, which has 2 Columns (Column I and Column II). Column I has four entries (A), (B), (C) and (D), Column II has four entries (P), (Q), (R) and (S). Match the entries in Column I with the entries in Column II. Each entry in Column I may match with one or more entries in Column II.

For each entry in Column I, tick the boxes of all the matching entries in Column II. For example, if entry (A) in Column I matches with entries (P) & (S) in Column II, then tick the boxes (P) & (S). Similarly, tick the boxes for entries (B), (C) and (D).

	P	Q	R	S
A.	☒	☐	☐	☒
B.	☐	☐	☐	☐
C.	☐	☐	☐	☐
D.	☐	☐	☐	☐

Space for Rough Work

22. Match the reactions given in column-I with their characteristics given in column-II.

Column-I	Column-II
(A) $C_{(\text{graphite})} + \frac{1}{2}O_2(g) \rightarrow CO(g)$	(P) $\Delta S \neq 0$
(B) $2NH_3(g) \rightarrow N_2(g) + 3H_2(g)$	(Q) Enthalpy of formation
(C) $N_2(g) + \frac{1}{2}O_2(g) \rightarrow N_2O(g)$	(R) Endothermic reaction
(D) $C_{(\text{graphite})} \rightarrow C(g)$	(S) Phase transformation

BIOLOGY**SECTION-I : SINGLE ANSWER TYPE**

This section contains 6 multiple choice questions. Each question has 4 choices (1), (2), (3) and (4) out of which **ONLY ONE** is correct.

23. The functions of some cell organelles are not coordinated with the components of endomembrane system. Identify those functions from the following and mark the **correct** option.

- (a) Synthesis of lipid-like steroidal hormones
- (b) Formation of glycolipids
- (c) Digestion of nucleic acids
- (d) Production of energy in the form of ATP
- (e) Trapping of light energy and assimilation of CO_2

- (1) (a), (c) and (d)
- (2) (d) and (e)
- (3) (b), (c) and (e)
- (4) (a) and (e)

24. How many stage(s) of karyokinesis of mitosis occur(s) after the disappearance of nuclear membrane?

- (1) Three
- (2) Two
- (3) Four
- (4) One

Space for Rough Work

25. Select the **incorrect** statement from the following.

- (1) All living organisms are made up of chemicals
- (2) Some metabolic reactions can be made to occur in cell free system
- (3) Properties of a tissue are not present in its constituent cells
- (4) Plants cannot sense various changes occurring in their surroundings

26. Choose the **incorrect** feature w.r.t. pseudostratified epithelium.

- (1) One cell layer thick
- (2) Ciliated type is found in the lining of trachea
- (3) Made of tall columnar cells
- (4) Cytoplasmic projections of cells increase absorptive surface area

27. Complete the analogy by choosing the **correct** option.

Endothelium : Simple squamous epithelium : : Tubular parts of nephron : _____

- (1) Columnar epithelium
- (2) Ciliated epithelium
- (3) Compound epithelium
- (4) Cuboidal epithelium

28. How many of the below given substances/ions are reabsorbed by PCT of nephron?

Sodium	Chloride	Potassium
Water	Glucose	Amino acids
Bicarbonate	Calcium	Phosphate

- (1) Six only
- (2) Seven only
- (3) Eight only
- (4) Nine only

Space for Rough Work

SECTION-II : MORE THAN ONE ANSWER TYPE

This section contains 3 multiple choice questions. Each question has 4 choices (1), (2), (3) and (4) out of which **MORE THAN ONE** answer may be correct.

29. A mycologist discovered a new species of a fungus. He observed dikaryophase in this species. Considering this property, he cannot place this fungus in
- (1) Basidiomycetes (2) Phycomycetes
(3) Deuteromycetes (4) Ascomycetes
30. Increased delivery of oxygen to tissues caused by dissociation of oxygen from haemoglobin is favoured by
- (1) Decrease in pH (2) Increase in partial pressure of carbon dioxide
(3) Lower temperature (4) High H^+ concentration
31. Which of the following is/are **incorrect** w.r.t. Watson-Crick B-DNA molecule?
- (1) Width of double helix is 0.2 nm
(2) The base ratio A+T/G+C is not constant for all individuals of a given species
(3) 20 bases stacked on each other along a single strand of DNA cover a distance of about 34 Å
(4) Regions rich in Adenine-Thymine require higher temperature for melting than regions rich in Guanine-Cytosine

SECTION-III : PARAGRAPH TYPE

This section contains a paragraph. Based upon this paragraph, 2 multiple choice questions have to be answered. Each question has 4 choices (1), (2), (3) and (4), out of which **ONLY ONE** is correct.

Paragraph for Q. Nos. 32 & 33

There are many plants which are used as vegetables. These plants are like tomato, *Asparagus*, chilli, brinjal, mustard and potato. They belong to different families. Generally their different parts are used as vegetables. Other members of the families are also of many economic importance.

32. How many plants, given in the above paragraph have superior ovary?
- (1) Four (2) Three
(3) Six (4) Five

Space for Rough Work

33. Which of the following statements is **incorrect** w.r.t. the plants mentioned in the paragraph?
- (1) The family to which maximum number of above given plants belong is characterized by having swollen placenta
 - (2) Out of the given plants no one has tricarpeal syncarpous gynoecium
 - (3) One of the given plants has floral formula $\oplus \overline{\text{P}_{(3+3)} \text{A}_{3+3} \text{G}_{(3)}}$
 - (4) Many of the given plants have valvate aestivation of calyx

SECTION-IV : ASSERTION-REASON TYPE

This section contains 1 Assertion-Reason type question, which has 4 choices (1), (2), (3) and (4) out of which **ONLY ONE** is correct.

34. **A** : The two strands of DNA are held together by complementary base pairing.
R : DNA is considered a hydrophilic molecule as the sugar-phosphate backbone is polar in nature.
- (1) Both (A) and (R) are true and (R) is the correct explanation of (A)
 - (2) Both (A) and (R) are true but (R) is not the correct explanation of (A)
 - (3) (A) is true but (R) is false
 - (4) (A) is false but (R) is true

SECTION-V : MATRIX MATCH TYPE

This section contains 1 Matrix Match type question, which has 2 Columns (Column I and Column II). Column I has four entries (A), (B), (C) and (D), Column II has four entries (P), (Q), (R) and (S). Match the entries in Column I with the entries in Column II. Each entry in Column I may match with one or more entries in Column II.

For each entry in Column I, tick the boxes of all the matching entries in Column II. For example, if entry (A) in Column I matches with entries (P) & (S) in Column II, then tick the boxes (P) & (S). Similarly, tick the boxes for entries (B), (C) and (D).

	P	Q	R	S
A.	☒	☐	☐	☒
B.	☐	☐	☐	☐
C.	☐	☐	☐	☐
D.	☐	☐	☐	☐

Space for Rough Work

35. Match the following columns.

Column-I	Column-II
(A) TMV	(P) Causes disease in plants
(B) <i>Mycoplasma</i>	(Q) Photosynthetic
(C) Viroid	(R) Genetic material is RNA only
(D) <i>Euglena</i>	(S) Lacks cell wall



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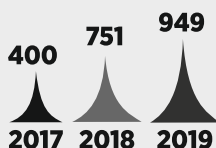
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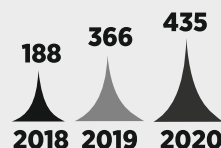
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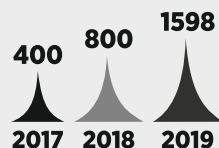
NTSE Stage-I



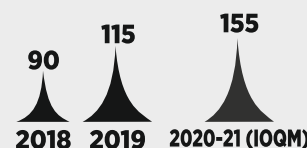
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