

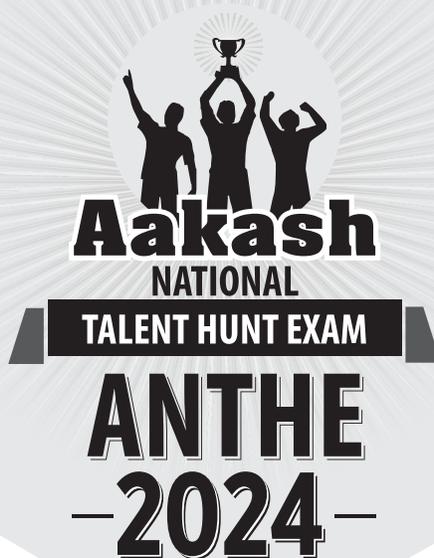
# Sample Paper

MEDICAL



## Aakash

Medical | IIT-JEE | Foundations



**(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 **40** questions. The maximum marks are **90**. There is **no negative marking** for wrong answer.
3. Pattern of the questions are as under:
  - (i) The question paper consists of three parts *i.e.*, **Physics, Chemistry** and **Biology**. Each part has **two sections**.
  - (ii) **Section-I**: This section contains **35** multiple choice questions, which have **only one** correct answer. Each question carries **+2 marks** for correct answer.
  - (iii) **Section-II**: This section contains **5** multiple choice questions, in which **one or more than one** choice(s) is(are) correct. Each question carries **+4 marks** for correct answer.

# Aakash National Talent Hunt Exam 2024

## 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-2024)

Time : 1 Hour

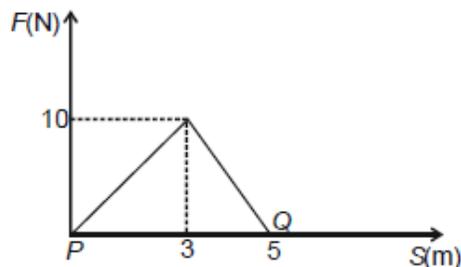
MM : 90

### PHYSICS

#### SECTION-I : SINGLE CORRECT ANSWER TYPE

This section contains 9 multiple choice questions. Each question has 4 choices (1), (2), (3) and (4) out of which **ONLY ONE** choice is correct.

1. If the percentage error in measurement of radius of a sphere is 0.2%, then the maximum percentage error in the measurement of its volume will be
  - (1) 0.6%
  - (2) 0.1%
  - (3) 0.4%
  - (4) 0.2%
2. A force  $(4\hat{i} + 5\hat{j})\text{N}$  displaces a particle through  $(2\hat{i} - \hat{j})\text{m}$  in 3 s. The average power consumed is
  - (1) 4 W
  - (2) 3 W
  - (3) 1 W
  - (4) 2 W
3. A body moves from point  $P$  to  $Q$  under the action of a force varying in magnitude with displacement as shown in figure. The work done by the force is



- (1) 15 J
  - (2) 25 J
  - (3) 32 J
  - (4) 45 J
4. If  $x$  and  $y$  components of a vector  $\vec{A}$  have numerical values 2 and 3 respectively and that of  $\vec{A} + \vec{B}$  have magnitudes 8 and 5 respectively, then magnitude of  $\vec{B}$  is
    - (1)  $\sqrt{40}$
    - (2)  $\sqrt{76}$
    - (3)  $\sqrt{89}$
    - (4)  $\sqrt{13}$
  5. Kinetic energy of a particle changes from 2 J to 5 J. The work done by forces acting on this particle will be
    - (1) 2 J
    - (2) 7 J
    - (3) 5 J
    - (4) 3 J

6. Moment of inertia of a uniform circular disc of mass  $m$  and radius  $R$  about an axis through centre and perpendicular to plane is
- (1)  $\frac{5}{4}mR^2$  (2)  $\frac{mR^2}{4}$   
 (3)  $\frac{3}{2}mR^2$  (4)  $\frac{mR^2}{2}$
7. A particle is dropped from the top of a tower of height 4.9 m. The velocity of particle with which it strikes the ground is
- (1) 5 m/s (2) 4.9 m/s  
 (3) 9.8 m/s (4) 7.3 m/s
8. A football at rest gets linear momentum of  $3 \text{ kg m s}^{-1}$  in 0.6 s of time interval, when it is hit by a footballer. The force acted on the football in the interval is
- (1) 3 N (2) 4 N  
 (3) 5 N (4) 6 N
9. The distance travelled by a body falling freely from rest in one second, two seconds and three seconds are in the ratio of
- (1) 1 : 2 : 3 (2) 1 : 3 : 5  
 (3) 1 : 4 : 9 (4) 3 : 2 : 1

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**SECTION-II : ONE OR MORE THAN ONE CORRECT ANSWER TYPE**

This section contains 1 multiple choice question, which has 4 choices (1), (2), (3) and (4) out of which **ONE OR MORE THAN ONE** choice(s) is(are) correct.

10. A particle moves in a circle of radius  $r$  with angular velocity  $\vec{\omega}$ . At some instant its velocity is  $\vec{v}$  and radius vector with respect to centre of the circle is  $\vec{r}$ . At this particular instant, centripetal acceleration  $\vec{a}_c$  of the particle would be
- (1)  $\vec{v} \times \vec{\omega}$  (2)  $\vec{\omega} \times (\vec{\omega} \times \vec{r})$   
 (3)  $\vec{v} \times (\vec{r} \times \vec{\omega})$  (4)  $\vec{\omega} \times \vec{v}$

**CHEMISTRY**

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

This section contains 9 multiple choice questions. Each question has 4 choices (1), (2), (3) and (4) out of which **ONLY ONE** choice is correct.

11. A ball has a mass of 10 g and speed of 20 m/s. If the speed can be measured with the accuracy of 1%, then the uncertainty in its position is
- (1)  $2.6 \times 10^{-32} \text{ m}$  (2)  $1.8 \times 10^{-33} \text{ m}$   
 (3)  $3.3 \times 10^{-30} \text{ m}$  (4)  $2.6 \times 10^{-35} \text{ m}$

12. Number of molecules of ethanol present in 100 mL of 0.1 M of its aqueous solution is
- (1)  $6.02 \times 10^{21}$  (2)  $6.02 \times 10^{20}$   
(3)  $6.02 \times 10^{23}$  (4)  $6.02 \times 10^{19}$
13. The maximum number of  $3p$  electrons having spin quantum value of  $+\frac{1}{2}$  is/are
- (1) 1 (2) 6  
(3) 3 (4) 2
14. Element of highest negative electron gain enthalpy is
- (1) He (2) Ne  
(3) Na (4) S
15. 0.1 mol of ideal gas compressed reversibly isothermally from 10 L to 1 L at 100 K. The work done in the process is
- (1) 230 R (2) 23 R  
(3)  $-23 R$  (4)  $-230 R$
16. Under what conditions, a reaction is spontaneous at all temperatures?
- (1)  $\Delta H > 0, \Delta S > 0$  (2)  $\Delta H < 0, \Delta S < 0$   
(3)  $\Delta H > 0, \Delta S < 0$  (4)  $\Delta H < 0, \Delta S > 0$
17. Order of ionic size for the ions,  $N^{3-}$ ,  $O^{2-}$ ,  $Na^+$  and  $Mg^{2+}$  is
- (1)  $N^{3-} > O^{2-} > Na^+ > Mg^{2+}$  (2)  $Mg^{2+} > Na^+ > O^{2-} > N^{3-}$   
(3)  $O^{2-} > N^{3-} > Mg^{2+} > Na^+$  (4)  $Na^+ > Mg^{2+} > N^{3-} > O^{2-}$
18. Mass of 50% pure  $CaCO_3$  required to produce 5.6 L of  $CO_2$  (g) at S.T.P. is
- (1) 25 g (2) 50 g  
(3) 75 g (4) 100 g
19. The hybridisation of P in  $PCl_5$  is
- (1)  $sp^3$  (2)  $dsp^2$   
(3)  $sp^3d$  (4)  $dsp^3$

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**SECTION-II : ONE OR MORE THAN ONE CORRECT ANSWER TYPE**

This section contains 1 multiple choice question, which has 4 choices (1), (2), (3) and (4) out of which **ONE OR MORE THAN ONE** choice(s) is(are) correct.

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20. Molecules having only  $\pi$ -bond(s) is/are
- (1)  $C_2$  (2)  $Li_2$   
(3)  $B_2$  (4)  $O_2$
-

**BIOLOGY**

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

This section contains 17 multiple choice questions. Each question has 4 choices (1), (2), (3) and (4) out of which **ONLY ONE** choice is correct.

21. Which of the following is a heteropolymeric compound but **not** a secondary metabolite?
- (1) Chitin (2) Gums  
(3) Haemoglobin (4) Rubber
22. Read the following statements and choose the **correct** answer.
- Statement X** : The pleural fluid lubricates the pleural membranes so that they may slide over each other without friction during expiration only.
- Statement Y** : The conducting part of respiratory system brings the temperature of the incoming air upto the body temperature.
- (1) Both statements X and Y are correct (2) Both statements X and Y are incorrect  
(3) Only statement X is correct (4) Only statement Y is correct
23. Triglyceride molecule contains
- (1) Three glycerol molecules joined to three fatty acids by ester bonds  
(2) Three fatty acid molecules joined to one glycerol molecule by ester bonds  
(3) Three glycerol molecules linked to three fatty acid molecules by glycosidic bonds  
(4) One fatty acid molecule joined to three glycerol molecules by ether bonds
24. Select the event that does not hold true for muscle contraction.
- (1) Length of 'I' band remains same (2) Length of 'A' band does not change  
(3) Length of sarcomere decreases (4) 'Z' line comes closer to each other
25. **Assertion** : JG cells help in regulation of blood pressure and glomerular filtration rate (GFR).  
**Reason** : Juxtaglomerular cells secrete renin in response to fall in BP or GFR, which through RAAS pathway restores BP and GFR in humans.
- In the light of above statements select the correct option.
- (1) Both Assertion & Reason are true and the Reason is the correct explanation of the Assertion  
(2) Both Assertion & Reason are true but the Reason is not the correct explanation of the Assertion  
(3) Assertion is true statement but Reason is false  
(4) Both Assertion and Reason are false statements
26. The condition called erythroblastosis foetalis can be avoided by
- (1) Injecting Rh antigen into mother's blood immediately after delivery of the first child  
(2) Administering anti-Rh-antibodies to the newborn  
(3) Administering anti-Rh antibodies to mother's blood immediately after delivery of first Rh positive child  
(4) Injecting Rh positive blood group into mother's blood just after conception.

27. Complete the analogy w.r.t. percentage of gases transported by RBCs and select the **correct** option.

$O_2 : 97\% :: CO_2$  \_\_\_\_\_

- (1) 3% (2) 70%  
 (3) 20-25% (4) 7%

28. Match column I with column II.

	Column I		Column II
a.	Tunica externa	(i)	Smooth muscles
b.	Tunica media	(ii)	Connective tissue
c.	Tunica interna	(iii)	Flattened squamous epithelial cells

Select the **correct** option.

- (1) a(i), b(ii), c(iii) (2) a(ii), b(i), c(iii)  
 (3) a(iii), b(ii), c(i) (4) a(i), b(iii), c(ii)

29. Number of nephrons present in both kidneys of a human is

- (1) 1 million (2) 2 million  
 (3) 3 million (4) 4 million

30. Members in which of the following obligate categories in taxonomic hierarchy will have least number of common characters?

- (1) Family (2) Genus  
 (3) Class (4) Phylum

31. What will be the amount of DNA in a meiosis-II product, if the meiocyte contains 40 pg DNA in  $G_1$  phase?

- (1) 20 pg (2) 80 pg  
 (3) 10 pg (4) 5 pg

32. Endomembrane system includes

- (1) Endoplasmic reticulum, Golgi apparatus, lysosomes and vacuoles  
 (2) Endoplasmic reticulum, plastids, lysosomes and vacuoles  
 (3) Endoplasmic reticulum, Golgi apparatus, peroxisomes and vacuoles  
 (4) Centrosome, Golgi apparatus, sphaerosomes and vacuoles

33. Leaves in angiosperms originate from A and are arranged in an B order.

Select the **correct** option for A and B.

- (1) **A** – Floral meristem, **B** – Basipetal order  
 (2) **A** – Shoot apical meristem, **B** – Acropetal order  
 (3) **A** – Internodes, **B** – Basipetal order  
 (4) **A** – Shoot apical meristem, **B** – Basipetal order

34. Nuclear membrane is absent in
- (1) Protista (2) Monera  
(3) Most of the fungi (4) All animals
35. In some leguminous plants the leaf base may become swollen, which is called
- (1) Lamina (2) Stipule  
(3) Petiole (4) Pulvinus
36. The function of fimbriae in bacteria is
- (1) To help in attachment to host tissues or to rocks  
(2) Motility  
(3) DNA replication  
(4) Secretion process
37. Which of the given symbols is used in floral formula to represent epipetalous stamens?
- (1)  $\overline{P A}$  (2)  $\overline{C A}$   
(3)  $C_{(n)}$  (4)  $\overline{K A}$

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**SECTION-II : ONE OR MORE THAN ONE CORRECT ANSWER TYPE**

This section contains 3 multiple choice questions. Each question has 4 choices (1), (2), (3) and (4) out of which **ONE OR MORE THAN ONE** choice(s) is(are) correct.

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38. A stage of prophase I of meiosis in which four chromatids of each bivalent begin to appear clearly as tetrad is also characterized by
- (1) Appearance of recombination nodules  
(2) Dissolution of the synaptonemal complex  
(3) Exchange of genetic material between non-sister chromatids of homologous chromosomes  
(4) Disappearance of nucleolus and breakage of nuclear membrane
39. Which among the following statements is/are **true** for photosynthetic Protists?
- (1) They are believed to be primitive relatives of the animals  
(2) Under suitable conditions, they form an aggregation called plasmodium  
(3) They may or may not have cell wall  
(4) They are found in marine as well as fresh water
40. In a human, the total number of bones that constitute the pectoral girdle is equal to the
- (1) Number of metacarpals present in each fore limb of man  
(2) Half of the total number of bones that constitute the cranium of man  
(3) Number of floating ribs present in man  
(4) Total number of bones that constitute the pelvic girdle of man



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