

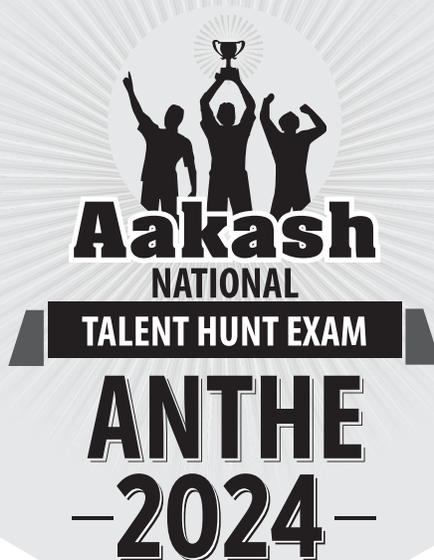
# Sample Paper

MEDICAL



## Aakash

Medical | IIT-JEE | Foundations



**(Class XII Studying Moving to XII Passed)**

## 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 XII Studying Moving to XII Passed)

(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

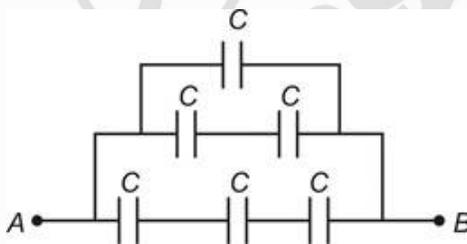
MM : 90

### 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. The electric flux through a cube of side 10 cm is  $\phi$ . If the side of cube is made 20 cm and charge enclosed remains same, then value of flux will be
  - (1)  $2\phi$
  - (2)  $\phi$
  - (3)  $0.5\phi$
  - (4)  $4\phi$
2. Equivalent capacitance of the combination between point A and B as shown in the figure below is



- (1)  $6C$
  - (2)  $\frac{11C}{6}$
  - (3)  $\frac{C}{6}$
  - (4)  $\frac{6C}{11}$
3. Kirchhoff's loop rule is based on
  - (1) Law of conservation of energy
  - (2) Law of conservation of charge
  - (3) Law of conservation of momentum
  - (4) Wheatstone bridge
4. The magnetic field lines inside a bar magnet are
  - (1) From south pole to north pole
  - (2) From north pole to south pole
  - (3) Perpendicular to the length of magnet
  - (4) No field lines exists inside the magnet

5. At resonance frequency, the impedance in series LCR circuit is
- (1) Maximum (2) Minimum  
(3) Zero (4) Infinity
6. Resistivity of a conductor of length  $l$  and area of cross-section  $A$  is  $\rho$ . If its length becomes three times and area becomes  $\frac{1}{3}$  times of its original values. Then the new resistivity of the conductor is
- (1)  $9\rho$  (2)  $\rho$   
(3)  $\frac{\rho}{9}$  (4)  $\frac{\rho}{3}$
7. Magnetic susceptibility is small and negative for
- (1) Diamagnetic substances (2) Paramagnetic substances  
(3) Ferromagnetic substances (4) All of these
8. The flux through a circular conducting coil of resistance  $20\ \Omega$  is varying with time ( $t$ ) as  $\phi = 5t^2$  Wb. The magnitude of induced current in the loop at time  $t = 1$  s is
- (1) 0.5 A (2) 1 A  
(3) 0.25 A (4) 10 A
9. An electric dipole of moment  $\vec{P}$  placed in uniform electric field  $\vec{E}$  has minimum potential energy. The work done by external agent to rotate this dipole very slowly upto which it has maximum potential energy.
- (1)  $-PE$  (2)  $2PE$   
(3)  $\frac{PE}{2}$  (4) Zero

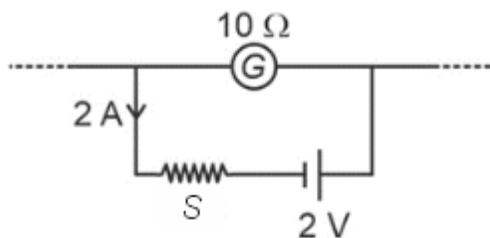
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**SECTION-II : ONE OR MORE THAN ONE CORRECT ANSWER TYPE**

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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10. The galvanometer shown in the figure has resistance  $10\ \Omega$ . It is shunted by a series combination of a resistance  $S = 1\ \Omega$  and an ideal cell of emf 2 V. A current 2 A passes as shown in the figure.



- (1) The reading of the galvanometer is 1 A  
(2) The reading of the galvanometer is zero  
(3) The potential difference across the resistance  $S$  is 1.5 V  
(4) The potential difference across the resistance  $S$  is 2 V
-

## CHEMISTRY

### 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. For a radioactive reaction, 90% of the reaction completes in 10 years. What will be its half-life?
- (1) 10 years (2) 5 years  
(3) 7 years (4) 3 years
12. The  $\Lambda_m^\circ$  value for  $\text{Mg}(\text{OH})_2$  is  
(Given:  $\lambda_{\text{Mg}^{2+}}^\circ = 106 \text{ S cm}^2 \text{ mol}^{-1}$   
 $\lambda_{\text{OH}^-}^\circ = 199.1 \text{ S cm}^2 \text{ mol}^{-1}$ )
- (1)  $504.2 \text{ S cm}^2 \text{ mol}^{-1}$  (2)  $292.2 \text{ S cm}^2 \text{ mol}^{-1}$   
(3)  $305.1 \text{ S cm}^2 \text{ mol}^{-1}$  (4)  $610.2 \text{ S cm}^2 \text{ mol}^{-1}$
13. Which of the following is correct for an ideal solution at 298 K?
- (1)  $\Delta_{\text{mix}}H = 0$  (2)  $\Delta_{\text{mix}}V > 0$   
(3)  $\Delta_{\text{mix}}G > 0$  (4)  $\Delta_{\text{mix}}S < 0$
14. If 0.4 molal aqueous solution of weak monobasic acid HA undergoes 50% dissociation then the boiling point of the solution will be ( $K_b$  of water =  $0.52 \text{ K kg mol}^{-1}$ )
- (1)  $101.21^\circ\text{C}$  (2)  $100.31^\circ\text{C}$   
(3)  $102.5^\circ\text{C}$  (4)  $101.8^\circ\text{C}$
15. Mass of silver deposited at cathode by passage of 9.65 A current for 1000 sec is ( $\text{Ag} = 108 \text{ u}$ )
- (1) 27 g (2) 54 g  
(3) 10.8 g (4) 216 g
16. The spin only magnetic moment of  $\text{Cr}^{2+}$  ion is (Atomic number of Cr is 24)
- (1)  $\sqrt{24} \text{ BM}$  (2)  $\sqrt{15} \text{ BM}$   
(3)  $\sqrt{8} \text{ BM}$  (4)  $\sqrt{3} \text{ BM}$
17. In neutral or faintly alkaline solution, permanganate ion oxidises thiosulphate ions to
- (1)  $\text{S}_4\text{O}_6^{2-}$  (2)  $\text{S}_2\text{O}_4^{2-}$   
(3)  $\text{SO}_4^{2-}$  (4)  $\text{SO}_3^{2-}$
18. Diamagnetic complex among the following is
- (1)  $\text{K}_3[\text{Mn}(\text{CN})_6]$  (2)  $[\text{Co}(\text{NH}_3)_6]\text{Cl}_3$   
(3)  $\text{K}_3[\text{Fe}(\text{CN})_6]$  (4)  $\text{K}_3[\text{MnCl}_6]$

19. If the slope of graph  $\log K$  vs  $\frac{1}{T}$  is  $-10$ , then activation energy of the reaction is
- (1) R (2) 23.03R  
 (3)  $\frac{R}{23.03}$  (4) 10R

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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. The complex(es) which involve  $d^2sp^3$  hybridisation is/are
- (1)  $[\text{FeF}_6]^{3-}$  (2)  $[\text{Fe}(\text{CN})_6]^{3-}$   
 (3)  $[\text{Co}(\text{H}_2\text{O})_6]^{3+}$  (4)  $[\text{Co}(\text{C}_2\text{O}_4)_3]^{3-}$

**BIOLOGY**

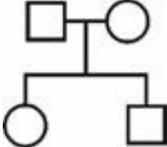
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**SECTION-I : SINGLE CORRECT ANSWER TYPE**

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.

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21. Zona pellucida is considered as primary egg membrane present around ovum and it is secreted by
- (1) Granulosa cells of ovary (2) Secondary oocyte  
 (3) Endometrium of uterus (4) Columnar cells of oviduct
22. Spermatogenesis is 'switched on' at puberty due to significant increase in the secretion of hypothalamic hormone called
- (1) GnRH (2) FSH  
 (3) LH (4) Androgens
23. Which of the following is **true** for vasectomy?
- (1) Sperm production decreases (2) Degeneration of testes  
 (3) Loss of sexual desire (4) Surgical intervention to block gamete transport
24. MTP is considered relatively safe upto \_\_\_\_\_ of pregnancy.  
 Select the **correct** option to fill in the blank.
- (1) 12<sup>th</sup> week (2) 22<sup>nd</sup> week  
 (3) 25<sup>th</sup> week (4) 30<sup>th</sup> week
25. The immunity mainly responsible for graft rejection is
- (1) Humoral immunity (2) Cell mediated immunity  
 (3) Antibody mediated immunity (4) Passive immunity
-

26. Widal test is used for the confirmation of
- (1) Typhoid (2) Cholera  
(3) Malaria (4) Tetanus
27. GM plants have been useful in many ways, **except**
- (1) Helped to reduce post harvest losses  
(2) Enhanced nutritional value of food  
(3) Decreased efficiency of mineral usage by plants  
(4) Reduced reliance on chemical pesticides
28. During maturation of proinsulin to active insulin
- (1) B-chain is linked to C-chain by covalent bonds  
(2) A and B chains are not linked by disulphide bonds  
(3) C-peptide is removed  
(4) A-chain is linked to C-chain by covalent bonds
29. The protein encoded by the gene *cryIIAb* controls the
- (1) Corn borer (2) Cotton bollworm  
(3) Nematode (4) *E. coli*
30. PEN is the result of
- (1) Apomixis (2) Triple fusion  
(3) Polyembryony (4) Syngamy
31. Cleistogamous flowers of *Oxalis* are
- (1) Wind pollinated (2) Water pollinated  
(3) Self-pollinated (4) Insect pollinated
32. Which of the given representations shows consanguineous mating?
- (1)  (2) 
- (3)  (4) 
33. AB blood group is an example of
- (1) Incomplete dominance (2) Co-dominance  
(3) Pleiotropy (4) Dominance
34. In which of the given aspects, prokaryotic transcription is similar to that of eukaryotes?
- (1) Types of RNA polymerases involved (2) Requirement of processing of m-RNA  
(3) Being coupled with translation (4) Direction of RNA formation

35. Which of the following is **not** found in mRNA?
- (1) Pentose sugar (2) 5-methyl uracil  
(3) Phosphate group (4) N-glycosidic linkage
36. Cyclosporin A is used as/for
- (1) Blood cholesterol lowering agents (2) Immunosuppressive agent  
(3) Clarifying fruit juices (4) Clot buster
37. Select the **odd** one w.r.t. beverages produced by distillation.
- (1) Whisky (2) Wine  
(3) Brandy (4) Rum

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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. In cloning vector pBR322, if the gene of interest is inserted and successfully ligated at the site where the recognition sequence for *Pst* I is present then, the recombinants obtained would
- (1) Not replicate further  
(2) Grow in a medium containing antibiotic 'tetracycline'  
(3) Be sensitive to antibiotic 'ampicillin'  
(4) Be sensitive to antibiotic 'tetracycline'
39. In which of the following conditions the structural genes of a *lac* operon will express themselves in a lactose containing medium?
- (1) Binding of inducer to the product of *lac* *i* gene  
(2) Production of non-functional protein by *lac* *y* gene  
(3) Inability of regulatory gene to express itself  
(4) A change in repressor that will make it unable to bind it with operator
40. Select the statement that is correct w.r.t sex determination in honey bee.
- (1) Males do not have father, but have a grandfather  
(2) An unfertilised egg develops as a sterile female (worker bee)  
(3) Males are haploid  
(4) During spermatogenesis among males, two types of gametes are produced



# 35 Years Old Legacy of Delivering Outstanding Results



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**36**

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4 Year Classroom

**AIR**  
**42**

**Shivanshu Kumar**  
4 Year Classroom

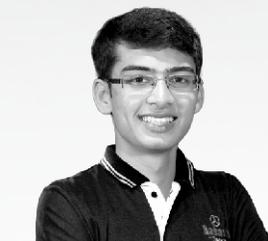
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## Aakashians Create History in International Olympiads (Classroom Students)

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**Gold Medalists**



**Dhruv Advani**



**Rohit Panda**



**Chirag Falor**



International Olympiad on Astronomy & Astrophysics



**Dhiren Bhardwaj**



32<sup>nd</sup> International Biology Olympiad



**Anshul**



32<sup>nd</sup> International Biology Olympiad



**Amritansh Nigam**



33<sup>rd</sup> International Biology Olympiad



**Prachi Jindal**



33<sup>rd</sup> International Biology Olympiad



**Tanishka Kabra**



54<sup>th</sup> International Chemistry Olympiad