Sample Questions for ASAT
(ALLEN Scholarship Cum Admission Test)

CLASSROOM CONTACT PROGRAMME

LEADER COURSE
(FOR XII PASSED & APPEARED STUDENTS)
INSTRUCTIONS (निदेश)

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

Things NOT ALLOWED in EXAM HALL: Blank Paper, clipboard, log table, slide rule, calculator, camera, mobile and any electronic or electrical gadget. If you are carrying any of these then keep them at a place specified by invigilator at your own risk.

1. This booklet is your Question Paper. DO NOT break seal of Booklet until the invigilator instructs to do so.
2. Fill your Form No. in the space provided on the top of this page.
3. The Answer Sheet is provided to you separately which is a machine readable Optical Response Sheet (ORS). You have to mark your answers in the ORS by darkening bubble, as per your answer choice, by using black & blue ball point pen.
5. After breaking the Question Paper seal, check the following:
   a. There are 27 pages in the booklet containing question no. 1 to 100 under 2 Parts i.e. Part-I & Part-II.
   b. Part-I contains total 20 questions of IQ (Mental Ability).
   c. Part-II contains total 80 questions under 4 sections which are-Section (A) : Physics, Section (B) : Chemistry, Section (C) : Mathematics & Section (D) : Biology.

   *Important: You have to attempt ANY ONE SECTION only out of Section(C): Mathematics and Section (D) : Biology. DO NOT attempt both sections.
6. Marking Scheme :
   a. If darkened bubble is RIGHT answer : 4 Marks.
   b. If no bubble is darkened in any question: No Mark.
   c. Only for part - II : If darkened bubble is WRONG answer: -1 Mark (Minus One Mark).
7. Think wisely before darkening bubble as there is negative marking for wrong answer.
8. If you are found involved in cheating or disturbing others then your ORS will be cancelled.
9. Do not put any stain on ORS and hand it over back properly to the invigilator.

1. पूरे सिलों अपने प्रश्न से- पैसे हैं। इसे मुह में ठहराकर ले के आगे निदेश व न दिये जायः।
2. ये क्षेत्र में हिस्से-पैदा गंतव्य स्थान न अपने फाइल के लिए बनाएँ , लेकिन टिकट, रेल टिकट, के लंबे लेटरा, के मस्तक नहीं है के इलेक व टी. ए निकाल सफर। आपने से किसे भात बर्‌तू बने ले जरूर हैं तो आपके अपने जो बिना मिड निर्देश के है।
3. इसे रिटेक्ल है की मुं हरे जोड़े, ने के खान स्थित ख: जंतू चले ' कि पूरे रिटेक्ल छूट पूरा है।' प्रश्न से फैला हो।
4. कु म भोज के हल करने है कु रशान भ या प्रश्न के 60.8 भ या।
5. इसे रिटेक्ल के मुं हरे जोड़े, ने के खान तक ख: जंतू चले ' कि पूरे रिटेक्ल छूट पूरा है।' प्रश्न से फैला हो।
6. अंक के जा की
   a. के डार रवा ले बुलु ले के अतः अनेक ले।
   b. ले धुं 11 बुलु ला ले के इलेक अनेक हैं।
   c. के बल क़ोरो। के लिए: गलत र रवा ले बुलु ले के जन्म कर से में चुर में गलत र रवा ले के इलेक अनेक हैं।
7. बुलु ला ले करने से फैले ठी बल कर से जंज चुर में गलत र रवा ले के इलेक अनेक हैं।
8. वाइट अन पृथ्वी आ एन बाहर के किसे जंज चुर में गलत र रवा ले के इलेक अनेक हैं।
9. ORS जिसे भात पू भ ले दा गलत र नहीं लगा जं जाती अनेक निर्देश के ख: जं जाए।
**Sample questions for ASAT : Leader Course**

**PART - I**

**IQ (MENTAL ABILITY)**

This section contains **20 multiple choice questions**. Each question has four choices (1), (2), (3) and (4) out of which **ONLY ONE** is correct.

1. Find the missing term
   TVA, QSC, NPE, (?), HJI
   (1) MGK (2) KLG (3) KMG (4) GKL

2. Find the missing number in the following diagram?

   ![Diagram](image)

   (1) 6 (2) 8 (3) 10 (4) 14

**Direction (Q.3 to Q.5) :** Below in Column-I are given some word and in column-II are given their equivalent in some code language. Word in column-II do not appear in the same order as in column-I. Moreover the order of letters is also jumbled up.

<table>
<thead>
<tr>
<th>Column – I</th>
<th>Column – II</th>
</tr>
</thead>
<tbody>
<tr>
<td>TAPE</td>
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<td>TYRE</td>
<td>pmlh</td>
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</tbody>
</table>

1. खेले या आ फ़ाइल ?
   TVA, QSC, NPE, (?), HJI
   (1) MGK (2) KLG (3) KMG (4) GKL

2. दिये गये चित्र में 'गा ख' से 'ख' का प्रस्ताव है?

   ![Diagram](image)

   (1) 6 (2) 8 (3) 10 (4) 14

3. निम्न (Q.3 से Q.5) : नीचे रख में कुछ बदल दिये गये हैं और रखों 13 न हों 'का बारे बदल कूट त 11 चौ' एवं में है '।

   ![Diagram](image)

   (1) 6 (2) 8 (3) 10 (4) 14

   रख-५१आ रख-५२आ दें 'का क्रम समा न नहीं है '। जा चुटकी आ रें 'का क्रम ५१वीं मिला जुला है '।

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Sample questions for ASAT : Leader Course

3. How will SOUP be coded in that code language?
   (1) nhsm (2) siom (3) hnsm (4) somh

4. How will REACT be coded in that code language?
   (1) lhpijk (2) lihpr (3) pkjih (4) jklph

5. How will TOP be coded in that code language?
   (1) mih (2) lih (3) pri (4) jio

Directions for (Q.6 & Q.7) : The following questions are based on the information given. Study the information carefully and answer the questions.

I. There are five students L, M, N, O and P in a class
II. L studies Physics, English and Chemistry
III. M and N study Chemistry and Psychology
IV. O and L study Biology and Sanskrit
V. P and M study Hindi and English

6. Who among the following students studies maximum number of subjects?
   (1) O (2) N (3) L (4) P

7. Which subject is studied by only one student?
   (1) Biology (2) Hindi (3) Physics (4) Sanskrit

8. A dice is thrown twice and its different positions are shown below.

![Dice positions](image)

Which is the number of dots on the face opposite 4 dots?
   (1) 6 (2) 3 (3) 2 (4) 1

9. Two positions of a standard dice are shown below.

![Dice positions](image)

When 6 is at the bottom, what number will be at the top?
   (1) 4 (2) 3 (3) 2 (4) 1
10. If a clock shows 12 : 37 then its mirror image will be:
(1) 11 : 37 (2) 11 : 23
(3) 01 : 23 (4) 21 : 23

Directions (Q.11 & Q.12) : Following questions are based on the information given below:
1. ‘P × Q’ means ‘P is the father of Q’
2. ‘P – Q’ means ‘P is the sister of Q’
3. ‘P + Q’ means ‘P is the mother of Q’
4. ‘P ÷ Q’ means ‘P is the brother of Q’

11. In the expression B + D × M ÷ N, how is M related to B?
(1) Granddaughter (2) Son
(3) Grandson (4) Granddaughter or Grandson

12. Which of the following represents ‘J is the son of F’ -
(1) J × R – T × F (2) J + R – T × F
(3) J × M – N × F (4) None of these

13. In the following letter series, some of the letters are missing, which are given in that order as one of the alternatives below it. Choose the correct alternative
abca – bcaab – aa – caa – ca
(1) bbac (2) bbac
(3) acbb (4) acac

Direction (Q.14 & Q.15) : A pyramid of letters is given below. Study the pyramid and select the correct alternative to fill in the missing term.

```plaintext
A
 /    \
N M B
 /    \
Y X C
 /    \
H G Z W
 /    \
O N I V Q J E
 /    \
T S P M J E B U R I F
W V U R Q L K D C T S H G
```

```plaintext
A
 /    \
N M B
 /    \
Y X C
 /    \
H G Z W
 /    \
O N I V Q J E
 /    \
T S P M J E B U R I F
W V U R Q L K D C T S H G
```
Sample questions for ASAT : Leader Course

14. GYXOW, ZXOLP, FZWPV ?
   (1) AWPKQ  (2) PVQJE
   (3) KQUCT  (4) EBURI

15. AMONB, YGIHZ ?
   (1) LPVBD  (2) FAVQJ
   (3) OSUTP  (4) LPVQJ

Directions (Q.16 to Q.19) : Read the following information carefully and answer the questions given below it :
(i) Six flats on a floor in two rows facing North and South are allotted to P, Q, R, S, T and U.
(ii) Q gets North facing flat and is not next to S.
(iii) S and U get diagonally opposite flats.
(iv) R, next to U, gets South facing flat and T gets North facing flat.

16. Which of the following combination get South facing flats ?
   (1) QTS  (2) UPT  
   (3) URP  (4) None of these

17. Whose flat is between Q and S ?
   (1) T  (2) U
   (3) R  (4) P

18. If the flats of T and P are interchanged, whose flat will be next to that of U ?
   (1) P  (2) Q
   (3) R  (4) T

19. Which of the following pairs other than SU are diagonally opposite to each other ?
   (1) QP  (2) QR
   (3) PT  (4) TS

20. If on 14th day after 5th March be Wednesday, what day of the week will fall on 10th Dec. of the same year?
   (1) Friday  (2) Wednesday
   (3) Thursday  (4) Tuesday
PART-II

SECTION-A : PHYSICS

This section contains 20 multiple choice questions. Each question has four choices (1), (2), (3) and (4) out of which ONLY ONE is correct.

21. An object of mass m is tied to string of length L and a variable horizontal force is applied on it which starts at zero and gradually increases (Equilibrium axis at all times) until the string makes an angle $\theta$ with the vertical. Total work done by the force F is

(1) $L \sin \theta \times mg$
(2) $mgL(1 - \cos \theta)$
(3) $mgL \cos \theta$
(4) None

22. A disc of mass m and radius R is rotated about an axis which is tangential to disc, in the plane of disc as shown. What is the moment of inertia of the disc about the given axis?

(1) $\frac{5mR^2}{4}$
(2) $\frac{3mR^2}{4}$
(3) $\frac{3mR^2}{2}$
(4) $\frac{7mR^2}{5}$

23. From a point if we move in a direction making an angle $\theta$ measured from +ve x-axis , the potential gradient is given as $\frac{dv}{dr} = 2 \cos \theta$. Find the direction and magnitude of electric field at that point.

(1) $2\hat{i}$
(2) $-2\hat{i}$
(3) $\hat{i} + \hat{j}$
(4) $\hat{i} - \hat{j}$
Sample questions for ASAT : Leader Course

24. Two masses each of mass m are attached at mid points B & end point C of a massless road AC hinged at A. It is released from horizontal position. Find the force at hinge A when the rod becomes vertical.

\[
\begin{align*}
(1) & \quad \frac{28 \text{ mg}}{5} \\
(2) & \quad \frac{26 \text{ mg}}{5} \\
(3) & \quad \frac{23 \text{ mg}}{5} \\
(4) & \quad \frac{31 \text{ mg}}{5}
\end{align*}
\]

25. For a poly-tropic process pressure P and Volume V is related as \( PV^{\frac{1}{n}} = \text{constant} \), if gas is mono-atomic what is molar specific heat capacity for it.

\[
\begin{align*}
(1) & \quad \frac{7R}{4} \\
(2) & \quad \frac{5R}{3} \\
(3) & \quad 3R \\
(4) & \quad \frac{11R}{4}
\end{align*}
\]

26. The spectral emissive power \( E_\lambda \) for a body at temperature \( T_1 \) is plotted against the wavelength and area under the curve is found to be A. At a different temperature \( T_2 \) the area is found to be 9A. Then \( \lambda_1/\lambda_2 = \)

\[
\begin{align*}
(1) & \quad 3 \\
(2) & \quad \frac{1}{3} \\
(3) & \quad \frac{1}{\sqrt{3}} \\
(4) & \quad \sqrt{3}
\end{align*}
\]

27. In the figure, there is a hexagon of side ‘a’ and charges are placed as shown; the electric field at centre of hexagon is:

\[
\begin{align*}
(1) & \quad \frac{kq}{a^2} \\
(2) & \quad \frac{2kq}{a^2} \\
(3) & \quad \frac{5\sqrt{3}kq}{a^2} \\
(4) & \quad \frac{6\sqrt{2}kq}{a^2}
\end{align*}
\]
28. The figure shows a uniformly charged hemisphere of radius R. If it has volume charged density \( \rho \). If the electric field at a point 2R distance above its centre is E. Then what is the electric field at the point at distance 2R below its centre.

\[
\begin{align*}
(1) & \quad \frac{\rho R}{6 \epsilon_0} + E \\
(2) & \quad \frac{\rho R}{12 \epsilon_0} - E \\
(3) & \quad -\frac{\rho R}{6 \epsilon_0} + E \\
(4) & \quad \frac{\rho R}{24 \epsilon_0} + E
\end{align*}
\]

29. Three large plates are arranged as shown. How much charge will flow through the key K if it is closed?

\[
\begin{align*}
(1) & \quad \frac{5Q}{6} \\
(2) & \quad \frac{4Q}{3} \\
(3) & \quad \frac{3Q}{2} \\
(4) & \quad \text{none}
\end{align*}
\]

30. A current carrying loop is coplanar with a long infinite current carrying wire as shown in the figure. If the loop is now rotated about axis XX' by an angle of 120°. The final flux of magnetic field associated with the loop will be -

\[
\begin{align*}
(1) & \quad \frac{\mu_0 I_a}{2\pi} \\
(2) & \quad \frac{\mu_0 I_a}{\pi} \\
(3) & \quad \frac{\mu_0 I_a}{2} \\
(4) & \quad \text{zero}
\end{align*}
\]
31. A photocell in the saturation mode is irradiated by light of wavelength $\lambda = 6600 \text{ Å}$. The corresponding spectral sensitivity of the cell is $s_{\lambda} = 4.8 \text{ mA/W}$. Find the yield of photoelectrons, i.e. the number of photoelectrons produced by each incident photon. [Take : $h = 6.6 \times 10^{-34} \text{ J-s}$]

(1) $9 \times 10^{-2}$
(2) $9 \times 10^{-4}$
(3) $9 \times 10^{-3}$
(4) $9$

32. A uniform magnetic field $B$ is directed out of the page and a metallic wire frame is placed in the field as shown. While the shape of the wire is transformed into a circle in the same plane, the current in frame is :

(1) Clock wise
(2) Does not appear
(3) Anti clockwise
(4) Alternating

33. A wire loop is placed in a region of time varying magnetic field which is oriented orthogonally to the plane of the loop as shown in the figure. The graph shows the magnetic field variation as the function of time. Assume the positive emf is the one which drives a current in the clockwise direction and seen by the observer in the direction of $B$ shown. Which of the following graphs best represents the induced emf as a function of time.
34. The equivalent resistance between A and B is

\[ r_A \parallel r_B \parallel r_C \parallel r_D \parallel r_E \parallel r_F \parallel r_G \parallel r_H \parallel r_I \]

(1) 2r (2) \( \frac{5r}{3} \) (3) r (4) \( \frac{r}{2} \)

35. The rms value of the current wave \( i = a \sin \omega t + b \cos \omega t \) is:

(1) \( \sqrt{\frac{a^2 + b^2}{2}} \) (2) \( \sqrt{\frac{2a^2 + b^2}{2}} \) (3) \( \sqrt{\frac{a^2 + 2b^2}{2}} \) (4) \( \sqrt{a^2 + b^2} \)

36. A block of mass \( m \) is moving at a speed \( V \) and collides with another block of mass \( 2m \) at rest. The lighter block comes to rest after collision. The co-efficient of restitution is

(1) \( \frac{1}{2} \) (2) \( \frac{1}{3} \) (3) \( \frac{1}{4} \) (4) \( \frac{2}{3} \)
In a rigid wire frame ABCDEFA, as shown in the figure, a current $I_0$ flows through the wire from F to A as shown in the figure. Radii of the three quarters AB, CD and EF are $r_1 = 3^{1/4} \text{ m}$, $r_2 = 3^{-1/4} \text{ m}$ and $r_3 = 1 \text{ m}$ respectively with common centre at O. All the wires are light except for the portion ED which have a mass of 'm' kg.

37. The magnetic moment of the loop is

(1) $\frac{\pi I_0}{4} \left[ \sqrt{3} \hat{i} + \frac{1}{\sqrt{3}} \hat{j} + \hat{k} \right]$

(2) $-\frac{\pi I_0}{4} \left[ \sqrt{3} \hat{i} + \frac{1}{\sqrt{3}} \hat{j} + \hat{k} \right]$

(3) $\frac{\pi I_0}{4} \left[ -\sqrt{3} \hat{i} - \frac{1}{\sqrt{3}} \hat{j} + \hat{k} \right]$

(4) $\frac{\pi I_0}{4} \left[ -\sqrt{3} \hat{i} + \frac{1}{\sqrt{3}} \hat{j} + \hat{k} \right]$

38. If this loop is kept in a magnetic field of magnitude 2 T which is directed along positive y-axis, angular acceleration of the loop is [where $\ell = (r_3-r_2)$]

(1) $\frac{8\pi I_0}{m\ell^2} \left[ \hat{i} + \sqrt{3} \hat{k} \right]$

(2) $\frac{6\pi I_0}{m\ell^2} \left[ \hat{i} + \sqrt{3} \hat{k} \right]$

(3) $\frac{8\pi I_0}{m\ell^2} \left[ \hat{i} - \sqrt{3} \hat{k} \right]$

(4) $\frac{6\pi I_0}{m\ell^2} \left[ \hat{i} - \sqrt{3} \hat{k} \right]$
Comprehension for (Q.No.39 & Q.No.40)

Heat generation may occur in a variety of radial geometries. Consider a long, solid cylinder as shown in the figure, which could represent a current-carrying wire or a fuel element in a nuclear reactor. For steady state conditions, the rate at which heat is generated within the cylinder must equal the rate at which heat is convected from the surface of the cylinder to a moving fluid.

This condition allows the surface temperature to be maintained at a fixed value of $T_s$. To determine the temperature distribution in the cylinder, we begin with energy conservation principle. Consider a cylindrical section of radius $r$. The energy is generated within the volume and is conducted radially outwards.

$$q \pi r^2 \ell = -K \pi r \left( -\frac{dT}{dr} \right)$$

where $q$ is the energy generated per unit time per unit volume, $K$ is the thermal conductivity and $\frac{dT}{dr}$ is the temperature gradient at radius $r$. 

\[ q \pi r^2 \ell = -K \pi r \left( -\frac{dT}{dr} \right) \]

**Sample questions for ASAT : Leader Course**

गणना (प्र. सं. 39 और प्र. 40) के लिए

क्रम उत्तर पदन के त्रिकोणयोग्य मित्र के विचारों के नतीजे खाने में लिख जा सकते हैं। चित्र में दिखाया गया सर-सफल वे, वे तपस्विय रखी जिसे क्रिया गया रहा हो तथा नामों की पत्तियों में इन घनों के उत्तर होते हैं। र-भ-क की हिस्ता तिमें वे लान में क्रम उत्तर पदन की दर वे लान की दर से गतिविधियों लड़ रही क्रम संवहन की दर के बाद रहते हैं।

\[ q \pi r^2 \ell = -K \pi r \left( -\frac{dT}{dr} \right) \]
If \( q \) is constant \( T(r) = -\frac{q}{4k}r^2 + C \)

At \( r = r_0 \), \( T(r_0) = T_S \). Therefore,

\[
T(r) = \frac{q}{4k}r_0^2 \left(1 - \frac{r^2}{r_0^2}\right) + T_S
\]

The rate of heat convected to the surrounding fluid (at temperature \( T_f \)) by the surface at temperature \( T_S \) is proportional to the temperature difference \( (T_S - T_f) \) and the surface area in contact with the fluid. Thus, rate of heat convection = \( h(2\pi r_0\ell)(T_S - T_f) \) where \( h \) is a constant called heat convection coefficient. By overall energy balance,

\[
q \left(\pi r_0^2\ell\right) = h(2\pi r_0\ell)(T_S - T_f) \Rightarrow T_S = T_f + \frac{4r_0}{2h}
\]

39. The dimension of heat convection coefficient is-

(1) \([ML^2T^{-1}\Theta^{-1}]\)

(2) \([ML^0T^{-2}\Theta^{-1}]\)

(3) \([ML^2T^{-2}\Theta^{-1}]\)

(4) \([ML^4T^{-3}\Theta^{-1}]\)

40. In the given passage, the difference in temperature at the axis and surface of the cylinder is-

(1) \(\frac{qr_0^2}{4k}\)

(2) \(-\frac{qr_0^2}{k}\)

(3) \(\frac{qr_0^2}{2k}\)

(4) \(-\frac{2qr_0}{k}\)
This section contains 20 multiple choice questions. Each question has four choices (1), (2), (3) and (4) out of which ONLY ONE is correct.

41. Most acidic phenol is -

42. Which of the following will convert

\[ \text{CH}_3 \text{CH}_2 \text{C} = \text{CH} \rightarrow \]

\[ \text{CH}_3 \text{C} - \text{CH}_2 - \text{CH}_3 \]

(1) \( \text{H}_2\text{O/}\text{H}^+ \)

(2) \( \text{Hg}^{2+}/\text{H}_2\text{SO}_4 \)

(3) \( \text{conc.} \text{H}_2\text{SO}_4 / \text{H}_3\text{PO}_4 \)

(4) \( \text{K}_2\text{Cr}_2\text{O}_7 / \text{KMnO}_4 \)

43. \( \text{CH}_2=\text{CH} - \text{CH}=\text{CH}-\text{CH}_3 \xrightarrow{\text{(i)O}_3 \text{(ii)Zn/H}_2\text{O}} \) Products

Which one of the following cannot be obtained as product.

(1) HCHO

(2) \( \text{CH}_3\text{CHO} \)

(3) \( \frac{\text{CHO}}{\text{CHO}} \)

(4) HCOOH
Sample questions for ASAT : Leader Course

44. Observe the given reaction pathway and choose the correct alternative from the options given below -

(i) Aq KOH
(ii) H^+

CH_3CPhHCl

CH_3CPhHOH

50%
50%

(I)

PE

Reaction co-ordinates

Reaction follow this path

(II)

PE

Reaction co-ordinates

(III) Intermediate of the reaction is carbocation.

(IV) reaction goes via pentavalent Transition state.

(1) I, IV  (2) II, IV  (3) I, III  (4) II, III

45. Identify the products of given reaction and choose the correct one from the options given below :-

O

1

C_2H_5 – I, S_N^1

C_2H_5 – OH, S_N^1

C_2H_5 – I, S_N^2

C_2H_5 – OH, S_N^2

(1)  

(2)  

(3)  

(4)  

OH

1

1
46. Which of the following compounds can undergo tautomerization?

(I) \[
\begin{array}{c}
\text{O} \\
\end{array}
\]

(II) \[
\begin{array}{c}
\text{O} \\
\end{array}
\]

(III) \[
\begin{array}{c}
\text{O} \\
\text{O}
\end{array}
\]

(IV) \[
\begin{array}{c}
\text{O} \\
\text{O}
\end{array}
\]

(1) I, II and III only (2) II and III only
(3) I, II, III and IV (4) I and III only

47. Which of the following does not show geometrical isomerism?

(1) \[
\begin{array}{c}
\text{C}_6\text{H}_5 - \text{N} = \text{N} - \text{C}_6\text{H}_5
\end{array}
\]

(2) \[
\begin{array}{c}
\text{CH}_3 - \text{CH} = \text{N} - \text{OH}
\end{array}
\]

(3) \[
\begin{array}{c}
\text{Me} \quad \text{Me}
\end{array}
\]

(4) None

48. Which of the following dissolve(s) in excess of NaOH solution?

(1) \[
\text{AgNO}_3
\]

(2) \[
\text{Zn(OH)}_2
\]

(3) \[
\text{BaSO}_4
\]

(4) \[
\text{Hg}_2 (\text{NO}_3)_2
\]

49. \[
\text{Be(NO}_3)_2 \xrightarrow{\text{Heat}} \text{BeO} + [X] + \text{O}_2
\]

What is the [X] :-

(1) \[
\text{NO}
\]

(2) \[
\text{N}_2\text{O}
\]

(3) \[
\text{NO}_2
\]

(4) \[
\text{N}_2\text{O}_3
\]

50. Which of the following molecule is correctly matched with its dipole moment:

(1) \[
\text{PF}_3\text{Cl}_2, \mu = 0
\]

(2) \[
\text{PF}_2\text{Cl}_3, \mu \neq 0
\]

(3) \[
\text{PF}_3\text{Cl}_2, \mu \neq 0
\]

(4) None of these
51. Which of the following molecule has S–O–S linkage -
   (1) $\text{H}_2\text{S}_2\text{O}_8$
   (2) $\text{H}_2\text{S}_2\text{O}_5$
   (3) $\text{S}_2\text{O}_6$
   (4) $\text{H}_2\text{S}_2\text{O}_4$

52. In which of the following process, maximum amount of energy involved.
   (1) $\text{Cl} \rightarrow \text{Cl}^-$
   (2) $\text{Br}^- \rightarrow \text{Br}$
   (3) $\text{F}^- \rightarrow \text{F}$
   (4) $\text{I}^- \rightarrow \text{I}$

53. Which of the following compounds have the same number of lone pairs on their central atom
   [I] $\text{XeF}_5^-$
   [II] $\text{BrF}_3$
   [III] $\text{XeF}_2$
   [IV] $\text{H}_3\text{O}^+$
   [V] $\text{XeO}_6^{4-}$
   (1) IV and V
   (2) I and III
   (3) I and II
   (4) II, IV and V

54. In $\text{P}_4$, $\text{P}_4\text{O}_6$ and $\text{P}_4\text{O}_{10}$ have how many $\sigma$ bonds?
   (1) 12, 6, 16
   (2) 16, 6, 12
   (3) 6, 12, 16
   (4) 16, 16, 12

55. According to Graham’s law, at a given temperature the ratio of the rates of diffusion
    $\frac{r_A}{r_B}$ of gases A and B is given by :
    (1) $\frac{P_A}{P_B} \left( \frac{M_A}{M_B} \right)^{1/2}$
    (2) $\left( \frac{M_A}{M_B} \right) \left( \frac{P_A}{P_B} \right)^{1/2}$
    (3) $\frac{P_A}{P_B} \left( \frac{M_B}{M_A} \right)^{1/2}$
    (4) $\left( \frac{M_B}{M_A} \right) \left( \frac{P_B}{P_A} \right)^{1/2}$
Comprehension for (Q.No.56 to Q.No.58)

Introducing the Cl-atoms in PF$_5$, we may get molecule PCl$_{5-x}F_x$.

56. When the value of $x = 2$. Comment on the position of F-atoms in the molecule.
   (1) Three F-atoms are at the three equatorial positions.
   (2) Two F-atoms are at the equatorial position and one F-atom is at the axial position.
   (3) Two F-atoms are at the axial position and one F-atom is at the equatorial position.
   (4) All are correct.

57. For which value of ‘$x$’, the dipole moment of the molecule is zero.
   (1) 4 (2) 2 (3) 3 (4) 1

58. For which value of $x$, the central atom is not utilising d-orbital for its hybridisation.
   (1) 3 (2) 5 (3) 2 (4) None of these

Comprehension for (Q.No.59 & Q.No.60)

(i) CH$_3$-C=OCH–CH$_3$ $\xrightarrow{\text{PCL}}$ 'P' + Q

(ii) CH$_3$-C=OCH–CH$_3$ $\xrightarrow{\text{DI-BALH}}$ 'R' + T

(iii) CH$_3$-C=OCH–CH$_3$ $\xrightarrow{\text{H}_2\text{O}}$ 'S' + T

(iv) CH$_3$-C=OCH–CH$_3$ $\xrightarrow{\text{LiAlH}_4}$ 2T

(v) T $\xrightarrow{\text{PCL}}$ Q

59. Which can’t show positive iodoform test -
   (1) T (2) Q (3) R (4) P

60. Which compound is a alcohol -
   (1) P (2) Q (3) R (4) T
61. If the letters of the word CHANDIGARH are written down at random in a row, the probability that two A's are together is

(1) \( \frac{1}{5} \)  \hspace{1cm} (2) \( \frac{2}{5} \)  \hspace{1cm} (3) \( \frac{3}{5} \)  \hspace{1cm} (4) \( \frac{4}{5} \)

62. If the function \( f(x) = 2x^3 - 9ax^2 + 12a^2 x + 1 \), where \( a > 0 \), attains its maximum and minimum values at \( p \) and \( q \) respectively such that \( p^2 = q \), then \( a \) equals -

(1) \( \frac{1}{2} \)  \hspace{1cm} (2) 3  \hspace{1cm} (3) 1  \hspace{1cm} (4) 2

63. The point \( (\alpha^2, \alpha) \) is a point in the angle between the lines, \( x + 2y - 3 = 0 \) and \( 2x - 5y + 2 = 0 \) containing the origin if:

(1) \( \alpha \in (1, 2) \)

(2) \( \alpha \in \left(\frac{1}{2}, 1\right) \)

(3) \( \alpha \in \left(-3, \frac{1}{2}\right) \)

(4) \( \alpha \in (-\infty, -3) \cup \left(\frac{1}{2}, 1\right) \)

64. The complete solution set of \( \frac{5^{x+1}}{4^x} \geq 0 \) is -

(1) \( (-\infty, 0] \)  \hspace{1cm} (2) \( [0, \infty) \)

(3) \( (-\infty, -1] \cup [1, \infty) \)  \hspace{1cm} (4) \( R \)
65. If \( x \in \left( 0, \frac{\pi}{4} \right) \), then \( \lim_{n \to \infty} \frac{(\sin x)^n - (\cos x)^n}{(\sin x)^n + (\cos x)^n} \) is

(1) 1
(2) -1
(3) 0
(4) Do not exist

66. Number of real solution of

\[
\sqrt{x^2 + 3x + 2} + |x-4| = 0
\]

is

(1) 0
(2) 1
(3) 2
(4) Infinite

67. \( \frac{1}{\cos^0 \cos 1\degree} + \frac{1}{\cos 1\degree \cos 2\degree} + \ldots + \frac{1}{\cos 88\degree \cos 89\degree} \) is equal to:

(1) \( \frac{\sin 1\degree}{\cos 1\degree} \)
(2) \( \frac{\cos 1\degree}{\sin 1\degree} \)
(3) \( \frac{\sin^2 1\degree}{\cos^2 1\degree} \)
(4) \( \frac{\cos^2 1\degree}{\sin^2 1\degree} \)

68. If all roots of the equation,

\( z^3 + az^2 + bz + c = 0 \) \((a,b,c \in \mathbb{R})\) are of unit modulus, then

(1) \( |a| \leq 3 \)
(2) \( |b| > 3 \)
(3) \( |c| > 1 \)
(4) none of these

69. Let \( \alpha, \beta, \gamma \) be three numbers such that

\[
2(\alpha\beta + \beta\gamma + \gamma\alpha) = \alpha\beta\gamma, \quad \frac{1}{\alpha^2} + \frac{1}{\beta^2} + \frac{1}{\gamma^2} = \frac{9}{4}
\]

and \( \alpha + \beta + \gamma = 2 \) then the value of \( \alpha\beta\gamma \) is

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

70. The value of \( \lim_{n \to \infty} \sum_{r=1}^{n} \frac{\sin^3 3r}{3r} \) is:

(1) \( \frac{3}{4} \)
(2) \( -\frac{3}{4} \)
(3) \( \frac{1}{4} \)
(4) \( -\frac{4}{3} \)
Sample questions for ASAT : Leader Course

71. Two contestants play a game as follows each is asked to select a digit from 3, 4, 5, 6, 7, 8. If the two digits match they both win a prize. The probability that they will win a prize in a single trial is

(1) $\frac{1}{36}$  
(2) $\frac{1}{6}$  
(3) $\frac{1}{3}$  
(4) $\frac{2}{3}$

72. Let function $f : \mathbb{R} \rightarrow \mathbb{R}$ be defined by $f(x) = 15x + \sin(x^{15})$ for $x \in \mathbb{R}$ then $f$ is

(1) one-to-one and onto  
(2) one-to-one not onto  
(3) onto but not one-to-one  
(4) neither one-to-one nor onto

73. The exact value of $\frac{60\sin 82^\circ \sin 51^\circ \sin 47^\circ}{\sin 16^\circ + \sin 78^\circ + \sin 86^\circ}$ is

(1) 12  
(2) 15  
(3) 16  
(4) 20

74. If $x^2 - 2x \cos \theta + 1 = 0$ then the value of $x^{2^n} - 2x^n \cos \theta + 1$ is equal to

(1) $\cos 2^n \theta$  
(2) $\sin 2^n \theta$  
(3) 0  
(4) some real number $> 0$

75. If $(2x^2 - 3x + 1)(2x^2 + 5x + 1) = 9x^2$, then equation has:

(1) Four real roots  
(2) Two real and two imaginary roots  
(3) All imaginary  
(4) None of the above

76. The probability that they will win a prize in a single trial is

(1) $\frac{1}{36}$  
(2) $\frac{1}{6}$  
(3) $\frac{1}{3}$  
(4) $\frac{2}{3}$

77. Two contestants play a game as follows each is asked to select a digit from 3, 4, 5, 6, 7, 8. If the two digits match they both win a prize. The probability that they will win a prize in a single trial is

(1) $\frac{1}{36}$  
(2) $\frac{1}{6}$  
(3) $\frac{1}{3}$  
(4) $\frac{2}{3}$

78. Let function $f : \mathbb{R} \rightarrow \mathbb{R}$ be defined by $f(x) = 15x + \sin(x^{15})$ for $x \in \mathbb{R}$ then $f$ is

(1) one-to-one and onto  
(2) one-to-one not onto  
(3) onto but not one-to-one  
(4) neither one-to-one nor onto

79. The exact value of $\frac{60\sin 82^\circ \sin 51^\circ \sin 47^\circ}{\sin 16^\circ + \sin 78^\circ + \sin 86^\circ}$ is

(1) 12  
(2) 15  
(3) 16  
(4) 20

80. If $x^2 - 2x \cos \theta + 1 = 0$ then the value of $x^{2^n} - 2x^n \cos \theta + 1$ is equal to

(1) $\cos 2^n \theta$  
(2) $\sin 2^n \theta$  
(3) 0  
(4) some real number $> 0$

81. If $(2x^2 - 3x + 1)(2x^2 + 5x + 1) = 9x^2$, then equation has:

(1) Four real roots  
(2) Two real and two imaginary roots  
(3) All imaginary  
(4) None of the above

82. The probability that they will win a prize in a single trial is

(1) $\frac{1}{36}$  
(2) $\frac{1}{6}$  
(3) $\frac{1}{3}$  
(4) $\frac{2}{3}$
Comprehension for (Q.No.76 to Q.No.78)

Consider the algebraic expression \((x + 1) (x - 2) (x + 3) (x - 4) \ldots \ldots \ldots (x - 100)\).

On the basis of above information, answer the following questions:

76. Coefficient of \(x^{100}\) is equal to-
   (1) 1  (2) 50  
   (3) 100  (4) 101

77. Coefficient of \(x^{99}\) is equal to-
   (1) –50  (2) –100  
   (3) –5050  (4) –101

78. Coefficient of \(x^{98}\) is equal to-
   (1) –158975  (2) –168925  
   (3) –167925  (4) –157925

Comprehension for (Q.No.79 to Q.No.80)

It is given that,

\[
\log \sin^2 \alpha = \log \cos \beta = \frac{\log \sin \gamma}{4x + y + 7z} = \frac{-x + y - 2z}{x - 6y + 3z}
\]

(wherever defined).

On the basis of above information, answer the following questions:

79. Value of \(\sin^2 \alpha \cdot \cos^5 \beta \cdot \sin \gamma\) is equal to-
   (1) 0  (2) 1  
   (3) \frac{1}{2}  (4) \sqrt{3}

80. If \(\alpha, \beta, \gamma \in [0, 2\pi]\) such that \((\alpha + \beta + \gamma)\) is maximum then \(\sum \tan \frac{\alpha}{8} \tan \frac{\beta}{8}\) is equal to-
   (1) –1  (2) 0  
   (3) 1  (4) \sqrt{3}
This section contains **20 multiple choice questions**. Each question has four choices (1), (2), (3) and (4) out of which **ONLY ONE** is correct.

**81.** The carrying capacity of a population is determined by its

(1) Population growth rate
(2) Birth rate
(3) Death rate
(4) Limiting resource

**82.** A graphical representation between potential energy and progression of reaction is given below. Identify appropriate terms for the given A, B and C –

- A–Substrate, B–Product, C–Activation energy with enzyme
- A–Product, B–Substrate, C–Activation energy with enzyme
- A–Product, B–Substrate, C–Activation energy without enzyme
- A–Substrate, B–Product, C–Activation energy without enzyme

**83.** Below the acromion process a depression is found called as glenoid cavity. From the above statement identify the bone which is been talked about–

(1) Clavicle
(2) Scapula
(3) Humerus
(4) Rib
84. रास-शास्त्र में उत्तर दें।

<table>
<thead>
<tr>
<th>सूची I</th>
<th>सूची II</th>
</tr>
</thead>
<tbody>
<tr>
<td>(i) पहला सर्वाथ्वीकरण परिपूर्ण</td>
<td>(a) पहला माह परिपूर्ण</td>
</tr>
<tr>
<td>(ii) नितनकय व पृष्ठांक करण</td>
<td>(b) द्वितीय माह परिपूर्ण</td>
</tr>
<tr>
<td>(iii) निष्टक नीरा नयना बनाए</td>
<td>(c) पत्ता माह परिपूर्ण</td>
</tr>
<tr>
<td>(iv) प्रथम निर्मति ऑफ़ फूटस</td>
<td>(d) पौष्पित माह परिपूर्ण</td>
</tr>
</tbody>
</table>

85. निम्न लिखित तम्में से कौन सी संरचना किलाट्टे के नरजन से सब जीव तनहीं है?

- (1) कॉडल, लर्टा इल
- (2) को लेंगे रिक्त गं, फिल
- (3) कॉ फिल गुं फिल
- (4) वी वी, वा हिनी / वी वी, के बी

86. नीचे उठा व पत्ता की व्यथाएं दो संठी हैं।

- (a) शीत दोष वाली सूग्र है।
- (b) नस उप पत्ता का नियमन।
- (c) पचक अंग्रेज का संस्कृत दर्पण
- (d) प्लांग्स परे टीन का संस्कृत दर्पण

उपर में से किन सभी नस का योग क्यों है?

- (1) के वल a, b तथा 90°
- (2) के वल b, a तथा उ
- (3) के वल b, c तथा उ
- (4) a, b, c तथा उ
Sample questions for ASAT : Leader Course

87. A process that starts with activity of most abundant enzyme in the world and results in release of CO$_2$ is :-

(1) Cellular respiration  
(2) Photosynthesis  
(3) Alcoholic fermentation  
(4) Photorespiration

88. A phenomenon that prevents pollination by pollen grains of same flower but not by that of another flower of same plant is :-

(1) Monoeciousness  
(2) Xenogamy  
(3) Cleistogamy  
(4) Autogamy

89. Match the following -

<table>
<thead>
<tr>
<th>Column-I</th>
<th>Column-II</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) Simple cuboidal epithelium</td>
<td>(i) Eustachain tube</td>
</tr>
<tr>
<td>(2) Simple columnar epithelium</td>
<td>(ii) Terminal bronchioles</td>
</tr>
<tr>
<td>(3) Simple squamous epithelium</td>
<td>(iii) Thyroid vesicle</td>
</tr>
<tr>
<td>(4) Ciliated columnar epithelium</td>
<td>(iv) Gastric gland</td>
</tr>
</tbody>
</table>

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

90. How many of the following are copper releasing IUD's.

LNG-20, CuT, Cu7, Progestasert, Multiload-375

(1) 2  
(2) 1  
(3) 3  
(4) 4
91. Cancerous tumours can be detected by the following techniques, except:-

(1) Radiography
(2) Computed tomography
(3) Magnetic resonance imaging (MRI)
(4) EEG

92. Which ancestor of man firstly hunted with stone weapons but essentially ate fruit :-

(1) Ramapithecus
(2) Dryopithecus
(3) Homo Habilis
(4) Australopithecus

93. Some of the contraceptive methods are given in table according to their types. Select correct option.

<table>
<thead>
<tr>
<th>Hormonal Method</th>
<th>Natural Method</th>
<th>Mechanical Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) Multiload 375</td>
<td>Condom</td>
<td>Mala-D</td>
</tr>
<tr>
<td>(2) Gossypol</td>
<td>B.B.T.</td>
<td>Mala-D</td>
</tr>
<tr>
<td>(3) IUCD</td>
<td>B.B.T.</td>
<td>CuT</td>
</tr>
<tr>
<td>(4) Saheli</td>
<td>B.B.T.</td>
<td>IUCD</td>
</tr>
</tbody>
</table>

94. Fill in the blanks in the different columns of the table given below:

<table>
<thead>
<tr>
<th>Disease</th>
<th>Casual organism and part it inputs</th>
<th>Medium of transfer</th>
</tr>
</thead>
<tbody>
<tr>
<td>(i) Common cold</td>
<td>A</td>
<td>Droplets from sneezing of infected persons</td>
</tr>
<tr>
<td>(ii) Pneumonia</td>
<td>C</td>
<td>Using towels of infected individuals</td>
</tr>
<tr>
<td>(iii) Filariaasis</td>
<td>D</td>
<td>Droplets/aerosols released by an infected person, sharing utensils</td>
</tr>
</tbody>
</table>

91. कैसे काफी के अंत तक के सारे सुंदरी मर के जो चाह जलता है?

(1) रे दिया गया फी
(2) का पैटे टो तो मय फी
(3) मे हाथ कर खो ने (MRI) मे जिंग
(4) EEG

92. मनुष्यके जीनेस पूँ बन जो प्राप्त मय शार के हिसाब व युद्ध फिक्क फो ते फोलाइ अन्य खे सुंदरी थे -

(1) रा मा फिरे कस्ट
(2) डा ये फिरे कस्ट
(3) हाँ मे हे विकिगिस
(4) अ रटे ले ईने फिरे कस

93. नौ चे खण्डी मे कु छ गांव निये धारित कहे उनके प्राप्त मर के शायर दी गई है। सही विकल्प पचु निये।

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<td>Droplets/aerosols released by an infected person, sharing utensils</td>
</tr>
</tbody>
</table>

94. नौ चे दी गई खण्डी के विकल्प न के लम मे रिख तर होते।
Sample questions for ASAT : Leader Course

In which one of the following options all the blanks A, B, C and D are correctly filled

(1) A – Rhinovirus. Nose and respiratory passage not lungs
B – Ringworm
C – Haemophilus influenzae, alveoli of lungs
D – Contaminated food and water

(2) A – Coryza virus. Alveoli of lungs
B – Ringworm
C – Streptococcus pneumoniae. Nose and respiratory passage
D – Culex mosquito

(3) A – Rhinovirus. Nose and respiratory passage not lungs
B – Ascariasis
C – Haemophilus influenzae, alveoli of lungs
D – Culex mosquito

(4) A – Rhinovirus, Nose and respiratory passage not lungs
B – Ringworm
C – Haemophilus influenzae, alveoli of lungs
D – Culex mosquito

95. Take a glance of a part of the life cycle of *Plasmodium* given below as events A, B, C and D along with their description

Events | Description
--- | ---
A. | Parasites reproduce asexually in the red blood cells, bursting the red blood cells and causing cycles of fever
B. | Sexual stages (gametocytes) develop in intestine of mosquito
C. | Fertilization and development take place in intestine/GIT of mosquito
D. | Mature infective stages (sporozoites) escape from the intestine and migrate to the mosquito salivary glands
Comprehension for (Q.No.96 & Q.No.97)

A simple tissue is made of cells similar in structure and function, and the tissues made of many different types of cells are called complex tissues. Simple tissues are parenchyma, collenchyma and sclerenchyma and the complex tissues are exemplified by xylem and phloem.

96. The most common simple tissue present in all plants is :-
   (1) Parenchyma  (2) Collenchyma  (3) Sclerenchyma  (4) Fibres

97. Which tissue is often contain chloroplast but this tissue is not present in monocots :-
   (1) Parenchyma (2) Sclerenchyma (3) Collenchyma (4) Phloem parenchyma

Comprehension for (Q.No.98 to Q.No.100)

All living organisms are made of cells. Some are unicellular and others are multicellular. But few structures are real exceptions in biology. Some organisms have cell wall but some don’t. In genetic engineering virus are very important.

98. Gene transfer by the help of virus is called :-
   (1) Transformation (2) Transduction (3) Conjugation (4) Both 1 & 2

99. Which of the following are exception of cell theory:-
   (1) Bacteria (2) Amoeba (3) Rickettsia (4) Virus

100. Which of the following organisms have cell membrane but never have cell wall :-
   (1) Cyanobacteria (2) Virus (3) Mycoplasma (4) Eubacteria
### Sample questions for ASAT: Leader Course

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