

VISA

Vision Infinity Scholarship Award

Students of Vision Infinity who secure All India Rank in IIT-JEE within top100, will be Awarded scholarship for four years during B. Tech in IIT

IIT- JEE
2012

All India Rank in IIT-JEE	Scholarship	Total (in four years)
AIR 1	Rs. 10,000/month	Rs. 4,80,000/-
AIR 2	Rs. 7,500/month	Rs. 3,60,000/-
AIR 3	Rs. 6,000/month	Rs. 2,88,000/-
AIR 4 -10	Rs. 5,000/month	Rs. 2,40,000/-
AIR 11- 20	Rs. 3,000/month	Rs. 1,44,000/-
AIR 21-30	Rs. 1,500/month	Rs. 72,000/-
AIR 31-50	Rs. 1,000/month	Rs. 48,000/-
AIR 51-100	Rs. 500/month	Rs. 24,000/-

* Terms & Conditions apply

Model Test Paper-I

One Year Programme

Name of the Student :

Reg. No. :

Duration : 1.30 hours

Max. Marks : 114

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

INSTRUCTIONS :

This booklet contain 30 questions in five sections.

Section A : Contains questions with **only one** correct answer. For every right answer you will be awarded 3 marks and for wrong answer you will be awarded -1 (Negative One) mark.

Section B : Contains Statement-1 (Assertion) & Statement-2 (Reason) type questions with **only one** correct answer. For every right answer you will be awarded 3 marks and for wrong answer you will be awarded -1 (Negative One) mark.

Section C : Contains questions with **one or more than one** correct answer. For every right answer you will be awarded 4 marks and for wrong answer you will be awarded -1 (Negative One) mark.

Section D : Contains comprehension type questions with **only one** correct answer. For every right answer you will be awarded 4 marks and for wrong answer you will be awarded -1 (Negative One) mark.

Section E : For each question in Section-E, you will be **awarded 6 marks** if you darken all the bubbles corresponding only to the correct answer or **awarded 1 mark** each for correct bubbling of answer in any row. **No negative mark will be awarded for an incorrectly bubbled answer.**

You should submit the question paper & answer sheet after the completion of the test to the invigilator.

You should keep the question paper & answer sheet clean. Rough work must be done in the space provided.

PHYSICS

SECTION - A

This section contains 3 multiple choice questions. Each question has 4 choices (A), (B), (C) and (D), out of which **ONLY ONE** is correct.

1. A ball is thrown with speed 20 m/sec vertically up from the ground at $t = 0$. The ball will be at height 15 m above the ground at :
(A) $t = 1$ sec only
(B) $t = 3$ sec only
(C) $t = 1$ sec and $t = 3$ sec
(D) $t = 1$ sec and $t = 2$ sec.
2. A one litre flask contains some mercury. It is found that at different temperatures the volume of air inside the flask remains the same. The volume of mercury is [coefficient of linear expansion of glass = 9×10^{-6} per degree, coefficient of volume expansion of mercury = 1.8×10^{-4} per degree] :
(A) 100 cm^3
(B) 25 cm^3
(C) 150 cm^3
(D) 200 cm^3 .
3. A wave is travelling along a string. In one time period :
(A) a particle advances a distance of one wavelength.
(B) a particle moves a distance of one amplitude.
(C) a crest advances a distance of one wavelength.
(D) average velocity of particle is proportional to amplitude.

SECTION- B

Directions for questions no. 4

The following question consists of two statements, one labelled as 'STATEMENT-1 (Assertion)' and the other labelled as 'STATEMENT-2 (Reason)'. You are to examine these two statements carefully and select the answer to these questions using the codes given below :

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- (A) Statement-1 is True, Statement-2 is True; Statement-2 is the correct explanation of Statement-1.
- (B) Statement-1 is True, Statement-2 is True; Statement-2 is not a correct explanation of Statement-1.
- (C) Statement-1 is True, Statement-2 is False
- (D) Statement-1 is False, Statement-2 is True.

4. STATEMENT-1

It is possible that a body be in accelerated motion under a force acting on the body, yet no work is being done by the force.

because

STATEMENT-2

Force acting on body may or may not work.

SECTION -C

This section contains 2 multiple choice questions. Each question has 4 choices (A), (B), (C) and (D), out of which **ONE OR MORE** is/are correct.

5. The displacement of a particle in a medium due to a wave travelling in the x-direction through the medium is given by $y = a \sin(\alpha t - \beta x)$ where t is time in second, α and β are constants :

- (A) The frequency of the wave is α
- (B) The time period of the wave is $\frac{2\pi}{\alpha}$
- (C) The wavelength of the wave is $\frac{2\pi}{\beta}$
- (D) The velocity of the wave is $\frac{\alpha}{\beta}$.

6. Consider the following statements when a steel ball hits a clay chunk in air and gets embedded in it, then :
- (A) both the momentum and the kinetic energy are conserved
 (B) only momentum is conserved
 (C) some kinetic energy is used to deform the clay chunk
 (D) momentum is not conserved.

SECTION - D

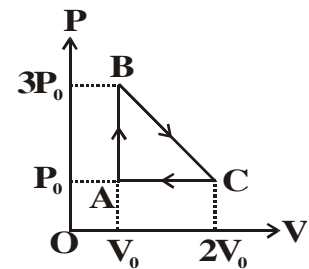
This section contains a paragraph. Based upon paragraph, 3 multiple choice questions have to be answered. Each question has 4 choices (A), (B), (C) and (D), out of which **ONLY ONE** is correct.

Comprehension (Question No. 7 to 9)

One mole of an ideal monoatomic gas is taken round the cyclic process ABCA, as shown.

7. The net work done by the gas is :

- (A) $P_0 V_0$ (B) $-P_0 V_0$
 (C) $2P_0 V_0$ (D) $-2P_0 V_0$.



8. The heat rejected by the gas in path CA is :

- (A) $\frac{2}{5} P_0 V_0$ (B) $\frac{5}{2} P_0 V_0$
 (C) $\frac{-2}{5} P_0 V_0$ (D) $\frac{-5}{2} P_0 V_0$.

9. The heat absorbed by the gas in path AB is :

(A) $P_0 V_0$

(B) $2P_0 V_0$

(C) $3P_0 V_0$

(D) $4P_0 V_0$

SECTION - E

This section contains 1 question. Each question contains statements given in two columns, which have to be matched. Statements in **Column I** are labelled as A, B, C and D whereas statements in **Column II** are labelled as 1, 2, 3 and 4. The answers to these questions have to be appropriately bubbled as illustrated in the following example.

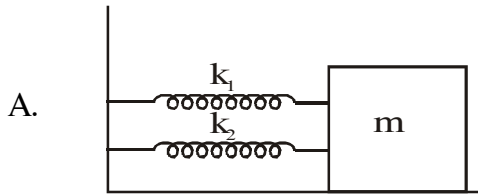
If the correct matches are A-2, A-3, B-1, B-4, C-3, C-4 and D-2, then the correctly bubbled matrix will look like the following :

	A	B	C	D
1	①	●	①	①
2	●	②	②	●
3	●	③	●	③
4	④	●	●	④

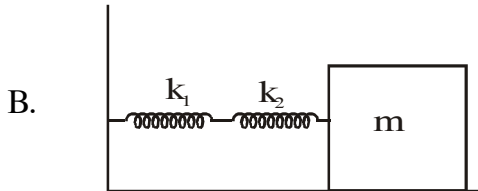
10. Match the following :

Column I (The symbols have their usual meanings)

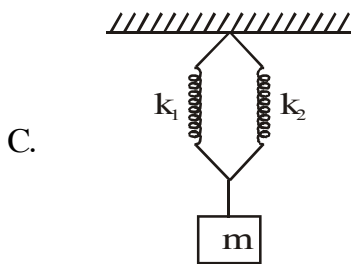
Column II (T=time period of oscillations)



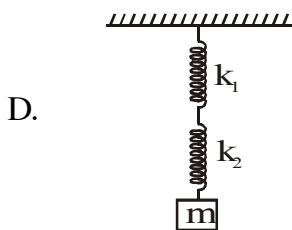
1. $T = 2\pi \sqrt{\frac{m}{k_1 + k_2}}$



2. $T = 2\pi \sqrt{\frac{(k_1 + k_2)m}{k_1 k_2}}$



3. Springs with spring constants k_1 and k_2 are in series



4. Spring with spring constants k_1 and k_2 are in parallel

CHEMISTRY

SECTION-A

This section contains 3 multiple choice questions. Each question has 4 choices (A), (B), (C) and (D), out of which **ONLY ONE** is correct.

11. An element has atomic no. 13 and mass number 27. This element has
(A) 13 electrons and 14 protons (B) 13 protons and 14 electrons
(C) 13 protons and 14 neutrons (D) 13 neutrons and 14 protons.
12. Which of the following has largest atomic radius ?
(A) Na (B) P
(C) S (D) Cl
13. $2\text{C}_2\text{H}_5\text{I} + 2\text{Na} \xrightarrow{\text{Dry ether}}$
The product in above reaction will be :
(A) C_4H_{10} (B) C_2H_6
(C) CH_4 (D) H_2 .

SECTION -B

Directions for questions no. 14

The following question consists of two statements, one labelled as 'STATEMENT-1 (Assertion)' and the other labelled as 'STATEMENT-2 (Reason)'. You are to examine these two statements carefully and select the answer to these questions using the codes given below :

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- (A) Statement-1 is True, Statement-2 is True; Statement-2 is the correct explanation of Statement-1.
- (B) Statement-1 is True, Statement-2 is True; Statement-2 is not a correct explanation of Statement-1.
- (C) Statement-1 is True, Statement-2 is False
- (D) Statement-1 is False, Statement-2 is True.

14. STATEMENT - 1 :

The radius of Na^+ ion will be smaller than Na atom.

because

STATEMENT 2 :

Na^+ ion has less electron than Na atom but have equal no. of protons.

SECTION -C

This section contains 2 multiple choice questions. Each question has 4 choices (A), (B), (C) and (D), out of which **ONE OR MORE** is/are correct.

15. Which of the following statement is/are correct ?

- (A) Methane is tetrahedral in shape
- (B) Double bond length is larger than single bond length
- (C) Single bond is longer than double bond
- (D) σ -bond is formed by overlap of atomic orbitals along internuclear axis.

16. Which of following molecules are polar ?

- | | |
|-------------------|-------------------|
| (A) O_2 | (B) NH_3 |
| (C) CO_2 | (D) HF. |

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SECTION - D

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

Comprehension(Question No. 17 to 19)

Mathematically, the dependence of energies of the orbitals on 'n' and 'l' are quite complicated but one simple rule is that of combined value of n and l. The lower the value of (n + l) for an orbital, lower is its energy. If two orbitals have same value of (n + l), the orbital with lower value of 'n' will have lower energy.

17. Which of the following shows correct order of energies of orbitals :
 (A) $2s > 3s > 3p > 3d > 4s$ (B) $3d > 4s > 3p > 3s > 2s$
 (C) $3p > 3d > 4s > 3s$ (D) $3s > 3d > 3p > 3f$.
18. Which of following represents correct electronic configuration of nitrogen in ground state?
- (A) $\begin{array}{ccc} \boxed{\uparrow\downarrow} & \boxed{\uparrow\downarrow} & \boxed{\uparrow\downarrow} \boxed{\uparrow} \boxed{} \\ 1s^2 & 2s^2 & 2p^3 \end{array}$ (B) $\begin{array}{ccc} \boxed{\uparrow\downarrow} & \boxed{\uparrow} & \boxed{\uparrow\downarrow} \boxed{\uparrow} \boxed{\uparrow} \\ 1s^2 & 2p^1 & 2p^4 \end{array}$
- (C) $\begin{array}{ccc} \boxed{\uparrow\downarrow} & \boxed{\uparrow\downarrow} & \boxed{\uparrow} \boxed{\uparrow} \boxed{\uparrow} \\ 1s^2 & 2s^2 & 2p^3 \end{array}$ (D) $\begin{array}{ccc} \boxed{\uparrow\downarrow} & \boxed{} & \boxed{\uparrow\downarrow} \boxed{\uparrow\downarrow} \boxed{\uparrow} \\ 1s^2 & 2s^0 & 2p^5 \end{array}$
19. "Pairing of electrons in the orbitals belonging to same subshell (p, d, or f) does not take place until each orbital belonging to that subshell has got one electron each". This rule is called :
 (A) Aufbau's rule (B) Hund's rule
 (C) Avogadro's rule (D) Pauli's rule.

SECTION - E

This section contains 1 question. Each question contains statements given in two columns, which have to be matched. Statements in **Column I** are labelled as A, B, C and D whereas statements in **Column II** are labelled as 1, 2, 3 and 4. The answers to these questions have to be appropriately bubbled as illustrated in the following example.

If the correct matches are A-2, A-3, B-1, B-4, C-3, C-4 and D-2, then the correctly bubbled matrix will look like the following :

	A	B	C	D
1	① ● ① ①			
2	● ② ② ●			
3	● ③ ● ③			
4	④ ● ● ④			

20. Match the following :

Column I

(Molecule)

- A. PCl_5
 B. SF_6
 C. C_2H_2
 D. BF_3

Column II

(Hybridisation of central atom)

1. sp
 2. sp^2
 3. sp^3d
 4. sp^3d^2 .

MATHEMATICS

SECTION - A

21. Choose the incorrect :

(A) $\sin 18^\circ = \frac{\sqrt{5}-1}{4}$

(B) $\cos 18^\circ = \frac{\sqrt{10+2\sqrt{5}}}{4}$

(C) $\cos 36^\circ = \frac{\sqrt{5}+1}{4}$

(D) $\sin 36^\circ = \frac{\sqrt{10+2\sqrt{5}}}{4}$

22. If the three lines $4x - 7y + 10 = 0$, $x + y = 5$ and $7x + 4y = 15$ form the sides of a triangle. Then point $(1, 2)$ is its :
- (A) Centroid (B) Incentre
(C) Orthocentre (D) Circumcentre.
23. Choose the incorrect :
- (A) If $a + b + c = 0$, then 1 is a root of the quadratic equation $ax^2 + bx + c = 0$, $a, b, c \in \mathbb{R}$ and $a \neq 0$
- (B) Imaginary roots of a quadratic equation with real co-efficients always occur in conjugate pair i.e. if $\alpha + i\beta$ be one root, then other root will be $\alpha - i\beta$, where $\alpha, \beta \in \mathbb{R}$
- (C) If the roots of equation $a(b - c)x^2 + b(c - a)x + c(a - b) = 0$ be equal then a, b, c are in A.P.
- (D) If a, b, c are rational then the roots of equation $(a + 2b - 3c)x^2 + (b + 2c - 3a)x + (c + 2a - 3b) = 0$, are rational.

SECTION - B

Direction for question no. 24

The following questions consists of two statements, one labelled as 'STATEMENT-1 (Assertion)' and the other labelled as 'STATEMENT-2 (Reason)'. You are to examine these two statements carefully and select the answer to these questions using the codes given below :

- (a) Statement-1 is True, Statement-2 is True; Statement-2 is the correct explanation of Statement-1.
- (b) Statement-1 is True, Statement-2 is True; Statement-2 is not a correct explanation of Statement-1.
- (c) Statement-1 is True, Statement-2 is False
- (d) Statement-1 is False, Statement-2 is True.

24. STATEMENT : 1

$$\lim_{x \rightarrow 1} \frac{1 - x^{-1/3}}{1 - x^{-2/3}} = 2$$

because

STATEMENT : 2

$$\lim_{x \rightarrow a} \frac{x^n - a^n}{x - a} = na^{n-1}$$

SECTION - C

25. If $\omega (\neq 1)$ is a cube root of unity then the value of $\omega^{1994} + \omega^{1995}$ is /are :

- (A) $-\omega$ (B) $-\omega^2$
(C) $-\omega^3$ (D) $-\omega^4$.

26. Equation of circles which passes through the points $(1, -2)$ and $(3, -4)$ and touch the x-axis is :

- (A) $x^2 + y^2 + 6x + 2y + 9 = 0$ (B) $x^2 + y^2 + 10x + 20y + 25 = 0$
(C) $x^2 + y^2 - 6x + 4y + 9 = 0$ (D) $x^2 + y^2 + x + y + 5 = 0$.

SECTION -D

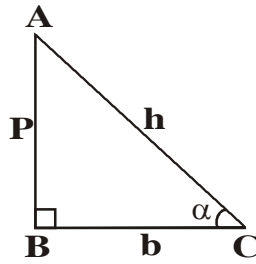
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Comprehension (Question No. 27 to 29)

$$\sin \alpha = \frac{P}{h}$$

$$\cos \alpha = \frac{b}{h}$$

$$\tan \alpha = \frac{P}{b}$$



If $7\sin \alpha = 24\cos \alpha$, $0 < \alpha < \frac{\pi}{2}$ then, answer the following :

27. The value of $14\tan \alpha - 75\cos \alpha - 7\sec \alpha =$

- (A) 1 (B) 2
(C) 3 (D) 4.

28. $\sec \alpha + \tan \alpha =$

- (A) 37/7 (B) 7/17
(C) 5 (D) 7.

29. $\sqrt{\sin \alpha + 2\cos \alpha}$

- (A) 3/5 (B) 7/5
(C) $\sqrt{29}/5$ (D) $\sqrt{38}/5$

SECTION - E

This section contains 1 question. Each question contains statements given in two columns, which have to be matched. Statements in **Column I** are labelled as A, B, C and D whereas statements in **Column II** are labelled as 1, 2, 3 and 4. The answers to these questions have to be appropriately bubbled as illustrated in the following example.

If the correct matches are A-2, A-3, B-1, B-4, C-3, C-4 and D-2, then the correctly bubbled matrix will look like the following :

	A	B	C	D
1	①	●	①	①
2	●	②	②	●
3	●	③	●	③
4	④	●	●	④

30. If a, b, c are in H.P., then Match the following :

Column I

A. $\frac{a}{b+c-a}, \frac{b}{c+a-b}, \frac{c}{a+b-c}$ will be in

B. $\frac{1}{b-a}, \frac{1}{b}, \frac{1}{b-c}$ will be in

C. $a - \frac{b}{2}, \frac{b}{2}, c - \frac{b}{2}$ will be in

D. $\frac{a}{b+c}, \frac{b}{c+a}, \frac{c}{a+b}$ will be in

Column II

1. A.P.

2. G.P.

3. H.P.

4. None of these.

Space for rough work

ANSWER

1-Year

- | | | | | | |
|-----|---------|-----|-------|-----|-------|
| 1. | C | 11. | C | 21. | D |
| 2. | C | 12. | A | 22. | C |
| 3. | C | 13. | A | 23. | C |
| 4. | A | 14. | A | 24. | D |
| 5. | B,C,D | 15. | A,C,D | 25. | A,D |
| 6. | B,C | 16. | B,D | 26. | B,C |
| 7. | A | 17. | B | 27. | B |
| 8. | B | 18. | C | 28. | D |
| 9. | C | 19. | B | 29. | D |
| 10. | A : 1,4 | 20. | A : 3 | 30. | A : 3 |
| | B : 2,3 | | B : 4 | | B : 1 |
| | C : 1,4 | | C : 1 | | C : 2 |
| | D : 2,3 | | D : 2 | | D : 3 |