

# VISA

## Vision Infinity Scholarship Award

Students of Vision Infinity who secure All India Rank in IIT-JEE within top 100, will be Awarded scholarship for four years during B. Tech in IIT

**IIT-JEE**  
**2010**

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-II**

### **One Year Programme**

Name of the Student : .....

Reg. No. : .....

Duration : 1.30 hour

Max. Marks : 114

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

#### **INSTRUCTIONS:**

This booklet contains 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.**

The IIT-JEE Institute

**VISION**  
**Infinity**

*A synonym of success...*

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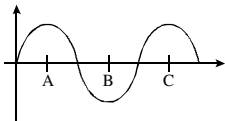
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**Physics**  
**Section - A**

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. Two cars having masses  $m_1$  and  $m_2$  move in circles of radii  $r_1$  and  $r_2$  respectively with equal angular velocity, then the ratio of their tangential velocity  $v_1/v_2$  is :
- (A)  $\frac{m_1}{m_2}$  (B)  $\frac{r_1}{r_2}$   
(C)  $\frac{m_1 r_1}{m_2 r_2}$  (D) 1.
2. When a metal rod is heated it expands because :
- (A) the size of its atoms increases.  
(B) the distance among its atoms increases.  
(C) atmospheric air rushes into it.  
(D) the actual cause is still unknown.
3. The linear distance between maximum displacement and the next minimum displacement in a wave is 6 cm. The wavelength of the wave would be:
- (A) 3 cm (B) 6 cm  
(C) 12 cm (D) 24 cm.



**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 :

- (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

Displacement of a body may be zero when distance travelled by it is not zero.  
because

STATEMENT : 2

The displacement is the longest distance between initial and final position.

### 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. A metal of mass 1 kg at constant atmospheric pressure and at initial temperature  $20^{\circ}\text{C}$  is given a heat of 20,000J. Then :
- (A) Change in temperature of metal is 50 K  
(B) Change in volume during the process is  $5 \times 10^{-7} \text{ m}^3$   
(C) amount of workdone in the process is 0.05 J  
(D) Change in internal energy is 19999.95 J
- (specific heat of metal is  $400 \text{ J/Kg}^{\circ}\text{C}$ , coefficient of volume expansion is  $9 \times 10^{-5}$  per  $^{\circ}\text{C}$ , density of metal is  $9000 \text{ Kg/m}^3$  and atmosphere pressure is  $10^5 \text{ N/m}^2$ ).
6. The change in frequency due to Doppler effect depends on :
- (A) The speed of the source                      (B) The speed of the observer  
(C) The frequency of the source                (D) Separation between the source and observer.

### Section - D

#### Comprehension-(Questions 7 to 9)

A pendulum bob of mass 50 g is suspended from the ceiling of an elevator, ( $g = 9.8 \text{ m/s}^2$ )

7. The tension in the string if the elevator goes up with acceleration of  $1.2 \text{ m/s}^2$  is :
- (A) 0.11N    (B) 0.22N  
(C) 0.33N    (D) 0.55N
8. The tension in the string if the elevator goes up with deceleration of  $1.2 \text{ m/s}^2$  is :
- (A) 0.43 N    (B) 0.53 N  
(C) 0.63 N    (D) None of these
9. The tension in the string if the elevator goes up with uniform velocity of  $2 \text{ m/s}$  is:
- (A) 0.49 N    (B) 0.98 N  
(C) 1.2 N    (D) None of these.

### 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**

- A Progressive wave  
 B Stationary wave  
 C Mechanical waves  
 D Non-mechanical waves

**Column II**

1. Sound waves  
 2. Light waves  
 3. Wave in organ pipes  
 4. Seismic waves.

**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. How many unpaired electrons are present in Nitrogen atom ?  
 (A) 2 (B) 3 (C) 1 (D) 0
12. Which of the molecules do not have Pi-bond ?  
 (A)  $C_2H_4$  (B)  $O_2$  (C)  $N_2$  (D)  $H_2$
13. The first law of thermodynamic is related with :  
 (A) Energy (B) Entropy (C) Both (D) None.

**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 :

- (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 rate of diffusion of  $H_2$  gas is faster than  $O_2$  gas.

STATEMENT-2 :

The molecular weight of  $O_2$  is higher than molecular weight of  $H_2$ .

**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 is true about hydrocarbons :

(A) Methane is a gas at room temperature

(B) The attractive forces between different molecules increases with increase in molecular mass.

(C) Hydrocarbons contain C, H, O, N etc.

(D) Hydrocarbons cannot be used as fuels.

16. Which of the following metals will evolve  $H_2$  gas on reaction with water ?

(A) Magnesium

(B) Sodium

(C) Mercury

(D) Copper

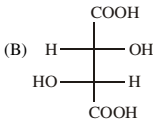
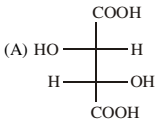
**Section - D**

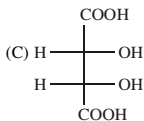
**Comprehension-(Question 17 to 19)**

This section contains 1 paragraph. Based upon each paragraph, 3 multiple choice questions have to be answered. Each question has 4 choices (A), (B), (C) and (D), out of which **ONLY ONE** correct.

The two asymmetric carbon atoms of a compound may have the same or different substituents. When the substituents on two asymmetric carbon atoms are same, in addition to two optically active forms, there is another form which has a plane of symmetry which bisects the molecules into two halves, each being mirror image of other half. This is called meso-form. When the two asymmetric carbon atoms are different, there are two pairs of enantiomers, or total four optical isomers. Examples of these are erythrose and throse.

17. Among the following the meso form of tartaric acid is :





(D) None.

18. Erythrose and threose form have the relationship called :  
 (A) enantiomer (B) stereomer (C) Diastereomer (D) None
19. The loss of optical activity due to presence of plane of symmetry within the molecule is called :  
 (A) External compensation (B) Internal compensation  
 (C) Polarisation (D) None.

### 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	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
2	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>
3	<input checked="" type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>
4	<input type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>

20. Match of the following :

#### Column-I

- A. Isothermal process  
 B. Adiabatic process  
 C. Isobaric process  
 D. Isochoric process

#### Column-II

1.  $q = \Delta E$   
 2.  $\Delta E = q + p\Delta v$   
 3.  $dE = +p\Delta s$   
 4.  $q = p\Delta v$

## Mathematics

### 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.

21. The vertices of a triangle are  $A(x_1, x_1 \tan \alpha)$ ,  $B(x_2, x_2 \tan \beta)$ ,  $C(x_3, x_3 \tan \gamma)$ . If the circumcentre of the  $\Delta ABC$  coincide with the origin and  $H(\bar{x}, \bar{y})$  is the orthocentre of

$\Delta ABC$  then  $\frac{\bar{y}}{\bar{x}} =$

(A)  $\frac{\sin \alpha + \sin \beta + \sin \gamma}{\cos \alpha + \cos \beta + \cos \gamma}$

(B)  $\tan \alpha + \tan \beta + \tan \gamma$

(C)  $\cot \alpha + \cot \beta + \cot \gamma$

(D)  $\frac{\cos \alpha + \cos \beta + \cos \gamma}{\sin \alpha + \sin \beta + \sin \gamma}$

22. If the lines  $x + 2ay + a = 0$ ,  $x + 3by + b = 0$  and  $x + 4cy + c = 0$  are concurrent, then  $a, b, c$  are in :

(A) A.P.

(B) G.P.

(C) H.P.

(D) None of these.

23. If  $(1 + x + 2x^2)^{20} = a_0 + a_1x + a_2x^2 + \dots + a_{40}x^{40}$ , then  $a_0 + a_2 + a_4 + \dots + a_{38}$  equals :

(A)  $2^{19}(2^{20} + 1)$

(B)  $2^{19}(2^{20} - 1)$

(C)  $2^{20}(2^{19} - 1)$

(D) none of these.

### Section - B

#### Direction for question no. 24

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 :

(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.



28. If  $\alpha$  is an acute angle, then  $\tan (18.84^\circ - \alpha) =$  :
- (A)  $\tan \alpha$  (B)  $\tan \alpha$   
 (C)  $\cot \alpha$  (D)  $\cot \alpha$

29. The value of  $\sin 3$  lies exactly in the interval :

- (A)  $\left( \sqrt{\frac{2\sqrt{2}-\sqrt{3}-1}{4\sqrt{2}}}, \frac{\sqrt{3}-1}{2\sqrt{2}} \right)$  (B)  $\left( \frac{1}{\sqrt{2}}, 1 \right)$   
 (C)  $\left( \frac{1}{2}, \frac{1}{\sqrt{2}} \right)$  (D)  $\left( \frac{\sqrt{3}-1}{2\sqrt{2}}, \frac{1}{2} \right)$

### 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.

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1	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
2	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>
3	<input checked="" type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>
4	<input type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>

30. Match the following :

#### Column I

A.  $\lim_{x \rightarrow 0} (1 + \sin x)^{\csc x}$

B.  $\lim_{x \rightarrow \frac{\pi}{2}} (1 + \cot x)^{\tan x}$

C.  $\lim_{x \rightarrow 0^+} \frac{\log \{1 + (\tan \sqrt{x})^{49}\}}{\sin \sqrt{x}}$

D.  $\lim_{x \rightarrow 0} \frac{\sqrt[20]{1 + (\tan x)^{30}} - 1}{\sqrt[20]{1 + x^{30}} - 1}$

#### Column II

1.  $\lim_{x \rightarrow \frac{\pi}{2}} (1 + \cos x)^{\sec x}$

2.  $\lim_{x \rightarrow \infty} \left(1 + \frac{1}{x}\right)^x$

3.  $\lim_{x \rightarrow 0} \sin x$

4.  $\lim_{x \rightarrow 0} \cos x$

## ANSWER

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