

# 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**  
**2011**

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 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.**

**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 spheres of masses  $M$  and  $2M$  are initially at rest at a distance  $R$  apart. Due to mutual attraction they approach each other. When they are at a distance  $R/2$ , the acceleration of their centre of mass will be :  
(A) 0                      (B)  $g$                       (C)  $3g$                       (D)  $4g$ .
  
2. If two waves of amplitudes  $2A$  and  $A$  have same frequency and velocity, propagate in the same direction in the same phase, the resulting amplitude will be :  
(A)  $3A$                       (B)  $\sqrt{5} A$                       (C)  $\sqrt{2} A$                       (D)  $A$ .
  
3. Expansion during heating  
(A) Occurs only in solids  
(B) increases the weight of a material  
(C) decreases the density of a material  
(D) occurs at the same rate for all solids and liquids.

**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 :

Sound waves are not transverse.

because

STATEMENT 2 :

The particles of the medium are pushed and pulled along the direction of propagation of sound.

**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. Which of the following statements are correct related to ideal gas ?

(A) A molecule of monoatomic gas has 3 translational degrees of freedom

(B) A molecule of monoatomic gas has 3 rotational degrees of freedom

(C) A molecule of diatomic gas has 3 translational degrees of freedom

(D) A molecule of diatomic gas has 2 rotational degrees of freedom.

6. A solid floats in a liquid in a partially dipped position then :

(A) The solid exerts a force equal to its weight on the liquid

(B) The liquid exerts a force of buoyancy on the solid which is equal to the weight of the solid

(C) The weight of the displaced liquid equals the weight of the solid

(D) The weight of the dipped part of the solid is equal to the weight of the displaced liquid.

**Section - D**

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** is correct.

### Comprehension (Question 7 to 9)

A wheel rotating at an angular speed of 20 rad/sec is brought to rest by a constant torque of 1 Nm. If the moment of inertia of the wheel about the axis of rotation is 0.20 kg m<sup>2</sup>, then:

7. The angular deceleration of wheel is :  
(A) 2 rad/sec<sup>2</sup>      (B) 4rad/sec<sup>2</sup>      (C) 5 rad/sec<sup>2</sup>      (D) 10 rad/sec<sup>2</sup>.
8. The time taken by the wheel to come to rest is:  
(A) 1 sec      (B) 2 sec      (C) 3 sec      (D) 4 sec.
9. The angle rotated in first four seconds is :  
(A) 10 rad      (B) 20 rad      (C) 30 rad      (D) 40 rad.

### Section - E

This section contains 1 question. 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"/>

10. Match the following :

**Column I**

- A. Newton's formula
- B. Laplace's formula
- C. Doppler's effect
- D. Echo

**Column II**

- 1. Velocity of sound in gaseous medium
- 2. Apparent frequency of sound source
- 3. Reflector of sound is required
- 4. Apparent wavelength of sound source.

**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. The quantum number which can predict the direction of rotation of electron along its own axis is :

- (A) Principal quantum number
- (B) Azimuthal quantum number
- (C) Magnetic quantum number
- (D) Spin quantum number

12. A solution has pH = 5. The  $\text{OH}^-$  ion concentration of this solution at  $25^\circ\text{C}$  will be :

- (A)  $10^{-5}$  M
- (B)  $10^5$  M
- (C)  $10^9$  M
- (D)  $10^{-9}$  M.

13. Which of the following substituents has +M effect on benzene ring ?

- (A)  $-\text{NH}_2$
- (B)  $-\text{CHO}$
- (C)  $-\text{C}\equiv\text{N}$
- (D)  $-\text{NO}_2$ .

## 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 :

- (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 most stable conformation of n-butane is staggered.  
because

STATEMENT 2 :

There is least torsional strain in staggered conformation of n-butane.

## 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 molecular species is/are diamagnetic in nature ?
- (A)  $O_2$                       (B)  $N_2$                       (C)  $H_2$                       (D)  $F_2$ .

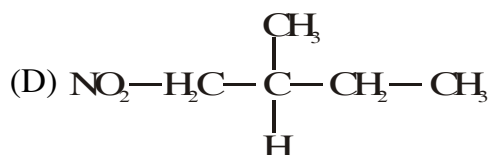
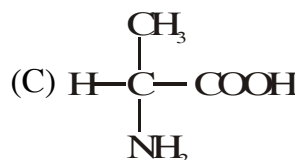
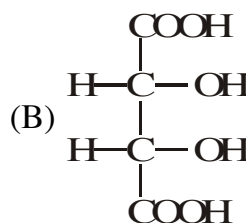
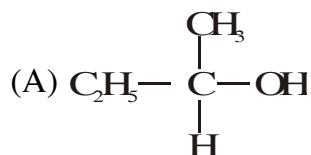
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*A synonym of success...*

Space for rough work

16. Which of the following species is/are optically active ?

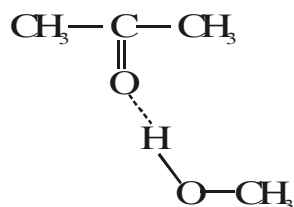
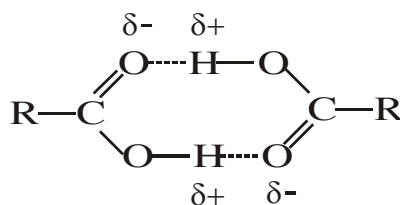


### Section - D

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** is correct.

#### Comprehension (Question 17 to 19)

The hydrogen bond (bond dissociation energy about 1–9 kcal/mol) is weaker than an ordinary covalent bond. When there are many such bonds as in carbohydrates, the total strength is very great. The bond may be formed both between molecules of the same type as in alcohols and carboxylic acids and molecules of different type as in an ether and alcohol or as in the interaction between the proton of an alcohol and the oxygen of a carbonyl group. Two types of hydrogen bonding have been recognized : intramolecular (within the same molecule) and intermolecular (between two or more molecules).



17. Which of the following force is weakest :
- (A) Ionic bond (B) Covalent bond  
(C) Hydrogen bond (D) Metallic bond.
18. Intermolecular hydrogen bonding can effect :
- (A) Density of liquid (B) Boiling point of liquid  
(C) Viscosity of liquid (D) All (A),(B), (C).
19. Which of the following molecules contain intramolecular hydrogen bonding ?
- (A) H<sub>2</sub>O (B) NH<sub>3</sub>  
(C) ortho-nitrophenol (D) Para-nitrophenol.

### Section - E

This section contains 1 question. 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**

- A.  $N_2$   
 B.  $O_2$   
 C.  $F_2$   
 D.  $O_2^+$

**Column II**

1. Paramagnetic  
 2. Diamagnetic  
 3. Bond order greater than one  
 4. Bond order less than two.

**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. If  $\frac{a^{n+1} + b^{n+1}}{a^n + b^n}$  is the arithmetic mean of a and b ( $a \neq b$ ) then value of n is :  
 (A) 0                      (B) 1                      (C) -1                      (D) 2.

22. If  $y = \cos(\sin x^2)$ , then at  $x = \sqrt{\frac{\pi}{2}}$ ,  $\frac{dy}{dx} =$   
 (A) -2                      (B) 2                      (C)  $-2\sqrt{\frac{\pi}{2}}$                       (D) 0.

23. Projection (foot of perpendicular) of the point  $(x, y)$  on the x-axis is :  
(A)  $(0, 0)$                       (B)  $(x, 0)$                       (C)  $(0, y)$                       (D)  $(-x, 0)$

**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.
24. STATEMENT : 1

$\sin^2 \theta + \operatorname{cosec}^2 \theta$  can never be less than 2.

because

STATEMENT : 2

If  $x > 0$  then  $x + \frac{1}{x} < 2$

**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.

25. If  $3x + 4y + 3 = 0$ ,  $3x + 4y - 7 = 0$  and  $4x - 3y - 2 = 0$  be the three sides of a square, then the equation of the fourth side is/are :
- (A)  $4x - 3y - 12 = 0$                       (B)  $4x - 3y + 8 = 0$   
(C)  $4x - 3y - 10 = 0$                       (D)  $4x - 3y + 6 = 0$ .

26.  $\tan 40^\circ + 2 \tan 10^\circ$ , is/are equal to :

- (A)  $\tan 60^\circ$                       (B)  $\tan 50^\circ$                       (C)  $\cot 40^\circ$                       (D)  $4 \cdot \frac{\sin 20^\circ}{\sin 40^\circ}$ .

### Section - D

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** is correct.

#### Comprehension-(Questions 27 to 29)

If  $\sin x + \sin^2 x = 1$ , then

27.  $\cos^8 x + 2 \cos^6 x + \cos^4 x =$   
(A) 0                      (B) -1                      (C) 2                      (D) 1.
28.  $\cos^{12} x + 3 \cos^{10} x + 3 \cos^8 x + \cos^6 x + 1 =$   
(A) 2                      (B) 1                      (C) 0                      (D) -1.
29.  $\cos^2 x + \cos^4 x - 1 =$   
(A) 2                      (B) 1                      (C) 0                      (D) -1.

### Section - E

This section contains 1 question. 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. Match the following :

**Column I**

Equation of curve

A. Circle  $x^2 + y^2 = 25$

B. Hyperbola  $\frac{x^2}{25} - \frac{y^2}{16} = 1$

C. Parabola  $y^2 = 16x$

D. Ellipse  $\frac{x^2}{25} + \frac{y^2}{16} = 1$

**Column II**

Equation of tangent at point  $(x_1, y_1)$

1.  $yy_1 = 8(x + x_1)$

2.  $\frac{xx_1}{25} + \frac{yy_1}{16} = 1$

3.  $\frac{xx_1}{25} - \frac{yy_1}{16} = 1$

4.  $xx_1 + yy_1 = 25$

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**ANSWER**  
**1-Year-Set-(B)**

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