

IIT-JEE-2012-P2-Model

Time:2:00 PM to 5:00 PM

IMPORTANT INSTRUCTIONS

Max Marks: 198

PHYSICS:

Section	Question Type	+Ve Marks	- Ve Marks	No.of Qs	Total marks
Sec – I(Q.N : 1 – 8)	Questions with Single Correct Choice	3	-1	8	24
Sec – II(Q.N : 9 – 14)	Questions with Comprehension Type (3 Comprehensions : 2+2+2 = 6Q)	3	-1	6	18
Sec – III(Q.N : 15 – 20)	Questions with Multiple Correct Choice	4	0	6	24
Total				20	66

CHEMISTRY:

Section	Question Type	+Ve Marks	- Ve Marks	No.of Qs	Total marks
Sec – I(Q.N : 21 – 28)	Questions with Single Correct Choice	3	-1	8	24
Sec – II(Q.N : 29 – 34)	Questions with Comprehension Type (3 Comprehensions : 2+2+2 = 6Q)	3	-1	6	18
Sec – III(Q.N : 35 – 40)	Questions with Multiple Correct Choice	4	0	6	24
Total				20	66

MATHEMATICS:

Section	Question Type	+Ve Marks	- Ve Marks	No.of Qs	Total marks
Sec – I(Q.N : (41 – 48)	Questions with Single Correct Choice	3	-1	8	24
Sec – II(Q.N : (49 – 54)	Questions with Comprehension Type (3 Comprehensions : 2+2+2 = 6Q)	3	-1	6	18
Sec – III(Q.N : 55 – 60)	Questions with Multiple Correct Choice	4	0	6	24
Total				20	66

MATHS:**Max. Marks: 66****SECTION – I
(SINGLE CORRECT CHOICE TYPE)**

This section contains **8 multiple choice questions**. Each question has 4 choices (A), (B), (C) and (D) for its answer, out of which **ONLY ONE is correct**

41. An ellipse whose length of semi major axis is ℓ_1 , and a confocal hyperbola with length of semi transverse axis ℓ_2 meet at P. If S and S' are the foci then (SP) (S'P) is equal to
- A) $\ell_1^2 + \ell_2^2$ B) $\frac{\ell_1^2 + \ell_2^2}{\ell_1^2 - \ell_2^2}$ C) $\frac{\ell_1^2 - \ell_2^2}{\ell_1^2 + \ell_2^2}$ D) $\ell_1^2 - \ell_2^2$
42. A hyperbola passes through (2,3) and has asymptotes $3x - 4y + 5 = 0$ and $12x + 5y - 40 = 0$. Then, the equation of its transverse axis is
- A) $77x - 21y - 265 = 0$ B) $21x - 77y + 265 = 0$
c) $21x - 77y - 265 = 0$ D) $21x + 77y - 265 = 0$
43. The number of normal(s) of a rectangular hyperbola which can touch its conjugate is equal to
- A) 0 B) 2 C) 4 D) 8
44. The total number of real tangents that can be drawn to the ellipse $3x^2 + 5y^2 = 32$ and to $25x^2 + 9y^2 = 450$ passing through (3, 5) is
- A) 4 B) 3 C) 2 D) 1

45. If a rectangular hyperbola $(x-1)(y-2)=4$ cuts a circle $x^2+y^2+2gx+2fy+c=0$ at point $(3,4)$, $(5,3)$, $(2,6)$ and $(-1,0)$, then the value of $(g+f)$ is equal to
- A) -8 B) -9 C) 8 D) 9
46. If C is the centre and A,B are two points on the conic $4x^2+9y^2-8x-36y+4=0$ such that $\angle ACB = \pi/2$ then $CA^{-2}+CB^{-2}$ is equal to
- A) $\frac{13}{36}$ B) $\frac{36}{13}$ C) $\frac{16}{33}$ D) $\frac{33}{16}$
47. The equation of the ellipse whose axes are coincident with the co-ordinate axes and which touches the straight lines $3x-2y-20=0$ and $x+6y-20=0$, is
- A) $\frac{x^2}{5}+\frac{y^2}{8}=1$ B) $\frac{x^2}{40}+\frac{y^2}{10}=10$ C) $\frac{x^2}{40}+\frac{y^2}{10}=1$ D) $\frac{x^2}{10}+\frac{y^2}{10}=1$
48. If CF is the perpendicular from the centre C of the ellipse $\frac{x^2}{16}+\frac{y^2}{9}=1$ on the tangent at $P\left(2, \frac{3\sqrt{3}}{2}\right)$ and G is the point when the normal at P meets the major axis, then CF. PG is
- A) $\frac{9\sqrt{3}}{2}$ B) $18\sqrt{3}$ C) 18 D) 9

SECTION - II**(COMPREHENSION TYPE)**

This section contains **6 multiple choice questions** relating to three paragraphs with two questions on each paragraph. Each question has 4 choices A), B), C) and D) for its answer, out of which **ONLY ONE is correct**.

Paragraph for Questions 49 and 50

P, Q are two points on the rectangular hyperbola $(x-1)(y-2)=c^2$, O is the centre of

hyperbola, also tangent at P is perpendicular to OQ and meets OQ at N such that (OQ)

(ON) = 4

49. One of the equation of directrix of the hyperbola is

- A) $x+y-2=0$ B) $x+y-2\sqrt{2}=0$ C) $x+y-4=0$ D) $x+y-5=0$

50. An ellipse confocal with the hyperbola and with eccentricity equal to $\frac{1}{\sqrt{2}}$ is intersected by the line $x+y-7=0$ at A and B, then intersection point of tangents at A and B will lie on

- A) $x+y-8=0$ B) $x+y-9=0$ C) $x+y-11=0$ D) $x+y-13=0$

Paragraph for Questions 51 and 52

$C_1: x^2 + y^2 = r^2$ and $C_2: \frac{x^2}{16} + \frac{y^2}{9} = 1$ intersect at four distinct points A, B, C, and D. Their common tangents form a parallelogram $A'B'C'D'$.

51. If ABCD is a square then r is equal to

- A) $\frac{12}{5}\sqrt{2}$ B) $\frac{12}{5}$ C) $\frac{12}{5\sqrt{5}}$ D) $\frac{24\sqrt{2}}{5}$

52. If $A'B'C'D'$ is a square then r is equal to

- A) $\sqrt{20}$ B) $\sqrt{12}$ C) $\sqrt{15}$ D) $\frac{5}{\sqrt{2}}$

Paragraph for Questions 53 and 54

The ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ is such that it has the least area but contains the

circle $(x-1)^2 + y^2 = 1$.

53. The radius of the director circle of the ellipse is

- A) $\sqrt{6}$ B) $\sqrt{3}$ C) $2\sqrt{3}$ D) none

54. The area of the maximum rectangle that can be inscribed in the director circle is

- A) 24 sq. units B) 18 sq. units C) 12 sq. units D) none

SECTION – III**(MULTIPLE CORRECT CHOICE TYPE)**

This section contains **6 multiple choice questions**. Each question has 4 choices (A), (B), (C) and (D) for its answer, out of which **ONE OR MORE is/ are correct**

55. A point on the ellipse $\frac{x^2}{16} + \frac{y^2}{9} = 1$ at a distance equal to the mean of the length of the semi-major axis and semi-minor axis from the centre is

- A) $\left(\frac{2\sqrt{91}}{7}, \frac{3\sqrt{105}}{14}\right)$ B) $\left(\frac{2\sqrt{91}}{7}, -\frac{3\sqrt{105}}{14}\right)$
C) $\left(-\frac{2\sqrt{105}}{7}, -\frac{3\sqrt{91}}{14}\right)$ D) $\left(-\frac{2\sqrt{105}}{7}, \frac{3\sqrt{91}}{14}\right)$

56. A right angled triangle ABC, right angled at A is inscribed in hyperbola $xy = c^2$ ($c > 0$)

such that slope of BC is 2. If distance of point A from centre of $xy = c^2$ is $\sqrt{10}$, then

which of the following is/are correct for $xy = c^2$

A) the value of c is 2

B) the value of c is 4

C) the equation of normal at point A can be $y = 2x - 3\sqrt{2}$

D) the equation of normal at point A can be $y = 3x + 8\sqrt{2}$

57. An ellipse whose major axis is parallel to x-axis is such that the segments of a focal chord are 1 and 3 units. The family lines $ax + by + c = 0$ are the chords of the ellipse such that a, b, c are in A.P and bisected by the point at which they are concurrent. The equation of auxiliary circle is $x^2 + y^2 + 2\alpha x + 2\beta y - 2\alpha - 1 = 0$. Then make all the correct alternative

A) The equation of the auxiliary circle is $x^2 + y^2 - 2x + 4y + 1 = 0$

B) Eccentricity of the ellipse is $1/2$

C) Lengths of major and minor axes are $4, \sqrt{3}$

D) Eccentricity of the ellipse is $\sqrt{3}/2$

58. If the foci of hyperbola lies on the line $y = x$, one asymptote is $y = 2x$ and hyperbola is passing through the point $(3, 4)$, then which of the following is/are correct
- A) Equation of hyperbola is $2x^2 - xy + 2y^2 = 38$
 - B) Equation of hyperbola is $2x^2 - 5xy + 2y^2 + 10 = 0$
 - C) Eccentricity of hyperbola is $\sqrt{17}/4$
 - D) Eccentricity of hyperbola is $\sqrt{10}/3$
59. If the quadrilateral formed by four tangents to the ellipse $3x^2 + 4y^2 = 12$ is a square then
- A) The vertices of the square lie on $y = x$
 - B) The vertices of the square lie on $x^2 + y^2 = 7$
 - C) The area of such squares is constant
 - D) Only two such squares are possible
60. A triangle is inscribed in $xy = c^2$ and two of its sides are parallel to $y = m_1x$ and $y = m_2x$. If m_1, m_2 are two values of $x^2 - 6x + 1 = 0$ and if third side envelopes the hyperbola $xy = c^2\lambda$, then the value of λ cannot be
- A) 7
 - B) 8
 - C) 9
 - D) 5