JEE-ADVANCED-2012-P1-Model

Time: 3:00 Hrs. **IMPORTANT INSTRUCTIONS** **Max Marks: 210**

PHYSICS:

Section	Question Type	+Ve Marks	- Ve Marks	No.of Qs	Total marks
Sec – I(Q.N : 1 – 10)	Questions with Single Correct Choice	3	-1	10	30
Sec – II(Q.N : 11 – 15)	Questions with Multiple Correct Choice	4	0	5	20
Sec – III(Q.N : 16 – 20)	Questions with Integer Answer Type	4	0	5	20
Total				**20**	**70**

CHEMISTRY:

Section	Question Type	+Ve Marks	- Ve Marks	No.of Qs	Total marks
Sec – I(Q.N : 21 – 30)	Questions with Single Correct Choice	3	-1	10	30
Sec – II(Q.N : 31 – 35)	Questions with Multiple Correct Choice	4	0	5	20
Sec – III(Q.N : 36 – 40)	Questions with Integer Answer Type	4	0	5	20
Total				**20**	**70**

MATHEMATICS:

Section	Question Type	+Ve Marks	- Ve Marks	No.of Qs	Total marks
Sec – I(Q.N : 41 – 50)	Questions with Single Correct Choice	3	-1	10	30
Sec – II(Q.N : 51 – 55)	Questions with Multiple Correct Choice	4	0	5	20
Sec – III(Q.N : 56 – 60)	Questions with Integer Answer Type	4	0	5	20
Total				**20**	**70**

MATHEMATICS **Max.Marks:70**

SECTION – I
(SINGLE CORRECT CHOICE TYPE)

This section contains 10 multiple choice questions. Each question has 4 choices (A), (B), (C) and (D) for its answer, out of which ONLY ONE is correct

41. The interval of a for which distinct chords drawn from (a + 1, 0) to the ellipse $x^2+2y^2=1$ are bisected by the parabola $y^2=4x$ is

A) $(8,4+\sqrt{17})$ B) $(6,6+\sqrt{5})$ C) $(1,1+\sqrt{5})$ D) $(7,3+\sqrt{17})$

42. A circle 'C' intersects the ellipse $\frac{x^2}{16}+\frac{y^2}{9}=1$ such that common chord is of maximum length, and also intersects the circle $x^2+y^2-6x-10y+9=0$ orthogonally, then number to common tangents of circle 'C' and circle $x^2+y^2-10x-11=0$ is

A) 0 B) 2 C) 3 D) 4

43. Let there exist atleast one normal to an ellipse which touches the centric circle (i.e circle with the same centre as ellipse), given that the circle intersects the ellipse at four distinct points then the eccentricity e of ellipse is such that

A) $e\in\left(0,\frac{1}{\sqrt{2}}\right)$ B) $e\in\left(\frac{1}{\sqrt{2}},1\right)$ C) $e\in\left(0,\frac{\sqrt{3}}{2}\right)$ D) $e\in\left(\frac{\sqrt{3}}{2},1\right)$

44. The tangent at $P\left(\frac{\pi}{3}\right)$ on the ellipse $\frac{x^2}{6}+\frac{y^2}{3}=1$ cuts the auxiliary circle at points A and B. If 'C' is the centre of the ellipse then the area of the triangle CAB (in square units) is

A) $\frac{6\sqrt{3}}{7}$ B) $\frac{12\sqrt{3}}{7}$ C) $\frac{24\sqrt{3}}{7}$ D) $\frac{\sqrt{7}}{2}$

45. Let A(3,2) and B(4,7) are the foci of an ellipse and the line $x+y-2=0$ is an tangent to the ellipse, then the point of contact of this tangent with the ellipse is

A) (2,0) B) (0,2) C) (1,1) D) (3,-1)

46. From any point P lying in first quadrant on the ellipse $\frac{x^2}{25}+\frac{y^2}{16}=1, PN$ is drawn perpendicular to the major axis and produced to Q so that NQ equals to PS, where S is a focus. Then the locus of Q is

A) $5y-3x-25=0$ B) $3x+5y+25=0$ C) $3x+5y-25=0$ D) $3x-2y-25=0$

47. A triangle is drawn such that it is right angled at the centre of the ellipse $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1(a>b)$ and its other two vertices lie on the ellipse with eccentric angles α,β Then $\frac{1-e^2\cos^2\left(\frac{\alpha+\beta}{2}\right)}{\cos^2\left(\frac{\alpha-\beta}{2}\right)}$ is equal to

A) $\frac{a^2}{a^2+b^2}$ B) $\frac{a^2+b^2}{a^2}$ C) $\frac{a^2}{a^2-b^2}$ D) $\frac{a^2-b^2}{a^2}$

48. Given an ellipse $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1(a>b)$ with foci at S and S^1 and vertices at A and A^1. A tangent is drawn at any point P on the ellipse and let R, R^1, B, B^1 respectively be the feet of the perpendiculars drawn from S, S^1, A, A^1 on the tangent at P. Then the ratio of the areas of the quadrilaterals S^1R^1RS and A^1B^1BA is

A) e : 2 B) e : 3 C) e : 1 D) e : 4

49. For a given non-zero value of m each of the lines $\frac{x}{a}-\frac{y}{b}=m$ and $\frac{x}{a}+\frac{y}{b}=m$ meets the hyperbola $\frac{x^2}{a^2}-\frac{y^2}{b^2}=1$ at a point. Sum of the ordinates of these points, as m varies is

A) $\frac{a(1+m^2)}{m}$ B) $\frac{b(1-m^2)}{m}$ C) 0 D) $\frac{a+b}{2m}$

50. The locus of the foot of the perpendicular from the centre of the hyperbola $xy=c^2$ on a variable tangent is:

A) $\left(x^2-y^2\right)^2=4c^2xy$ B) $\left(x^2+y^2\right)^2=2c^2xy$

C) $\left(x^2+y^2\right)=4c^2xy$ D) $\left(x^2+y^2\right)^2=4c^2xy$

SECTION – II

(MULTIPLE CORRECT CHOICE TYPE)

This section contains 5 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

51. Consider the hyperbola $\frac{(x-7)^2}{4}-\frac{(y+3)^2}{9}=1$. A variable point $P(\alpha+7,\alpha^2-4),\forall\alpha\in R$ exists in the xy plane. Let B_L and B_R be left and right branches of the given hyperbola. Which of the following is/are correct?

A) The value of α for which 2 distinct real tangents can be drawn to B_L from P can be - 1

B) The value of α for which real tangents can be drawn to both B_L and B_R from P can be 0

C) The values of α for which only one real tangent can be drawn to B_L only from point P can be $-2,-\frac{1}{2}$

D) The value of α for which 2 real tangents can be drawn to B_R only from point P can be 2

52. In triangle ABC, a = 4 and $b = c = 2\sqrt{2}$. A point P moves with in the triangle such that the square of its distance from BC is half the rectangle contained by its distances from the other two sides. If D be the centre of the curve on which the locus of lies then which of the following is/are correct

A) Locus of P lies on an ellipse with eccentricity $\sqrt{\frac{2}{3}}$

B) Locus of P lies on a hyperbola with eccentricity $\sqrt{\frac{3}{2}}$

C) Area of the quadrilateral ABCD $= \frac{16}{3} sq.$ units

D) Area of the quadrilateral ABCD $= \frac{32}{3} sq.$ units

53. A straight line touches the rectangular hyperbola $9x^2 - 9y^2 = 8$ and the parabola $y^2 = 32x$. An equation of the line is

A) $9x + 3y - 8 = 0$ B) $9x - 3y + 8 = 0$ C) $9x + 3y + 8 = 0$ D) $9x - 3y - 8 = 0$

54. Which of the following is/are true?

A) There are infinite positive integral values of a for which $(13x-1)^2 + (13y-2)^2 = \left(\frac{5x+12y-1}{a}\right)^2$ represents an ellipse

B) The minimum distance of the point (1,2) from the ellipse $4x^2 + 9y^2 + 8x - 36y + 4 = 0$ is 1

C) If from a point $P(0,\alpha)$ two normals other than axes are drawn to the ellipse $\frac{x^2}{25} + \frac{y^2}{16} = 1,$ then $|\alpha| < \frac{9}{4}$

D) If the length of latusrectum of an ellipse is one third of its major axis, then its eccentricity is equal to $\frac{1}{\sqrt{3}}$

55. Consider the hyperbola $\frac{x^2}{9}-\frac{y^2}{16}=1$. A circle with centre at (5,0) is drawn which is tangent to the hyperbola with no part of the circle being outside the hyperbola if λ is the radius of the circle then which of the following is/are not correct

A) $\lambda=\frac{11}{3}$ B) $\lambda=2$ C) $\lambda=\frac{11}{7}$ D) λ lies between $\frac{1}{2}$ and 2

SECTION –III

(INTEGER ANSWER TYPE)

This section contains 5 questions . The answer to each of the questions is a single digit integer, ranging from 0 to 9. The appropriate bubbles below the respective question numbers in the ORS have to be darkened.

56. P and Q are two variable points on the rectangular hyperbola $xy=c^2$ such that tangent at Q passes through the foot of the ordinate of P. If the locus of the intersection of tangents at P and Q is a hyperbola $xy=\lambda c^2$, then the value of 9λ must be

57. If the equation $(5x-1)^2+(5y-2)^2=(\lambda^2-2\lambda+1)\times(3x+4y-1)^2$ represents an ellipse, then the number of integral values of λ is

58. A tangent is drawn to the ellipse $\frac{x^2}{16}+\frac{y^2}{9}=1$ to cut the ellipse $(x^2/c^2)+(y^2/d^2)=1$ at the points P and Q. If the tangents at P and Q to the ellipse $(x^2/c^2)+(y^2/d^2)=1$ intersect at right angles, then the value of $\frac{16}{c^2}+\frac{9}{d^2}$ is

59. The radius of the circle passing through the foci of the ellipse $\frac{x^2}{16}+\frac{y^2}{9}=1$ and having its center at (0, 3) is

60. The line $2x+y=1$ is tangent to the hyperbola $\frac{x^2}{a^2}-\frac{y^2}{b^2}=1$. If this line passes through the point of intersection of the nearest directrix and the x-axis then the eccentricity of the hyperbola is