JEE-ADVANCED-2014-P2-Model

Time: 2.00 PM to 5.00 PM **IMPORTANT INSTRUCTIONS** Max Marks: 180

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 – 16)	Questions with Comprehension Type (3 Comprehensions – 2 +2+2 = 6Q)	3	-1	6	18
Sec – III(Q.N : 17 – 20)	Matrix Matching Type	3	-1	4	12
Total				**20**	**60**

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 – 36)	Questions with Comprehension Type (3 Comprehensions – 2 +2+2 = 6Q)	3	-1	6	18
Sec – III(Q.N : 37 – 40)	Matrix Matching Type	3	-1	4	12
Total				**20**	**60**

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 – 56)	Questions with Comprehension Type (3 Comprehensions – 2 +2+2 = 6Q)	3	-1	6	18
Sec – III(Q.N : 57 – 60)	Matrix Matching Type	3	-1	4	12
Total				**20**	**60**

PART-III_MATHEMATICS Max Marks : 60

Section-1
(Only one Option correct Type)

This section contains 10 Multiple Choice questions. Each Question has Four choices (A), (B), (C) and (D). Out of Which **Only One is correct**

41. Number of right isosceles triangles that can be formed with points lying on the curve $8x^3+y^3+6xy=1$ is

A) 1 B) 3 C) 2 D) infinite

42. ABCD is a rhombus. A lies on $x+2y-1=0,$ and sides of rhombus are parallel to $x+y-2=0$ and $7x+y+4=0.$ If the centre of rhombus is at (3,5) then minimum distance of A from origin is___

A) $\sqrt{13}$ B) $\sqrt{15}$ C) $3\sqrt{2}$ D) $2\sqrt{3}$

43. If the lines $2x-ky-2\sqrt{2}a=0$ and $2x-2y-2\sqrt{2}a=0$ are tangents of the circle $x^2+y^2=a^2,$ and if the area formed by given tangents and chord of contact is $\frac{\lambda}{2}a^2$ then the value of $6\lambda+k$ equals

A) 1 B) 4 C) 0 D) 2

44. Given a point $(3,1)$. The minimum perimeter of the triangle with one vertex at $(3,1)$, one vertex on x-axis, and one vertex on $y=x$ is

A) $2\sqrt{2}$ B) $\sqrt{5}$ C) $2\sqrt{5}$ D) $\sqrt{3}$

45. The line $L_1:\left(2-\sqrt{3}\right)x-y+\sqrt{3}=0$ through $A(1,2)$ is rotated about A through $\frac{\pi}{3}$ in counter clockwise direction to get L_2 line. Let B, C respectively on L_1, L_2 such that $B(h,k),C(\alpha,\beta)$ and AC = 4 then the maximum value of $\left(2+\sqrt{3}\right)h-k$ if area of ΔABC is $\sqrt{8+4\sqrt{3}}$ square units

A) $3\sqrt{3}$ B) $2\sqrt{3}$ C) $4+2\sqrt{3}$ D) $4+3\sqrt{3}$

46. Let $d(P,L)$ represents the perpendicular distance of the point P from the line L. If $A(0,0),B(5,0),C(5,3),D(0,3)$ are the vertices of a rectangle ABCD. If P is a variable point lying inside the rectangle ABCD such that $d(P,AB)\geq \max\{d(P,BC),d(P,CD),d(P,AD)\}$ then the area of the region in which P lies is

A) 1 B) ½ C) ¼ D) ¾

47. Circles on sides BC, CA, AB of ΔABC as diameters are drawn and if the harmonic mean of the lengths of common chords of the circles taken pair wise is 12 then the inradius of the triangle ABC equals

A) 2 B) 3 C) 4 D) None

48. If A and B are the feet of perpendiculars from $O(0,0)$ on $x-2y+1=0, 2x-y-1=0$ respectively then the circum radius of ΔOAB is

A) 2 B) 1 C) $\sqrt{2}$ D) $\frac{1}{\sqrt{2}}$

49. A circle cuts x-axis at two distinct points $A(a,0),B(b,0)$ and y-axis at two distinct points $C(0,c),D(0,3)$ $(c\neq 0)$ then the orthocenter of ΔABC is

A) $(3,0)$ B) $(-3,0)$ C) $(0,3)$ D) $(0,-3)$

50. The largest and smallest values of $\frac{y-1}{x-1}$ such that the point (x,y) satisfies $x^2+y^2-6x-6y+12=0$ are respectively p and q then

A) $p+q=4$ B) $p-q=\sqrt{3}$ C) $pq=1$ D) $p=2q$

Section-2
(Paragraph Type)

This section contains 3 paragraphs each describing theory, experiment, data etc. Six questions relate to three paragraphs with two questions on each paragraph. Each question pertaining to a particular paragraph should have **only one correct answer** among the four choices A, B, C and D.

Paragraph for Questions 51 & 52

Consider ΔABC with incentre I(2,0). Equations of straight lines AI, BI, CI are $x=2, y+2=x$ and $x+3y=2$ respectively and $\cot\frac{A}{2}=2$ then

51. Slope of side BC is

A) ½ B) 1/3 C) 2/3 D) 1/8

52. Equation of the locus of centroid of ΔABC is

A) $x-y=1$ B) $x-2y=2$ C) $2x-y=2$ D) $x-y=2$

Paragraph For Questions 53 & 54

Let the lines $(2+\lambda)x+(3-\lambda)y+(8-\lambda)=0$, $(3-\lambda)x-(2+\lambda)y+(12+\lambda)=0$ are concurrent at points A and B respectively, and intersect at C, then

53. The locus of centroid of ΔABC is

A) a circle of radius $\sqrt{\frac{13}{18}}$

B) a circle of radius $\sqrt{\frac{13}{2}}$

C) a straight line whose distance from origin is $\sqrt{\frac{5}{2}}$

D) an ellipse with centre $\left(\frac{-3}{2},\frac{1}{2}\right)$

54. If C is such that area of ΔABC is maximum then the minimum distance of C from origin is

A) $\sqrt{17}$ B) $3\sqrt{2}$ C) $\sqrt{2}$ D) $\sqrt{3}$

Paragraph For Questions 55 & 56

Two circles of radii 8 and 4 touch each other externally at a point A. Through the point B taken on the larger circle, a straight line is drawn touching the smaller circle at C. Given that $AB = \sqrt{6}$ then

55. The length of BC equals

A) 2 B) 3 C) 3/2 D) 5/2

56. The length of the direct common tangent of the two circles is

A) $2\sqrt{2}$ B) $4\sqrt{2}$ C) 8 D) $8\sqrt{2}$

Section-3
(Matching List Type)

This section contains four questions, each having two matching lists (List-1 & List-II). The options for the **correct match** are provided as (A), (B),(C) and (D) out of which **ONLY ONE** is correct.

57. Match the following

	COLUMN – I	COLUMN – II
(A)	The number of lines equidistant from the vertices of a triangle formed by (0,0), (1,0), (2,3)	(p) 2
(B)	The number of points on the line $4x+3y=5$ which are at a distance of $\sec^2\theta + 2\operatorname{cosec}^2\theta$ (for admissible values of θ) from the point (3,1) is	(q) 3
(C)	If $A\left(n,n^2\right), n \in N$ is any point in the interior of the quadrilateral formed by $x=0, y=0, 3x+y-4=0, 4x+y-21=0$	(r) 4
(D)	Number of distinct lines of the type $x\sqrt{3}+y\sin\theta=2$ is $(\theta \in N)$ is p then the value of $\frac{2p}{3}$ equals	(s) 1

A) A – q, B – p, C – r, D – s B) A – p, B – q, C – r, D – s

C) A – q, B – s, C – p, D – r D) A – q, B – p, C – s, D – r

58.

	COLUMN – I		COLUMN – II
(A)	For any given line $15x+8y=34$ minimum value of $x^2+y^2-6x-10y+34$ equals	(p)	3
(B)	The length of the largest altitude of the triangle formed by the lines $7x-2y+10=0, 7x+2y-10=0,$ and $y+2=0$ is	(q)	1
(C)	Two rays in the first quadrant $x+y=\|a\|$ and $ax-y=1$ intersect each other in the interval $a\in(a_0,\infty)$ then the value of a_0 is	(r)	7
(D)	A and B are fixed points such that AB=3 units. P is a point such that $\frac{PA}{PB}=2$ then the maximum area of ΔPAB is	(s)	9

A) A – s, B – r, C – q, D – p
B) A – s, B – q, C – r, D – p
C) A – r, B – s, C – q, D – p
D) A – s, B – r, C – p, D – q

59. Match the following

	COLUMN – I	COLUMN – II
(A)	A circle through origin and (4,0) touches the circle $x^2+y^2=36$ then the equation of tangent at origin to that circle is $2x+ky=0$ then k=	(p) $\sqrt{5}$
(B)	A line perpendicular to the tangent to $x^2+y^2=4$ from $P(\sqrt{3},1)$ touches $(x-3)^2+y^2=1$ has a possible equation $x+\lambda y=1$ then $\lambda=$	(q) 1
(C)	The chord of contact of the pair of tangents drawn from each point on the line $2x+y=4$ to the circle $x^2+y^2=1$ always pass through the point (α,β) then $4(\alpha+\beta)$ equals	(r) $-\sqrt{3}$
(D)	A variable line through $A(-1,-1)$ cut the circle $x^2+y^2=1$ at the points B and C. If P is on BC such that AB, AP, AC are in HP and if locus of P is $px+qy+1=0$ then pq equals	(s) 3

A) A – p, B – r, C – s, D – q B) A – p, B – s, C – r, D – q

C) A – r, B – p, C – s, D – q D) A – r, B – p, C – q, D – s

60. Consider the circles C_1, of radius a and C_2 of radius b, $b>a$ both lying the first quadrant and touching the coordinate axes.

	COLUMN – I	COLUMN – II
(A)	C_1 and C_2 touch each other	(p) $2+\sqrt{2}$
(B)	C_1 and C_2 are orthogonal	(q) 3
(C)	C_1 and C_2 intersect so that the common chord is longest	(r) $2+\sqrt{3}$
(D)	C_2 passes through the centre of C_1	(s) $3+2\sqrt{2}$

A) A – q, B – p, C – q, D – s B) A – q, B – p, C – r, D – s

C) A – s, B – r, C – q, D – p D) A – q, B –p, C – r, D – q