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. A bag contains some white and some black balls, all combination's of balls being equally likely. The total number of balls in the bag is 10. If three balls are drawn at random without replacement and all of them are found to be black, the probability that the bag contains 1 white and 9 black balls is

A) 14/55 B) 12/55 C) 2/11 D) 22/55

42. A and B are events of an experiment such that 0<P(A), P(B)<1

If $P(B^c) > P(A^c)$ then

A) $P(A \cap B^c) < P(A^c \cap B)$ B) $P(A \cap B^c) = P(A^c \cap B)$

C) $P(B/A) < P(A/B)$ D) $P(B/A) > P(A/B)$

43. A die whose faces are marked with the numbers -3, -2, -1, 0, 1, 2, 3, is rolled. If k denotes the number turns up on the die then the probability that the planes $x-2y+kz=-1,\ kx-2y+z=-1,\ x-2ky+z=2$ intersect on a line is

A) $1/6$ B) $1/3$ C) $1/2$ D) $5/6$

44. A bag contains a large number of white and black marbles in equal proportions. Two samples of 5 marbles are selected (with replacement) at random. The probability that the first sample contains exactly 1 black marble, and the second sample contains exactly 3 black marbles, is

A) $\frac{25}{512}$ B) $\frac{15}{32}$ C) $\frac{15}{1024}$ D) $\frac{35}{256}$

45. If $P(B)=3/4, P(A\cap B\cap \overline{C})=1/3$ and $P(\overline{A}\cap B\cap \overline{C})=1/3$, then $P(B\cap C)$ is

A) $\frac{1}{12}$ B) $\frac{1}{6}$ C) $\frac{1}{15}$ D) $\frac{1}{9}$

46. let $S=\{a\in N,\ a\le 1000\}$,

If the equation $[\tan^2 2x]-\tan 2x-a=0$ has real roots then p be the probability of selecting element 'a' from set S which satisfy given equation

A) $p=\frac{25}{999}$ B) $p=\frac{29}{1000}$ C) $p=\frac{31}{1000}$ D) $p=\frac{27}{1000}$

47. Let A be the set of all 3×3 determinant having entries 1 or -1, if a determinant A, from the set A is chosen randomly, then the probability that the product of the elements of any row or any column of A, is -1 is_____

A) $\frac{1}{32}$ B) $\frac{1}{8}$ C) $\frac{1}{16}$ D) $\frac{1}{12}$

48. Let P_n be the probability that n throws of a fair die, contain an odd number of "sixes" then

A) $6P_n-4P_{n-1}-1=0$ B) $6P_n-5P_{n-1}-1=0$

C) $4P_n-3P_{n-1}-1=0$ D) $P_n=2P_{n-1}-1$

49. If E_1,E_2 are two events such that $P(E_1)=3/10$, $P(E_2)=1/4$, $P(E_1\cap E_2)=1/5$ then $P\left(\overline{\frac{\overline{E_1}}{\overline{E_2}}}\right)=$_____

A) $2/15$ B) $\frac{11}{15}$ C) $\frac{13}{15}$ D) $\frac{14}{15}$

50. 'A' is a 3×3 matrix with entries from the set $\{-1,0,1\}$. The probability that 'A' is neither symmetric nor skew symmetric is

A) $\frac{3^9-3^6-3^3+1}{3^9}$ B) $\frac{3^9-3^6-3^3}{3^9}$ C) $\frac{3^9-1}{3^{10}}$ D) $\frac{3^9-3^3+1}{3^9}$

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

In a bag, there are 10 cards labelled from, 1 to 10, three cards are drawn, denoted by a, b, c, (a>b>c) are drawn from the bag at the same time.

51. If $S=\left\{(a,b,c)\middle/\int_0^a\left(x^2-2bx+3c\right)dx=0\right\}$, Then n(S)=_____

A) 4 B) 3 C) 2 D) 5

52. Probability that $\int_0^a\left(x^2-2bx+3c\right)dx=0$ is

A) $1/30$ B) $1/40$ C) $1/20$ D) $\frac{1}{120}$

Paragraph For Questions 53 & 54

There are n black balls and 2 red balls in a bag. One by one balls are drawn from the bag without replacement, by Mr.A. Mr.X is declared as winner, as soon as 2 black balls are drawn and Mr.Y is declared as winner, as soon as 2 red balls are drawn by Mr.A. The game continues until one of those two wins. Let X(n) and Y(n) denotes the probability that X and Y wins respectively.

53. The value of $\lim_{n\to\infty} Y(1)+Y(2)+Y(3)+.....+Y(n)$

A) $1/3$ B) $1/2$ C) 2 D) 3

54. The value of $\lim_{n\to\infty}(X(2).X(3).X(4).....X(n))=$_____

A) $1/3$ B) $1/10$ C) $1/5$ D) $1/20$

Paragraph For Questions 55 & 56

A number 'a' is chosen at random from the set of $\{1,2,3.....N\}$. P_N be the probability that a^2-1 is divisible by 10 (k is a natural number)

55. $if\ N=10k+l\ \ (0<l<9)$ then $P_N=$_____

A) $\frac{2k}{N}$ B) $\frac{2k+1}{N}$ C) $\frac{2(k+1)}{N}$ D) $\frac{2(k-1)}{N}$

56. *If* $N=10k+l \ \ (l=9)$ *then* $P_N = \_\_$

A) $\frac{2k}{N}$ B) $\frac{2k+1}{N}$ C) $\frac{2(k+1)}{N}$ D) $\frac{2(k-1)}{N}$

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. 6 letters are written by a person to his 6 friends. The address of each friend is written on 6 envelopes. Letters are put in the addressed envelopes at random then

	Column I		**Column II**
P)	The probability that no letters goes into correct envelope is	1)	53/144
Q)	The probability that exactly two letters go into correct envelopes is	2)	1/48
R)	The probability that at least two letters go into wrong envelopes is	3)	719/720
S)	The probability that at most two letters go into wrong envelopes is	4)	3/16

	P	Q	R	S		P	Q	R	S
A)	1	2	3	4	B)	1	4	3	2
C)	4	1	3	2	D)	4	3	2	1

58. Five unbiased cubical dies are rolled simultaneously. Let m and n be the smallest and the largest number appearing on the upper faces of the dies, then match the probabilities given in the column II corresponding to the events given in the column I:

Column I	**Column II**
(P) $m = 3$	(1) $\left(\frac{2}{3}\right)^5$
(Q) $n = 4$	(2) $\left(\frac{2}{3}\right)^5+\left(\frac{1}{3}\right)^5-\left(\frac{1}{2}\right)^4$
(R) $2 \le m \le 4$	(3) $\left(\frac{5}{6}\right)^5-\left(\frac{1}{3}\right)^5$
(S) $m = 2$ and $n = 5$	(4) $\left(\frac{2}{3}\right)^5-\left(\frac{1}{2}\right)^5$

	P	Q	R	S
A)	1	3	3	2
B)	1	4	3	2
C)	4	4	3	2
D)	4	3	3	2

59. Match the following Column – I with Column – II :

	Column I		Column II
P)	Out of five machines, exactly two are faulty. If they are tested one by one in a random order till both faulty machines are identified then probability that atmost three tests are needed is	1)	$\frac{3}{4}$
Q)	A die with 6 faces marked 1, 1, 4, 3, 3, 3 is tossed twice. Then the probability of getting sum 4	2)	$\frac{5}{9}$
R)	A fair die is rolled four times. Then the probability that the list of out comes contains exactly 3 distinct numbers is	3)	$\frac{1}{3}$
S)	A bag contains 3 identical red balls, 3 identical blue balls and 3 identical white balls. If two balls are drawn together at random, then the probability of getting two balls of different colours is	4)	$\frac{2}{5}$

	P	Q	R	S		P	Q	R	S
A)	4	2	3	1	B)	4	3	1	2
C)	1	2	3	4	D)	4	3	2	1

60. The letters of the word "NUMBER" is arranged at random. Match the events of column – I with their chances of occurrence in column - II

COLUMN-I	COLUMN-II
P) There are exactly two letters between N and R	**1)** $\frac{1}{2}$
Q) Vowels are not together	**2)** $\frac{1}{3}$
R) R is always towards right of N	**3)** $\frac{2}{3}$
S) The order of vowels does not change	**4)** $\frac{1}{5}$

	P	Q	R	S		P	Q	R	S
A)	4	3	1	1	B)	4	3	1	2
C)	4	1	1	2	D)	3	4	1	1