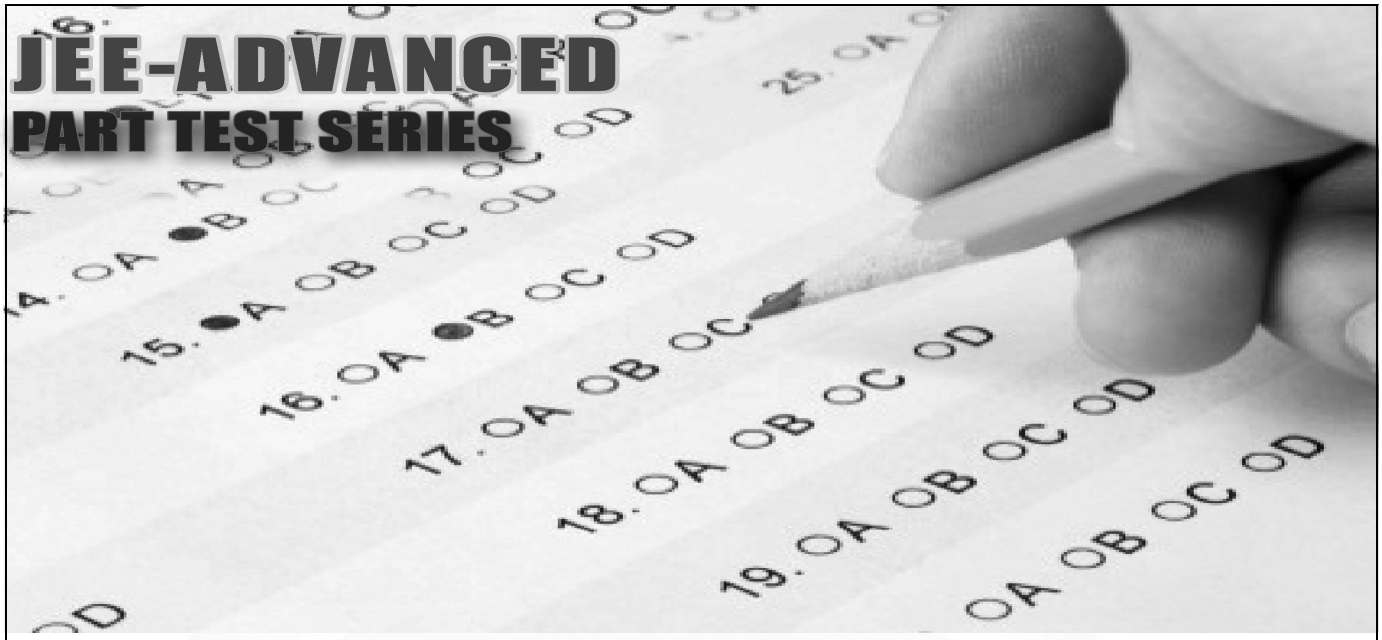

RPTA-16

Sri Chaitanya IIT Academy, India

A.P, TELANGANA, KARNATAKA, TAMILNADU, MAHARASHTRA, DELHI, RANCHI

A right Choice for the Real Aspirant

ICON CENTRAL OFFICE, MADHAPUR-HYD

Sec: Sr.IPLCO **Dt: 27-12-15**

Time: 09:00 AM to 12:00 Noon **Max.Marks: 180**

Name of the Student: _____ **I.D. NO:** | | | | | | | |

PAPER-I

27-12-15_Sr.IPLCO_RPTA-16_Weekend Syllabus

MATHS:

Probability :addition and multiplication rules of probability, conditional probability, bayes theorem, independence of events, computation of probability of events using permutations and combinations.

PHYSICS:

Modern Physics : Atomic nucleus; alpha, beta and gamma radiations; law of radioactive decay; decay constant; half-life and mean life; binding energy and its calculation; fission and fusion processes; energy calculation in these processes.

Photoelectric effect; bohr's theory of hydrogen-like atoms; characteristic and continuous x-rays, moseley's law; de broglie wavelength of matter waves

CHEMISTRY:

Chemical Equilibrium and Ionic Equilibrium

PART-III_MATHEMATICS **Max Marks : 60**

Section-1
(One or More options Correct Type)

This section contains 10 multiple choice equations. Each question has four choices (**A**) (**B**)(**C**) and (**D**) out of which **ONE or MORE** are correct.

41. A certain coin is tossed with probability of showing head being p. Let q denotes the probability that when the coin is tossed four times the number of heads obtained is even. Then

A) there is no value of p, if q = 1/4

B) there is exactly one value of p if q = 3/4

C) there are exactly two values of p if q = 3/5

D) there are exactly four values of p if q = 4/5

42. K subsets of a set A = {1,2,3,….,n} are chosen at random with replacement. The probability that their intersection is

A) empty is $\left(\frac{1}{2}\right)^n$ for K = 2 B) empty is $\left(\frac{3}{4}\right)^n$ for K = 2

C) empty is $\left(\frac{7}{8}\right)^n$ for K = 3 D) singleton is $\frac{n}{8}\left(\frac{7}{8}\right)^{n-1}$ for K = 3

43. If n different objects are distributed among n +2 persons, then

A) Probability that exactly 2 persons will get nothing is $\frac{(n+1)!}{2(n+2)^{n-1}}$

B) Probability that exactly 3 persons will not get anything is

$$\frac{^{(n+2)}C_3\,(n-1)\;{}^nC_2\,(n-2)!}{(n+2)^n}$$

C) Probability that exactly 3 persons will not get anything is $\frac{n(n-1)^2(n+1)}{12(n+2)^{n-1}}$

D) Probability that exactly 2 persons will get nothing is $\frac{n^2(n-1)^2}{(n+2)^{n-1}}$

44. Let $A_1A_2\ldots A_n$ be a regular n – sided polygon inscribed in a circle. Three points A_i, A_j, A_k are randomly chosen, where i,j,k are distinct integers between 1 and n, both inclusive. Denote by P_n the probability that the triangle $A_iA_jA_k$ is obtuse. Which of the following statements is/are true?

A) P_5 equals $\frac{1}{2}$ B) P_{10} equals $\frac{1}{2}$

C) P_{10} equals $\frac{2}{3}$ D) P_{15} equals $\frac{9}{13}$

45. Mr. A randomly picks 3 distinct numbers from the set $\{1,2,3,4,...9\}$ and arranges them in descending order to form a three digit number. Mr.B randomly picks 3 distinct numbers from the set $\{1,2,3,4,...8\}$ and also arranges them in descending order to form a 3 digit number.

A) Probability that Mr.A's 3 digit number is always greater than Mr. B's 3 digit number, is 1/3

B) Probability that Mr.A and Mr.B has the same 3-digit number, is 1/84

C) Probability that Mr.A's 3 digit number is greater than Mr. B's 3 digit number, is 37/56

D) Probability that Mr.A's 3 digit number is greater than Mr. B's 3 digit number, is 1/3

46. Letters (Alphabets) in four different places are selected at random from the letters of the word "INDEPENDENCE". Then

A) The probability that all the 4 letters chosen are consonants is $\frac{7}{99}$

B) If it is known that at least two of the 4 letters chosen are consonants, then the probability that all the four letters are consonants is $\frac{2}{11}$

C) The chance of choosing 2 D's and 2 different letters from the remaining letters is $\frac{4}{55}$

D) If it is known that at least two of the 4 letters chosen are consonants, then the probability that all the four letters are consonants is $\frac{1}{12}$

47. Let A and B be any two independent events. If α and β are any two positive real numbers such that $\alpha\sqrt{P\left(\frac{A}{B}\right)}+\beta\sqrt{P\left(\frac{\overline{A}}{B}\right)}=\frac{2}{3}$

Then $9\left(\alpha^2+\beta^2\right)$ can take the value (s)

A) 5 B) 3 C) 6 D) 4

48. There are 'n' countries $c_1, c_2, c_3 \ldots\ldots\ldots c_n$, each of which participate in a global summit with a probability $1/n$. Each country sending male representative has odds in favour n:1,then

A) The probability that all the countries represent by sending female representatives only is $\frac{1}{n!(n+1)!}$

B) The probability that all the countries represent by sending female representatives only is $\frac{1}{(n+1)!}$

C) The probability that all the countries represent by sending male representatives only is $\frac{1}{(n+1)!}$

D) The probability that C_2, C_6 attend the summit by sending male representatives, is $1/21$

49. A cubical die is thrown 9 times and the numbers obtained are written as a 9-digit number. The probability that the number

A) begins with 246 is $\frac{1}{6^3}$

B) ends with 135 is $\frac{1}{6^3}$

C) beings with 246 and ends with 135 is $\frac{1}{6^6}$

D) beings with 246 or ends with 135 is $\frac{431}{6^6}$

50. In an experiment of tossing a fair coin 10 times, then.

A) Probability that no two heads, occur consecutive is $\frac{9}{2^6}$

B) Probability of having exactly four heads which are all not consecutive is $\frac{35}{2^{10}}$

C) Probability of having exactly four heads which occur alternately, is $\frac{4}{2^{10}}$

D) Probability of having exactly three heads which are all not consecutive is $\frac{56}{2^{10}}$

Section-2
(Integer Value Correct Type)

This section contains 10 questions. The answer to each question is a **single digit integer, ranging** from 0 to 9 (both inclusive).

51. A drawer contains a mixture of red marbles and blue marbles, at most 17 in all. It so happens that when two marbles are selected randomly without replacement, there is a probability of exactly $\frac{1}{2}$ that both are red or both are blue. Let n be the largest possible number of red marbles in the drawer, consistent with the data. Then n–10 equals _____.

52. A drawer contains several pairs of socks. Not wanting to count Mr. A asked miss X "how many pairs of socks are there in the drawer ? " . Miss X, not wanting to give answer replied, " well, each sock has exactly one matching sock and the probability that two socks drawn from the drawer form a matching pair is 1/15". Then the answer to Mr.A's question is…….

53. Three boxes are labeled as x, y, z and each box contains 5 balls numbered 1,2,3,4,5, the balls in each box are well mixed. One ball is chosen at random from each of three boxes x, y, z respectively, and if α,β,γ are the numbers on the balls chosen respectively. If P is probability that $\alpha=\beta+\gamma$ then 25p=_____

54. A letter is taken at random from the letters of the word 'STATISTICS' and another letter is taken at random from the letters of the word ASSISTANT. The probability that they are the same letter is $\frac{k}{l}$

Then the value of $k+l-100$ = _____ (k, l are coprime)

55. In the equation A + B + C + D + E = FG, where FG is the two digit number whose value is 10F + G and letters A, B, C, D, E, F and G each represents different digits. If FG is as large as possible and a five digit number is made using letters A, B, C, D, E, F, G (repetition not allowed) then

Probability that number made is divisible by 5 is "m" and the probability that number made is divisible by 3 is "n", then the value of 14(m+n) = ….. (where m and n are fractions given in its lowest form)

56. In a multiple-choice question, there are five alternative answers, of which one or more than one are correct. A candidate will get marks on the question if he ticks all the correct answers. So he decides to tick answers at random, if the least number of chances ,he should be allowed so that the probability of his getting marks on the question exceeds 1/8 is K, then K = ……..
(the student always attempt the question)

57. 10 identical pens are to be distributed among 5 students so that each student receive atleast one pen. The probability that a particular student will get exactly 3 pens is $\left(\frac{a}{b}\right)$ where a, b are relatively prime then $(b-6a)=$

58. If the cube of a natural number ends with a prime digit then the probability of its fourth power ending not with a prime digit, is m/n (where m and n are co primes). Number of positive integers of the product mn is……..

59. Let us define the events A and B as
A : An year chosen at random contains 29 February.
B : An year chosen at random has 52 Fridays.
If P(E) denotes the probability of happening of event E then $P(A/\bar{B})$ = m/n (where m and n are co primes). where m + n is equal to ……..

60. From three digited natural numbers, which are divisible by 3, a number is selected at random. If p is the probability that at least one of the digit is repeated in that numbers then 25 p= _____