CLASS : CC (Advanced) *PROBABILITY* **PRACTICE TEST**

M.M.: 67 **Time: 60 Min**

PART-A
[SINGLE CORRECT CHOICE TYPE]

Q.1 to Q.10 has four choices (A), (B), (C), (D) out of which **ONLY ONE** is correct. **[10 × 3 = 30]**

Q.1 The probability that event A occurs is 3/4; the probability that event B occurs is 2/3. Let p be the probability that both A and B occur. The smallest interval necessarily containing p is the interval

(A) $\left[\frac{1}{12}, \frac{1}{2}\right]$ (B) $\left[\frac{5}{12}, \frac{1}{2}\right]$ (C) $\left[\frac{1}{2}, \frac{2}{3}\right]$ (D) $\left[\frac{5}{12}, \frac{2}{3}\right]$

Q.2 Mr. A and Mr. B are playing a series of basket ball games. The first one to win four games wins the series. In the first three games, Mr. A had two wins and Mr. B had one win. Assume that both team are equally probable to win matches. The probability that Mr.A will win the series, is

(A) $\frac{11}{16}$ (B) $\frac{5}{8}$ (C) $\frac{3}{4}$ (D) $\frac{67}{128}$

Q.3 An ordered pair (a, b) is selected at random from the set of ordered pairs
$P = \{(x, y) \mid x, y \in W, x \le 8 \text{ and } y \le 222\}$.
The probability that for the selected pair (a, b), $a > b$, is (where W is the set of whole numbers)

(A) $\frac{4}{223}$ (B) $\frac{8}{222}$ (C) $\frac{28}{2007}$ (D) $\frac{5}{223}$

Q.4 A box contains nine slips bearing the numbers $-4, -3, -2, -1, 0, 1, 2, 3, 4$. A slip is drawn 9 times with replacement and the slip numbers noted, are arranged row wise to form a 3×3 matrix, starting from the first element of first row and continuing in this similiar manner, then the probability that the matrix so formed is a skew-symmetric is equal to

(A) $\left(\frac{1}{9}\right)^9$ (B) $\left(\frac{1}{9}\right)^6$ (C) $\left(\frac{1}{9}\right)^3$ (D) $\left(\frac{1}{9}\right)^4$

Q.5 The sides of a six sided die are labelled as $0, 0, 1, -1, i$ and $-i$ where $i = \sqrt{-1}$. If two such dice are rolled, the probability that the sum of two outcomes, vanish is

(A) $\frac{3}{36}$ (B) $\frac{4}{36}$ (C) $\frac{5}{36}$ (D) $\frac{8}{36}$

Q.6 In the major league world series two teams play until one team wins 4 games. If both teams are equally likely to win each game, the probability that the series will end in exactly 5 games, is

(A) $\frac{3}{16}$ (B) $\frac{1}{4}$ (C) $\frac{5}{32}$ (D) $\frac{1}{8}$

Q.7 Let S be the set of permutations of the sequence 1, 2, 3, 4, 5 for which the first term is not 1. A permutation is chosen randomly from S. The probability that the second term is 2, in lowest terms, is $\frac{a}{b}$. The value of $(a + b)$ is equal to

(A) 5 (B) 6 (C) 11 (D) 19

Q.8 There are n urns $u_1, u_2, \ldots\ldots, u_n$. Each urn contains $(2n + 1)$ balls. The i^{th} urn contains 2i number of white balls. Let $P(u_i)$ which is probability of selecting i^{th} urn is proportional to $(i^2 + 2)$. If we randomly select one of the urns and draw one ball and probability of ball being white be P(A), then $\lim_{n\to\infty} P(A)$ is equal to

(A) $\frac{3}{4}$ (B) $\frac{1}{4}$ (C) $\frac{2}{3}$ (D) $\frac{3}{16}$

Q.9 A biased coin with probability of falling headwise being $3/5$, is continued tossing until either two consecutive heads or two consecutive tails occurs in a row for the first time. The probability that two consecutive heads occur, is

(A) $\frac{61}{95}$ (B) $\frac{63}{95}$ (C) $\frac{64}{95}$ (D) $\frac{67}{95}$

Q.10 Three hunters shoot simultaneously at a wild boar, which is killed by exactly one bullet hitting the animal. If the probabilities of these three hunters hitting the boar are respectively 0.2, 0.4 and 0.6 then the probabilities that the boar is killed by the first, second or the third hunter are in the ratio

(A) 3 : 8 : 18 (B) 1 : 2 : 3 (C) 2 : 7 : 10 (D) 4 : 9 : 18

[PARAGRAPH TYPE]

Q.11 to Q.15 has four choices (A), (B), (C), (D) out of which **ONLY ONE** is correct. **[5 × 3 = 15]**

Paragraph for question nos. 11 & 12

Let three dice be thrown once. A, B and C three events are defined as

A : Sum on the dice is divisible by 6.

B : Sum on the dice has maximum number of divisors.

C : Sum on two of the dice is 11 or more.

Q.11 The value of $P\left(\frac{B}{A}\right)$ is equal to

(A) $\frac{25}{36}$ (B) $\frac{26}{36}$ (C) $\frac{27}{36}$ (D) $\frac{25}{216}$

Q.12 The value of $P\left(\frac{B \cap C}{A}\right)$ is equal to

(A) $\frac{1}{36}$ (B) $\frac{5}{36}$ (C) $\frac{6}{36}$ (D) $\frac{7}{36}$

Paragraph for question nos. 13 to 15

Three fair dice coloured yellow, red and blue are rolled at the same time. (Each die has faces numbered from 1 to 6). Three events A, B and C are defined as

Let A : Event that the score of the yellow die is divisible by 3.

B : Event that the red and blue die have distinct scores.

and C : Event that the sum of the scores on the three dice is 10.

Q.13 P(B) has the value equal to

(A) $\frac{5}{18}$ (B) $\frac{1}{9}$ (C) $\frac{5}{6}$ (D) $\frac{2}{3}$

Q.14 P(C) has the value equal to

(A) $\frac{1}{8}$ (B) $\frac{1}{3}$ (C) $\frac{5}{18}$ (D) $\frac{1}{4}$

Q.15 P(A/C) has the value equal to

(A) $\frac{7}{27}$ (B) $\frac{1}{3}$ (C) $\frac{1}{9}$ (D) $\frac{5}{18}$

[MULTIPLE CORRECT CHOICE TYPE]

Q.16 to Q.18 has four choices (A), (B), (C), (D) out of which **ONE OR MORE** may be correct. **[4 × 3 = 12]**

Q.16 Let $\left\{\frac{6^p - 1}{5}\right\} x^2 + (p - 5)(p^2 - 4p + 3)x + \left[\frac{p-2}{3}\right] = 0$

where $\{y\}$ and $[y]$ denote fractional part function and greatest integer function of y respectively. On throwing a normal dice, its outcome is considered as the value of p. Identify which of the following statement(s) is(are) **correct**?

(A) The probability that the equation has exactly one root is infinite is $\frac{1}{2}$.

(B) The probability that the equation has both roots are infinite is $\frac{1}{3}$.

(C) The probability that the equation becomes an identity is $\frac{1}{6}$.

(D) The probability that the equation has two distinct real roots is 1.

Q.17 If A and B are two independent events such that $P(A) = \frac{1}{2}$ and $P(\overline{B}) = \frac{4}{5}$. Then

(A) $P\left(\frac{A}{A \cup B}\right) = \frac{5}{6}$ (B) $P\left(\frac{A \cap B}{A' \cup B'}\right) = 0$ (C) $P\left(\frac{A}{B}\right) = \frac{1}{2}$ (D) $P\left(\overline{A} \cap \overline{B}\right) = \frac{2}{5}$

Q.18 A consignment of 15 record players contain 4 defectives. The record players are selected at random, one by one and examined. The one examined is not put back. Then

(A) the probability of getting exactly 3 defectives in the examination of 8 record players is $\frac{{}^{4}C_{3} \cdot {}^{11}C_{5}}{{}^{15}C_{8}}$.

(B) the probability that 9th one examined is the last defective is $\frac{8}{197}$.

(C) the probability that 9th examined record player is defective, given that there are 3 defectives in first 8 players examined is $\frac{1}{7}$.

(D) the probability that 9th one examined is the last defective is $\frac{8}{195}$.

PART-D
[INTEGER TYPE]

Q.1 to Q.2 are "Integer Type" questions. (The answer to each of the questions **are upto <u>4 digits</u>**) **[2 × 5 = 10]**

Q.1 Consider 3 independent trials, in which the event A occurs with the probability 0.2. The probability of the occurrence of the event B depends on the number occurrences of A. If the event A occurs once, the probability is 0.1, if A occurs twice, it is 0.3, if A occurs three times it is 0.7, if the event A does not occur the event B is impossible. Find the most probable number of occurrences of A if it is known that B has occurred.

Q.2 A batch of fifty radio sets was purchased from three different companies A, B and C. Eighteen of them were manufactured by A, twenty of them by B and the rest were manufactured by C.
The companies A and C produce excellent quality radio sets with probability equal to 0.9 ; B produces the same with the probability equal to 0.6.
If the probability of the event that the excellent quality radio set chosen at random is manufactured by the company B is expressed as (p/q), find the least value of $(p + q)$.

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ANSWER KEY

PART-A

Q.1	D	Q.2	A	Q.3	A	Q.4	B	Q.5	D
Q.6	B	Q.7	D	Q.8	A	Q.9	B	Q.10	A
Q.11	B	Q.12	D	Q.13	C	Q.14	A	Q.15	B
Q.16	ABC	Q.17	ABCD	Q.18	ACD				

PART-D

Q.1	1	Q.2	17