Probability

Exercise-1

Marked Questions may have for Revision Questions.

OBJECTIVE QUESTIONS

Section (A) : Classical definition of probability

A-1. Two dies are rolled simultaneously. The probability that the sum of the two numbers on the top faces will be atleast 10 is:
(1) 1/6 (2) 1/12 (3) 1/18 (4) none

A-2. A number is chosen at random among the set of first 120 natural numbers the probability of the number chosen from the set being a multiple of 5 or 15,is
(1) $\frac{1}{5}$ (2) $\frac{1}{8}$ (3) $\frac{1}{24}$ (4) $\frac{1}{6}$

A-3. In a horse race the odds in favour of three horses are 1:2, 1:3 and 1: 4 . The probability that one of the horse will win the race
(1) $\frac{11}{30}$ (2) $\frac{47}{60}$ (3) $\frac{13}{30}$ (4) none

A-4. 7 men and 7 women can be seated at a round table find the probability such that no two women can sit together is
(1) $\frac{6!6!}{13!}$ (2) $\frac{6!7!}{12!}$ (3) $\frac{7!6!}{14!}$ (4) $\frac{7!6!}{13!}$

A-5. A couple has three children. The probability of having 2 sons and a daughter, if the eldest child is a son, is
(1) $\frac{2}{3}$ (2) $\frac{1}{3}$ (3) $\frac{3}{4}$ (4) $\frac{1}{2}$

A-6. The chance that a 13 card combination from a pack of 52 playing cards is dealt to a specified player in a game of bridge, in which 9 cards are of the same suit, is
(1) $\frac{4\,.\,{}^{13}C_9\,.\,{}^{39}C_4}{{}^{52}C_{13}}$ (2) $\frac{4!\,.\,{}^{13}C_9\,.\,{}^{39}C_4}{{}^{52}C_{13}}$ (3) $\frac{{}^{13}C_9\,.\,{}^{39}C_4}{{}^{52}C_{13}}$ (4) none of these

A-7. 15 coupons are numbered 1, 2, 3,....., 15 respectively. 7 coupons are selected at random one at a time with replacement. The probability that the largest number appearing on a selected coupon is 9 is:
(1) $\left(\frac{9}{16}\right)^6$ (2) $\left(\frac{8}{15}\right)^7$ (3) $\left(\frac{3}{5}\right)^7$ (4) $\frac{9^7-8^7}{15^7}$

A-8. 2n boys are randomly divided into two subgroups containing n boys each. The probability that the two tallest boys are in different groups is
(1) $\frac{n}{2n-1}$ (2) $\frac{n-1}{2n-1}$ (3) $\frac{2n-1}{4n^2}$ (4) none of these

A-9. If M & N are any two events, then which one of the following does not represents the probability of the occurance of exactly one of them ?
(1) $P(M) + P(N) - 2P(M \cap N)$ (2) $P(M) + P(N) - P(M \cap N)$
(3) $P\left(\bar{M}\right) + P\left(\bar{N}\right) - 2P\left(\bar{M} \cap \bar{N}\right)$ (4) $P\left(M \cap \bar{N}\right) + P\left(\bar{M} \cap N\right)$

A-10. Thirteen persons take their places at a round table, then the probability that two particular persons sitting together are -

(1) $\frac{1}{6}$ (2) $\frac{1}{3}$ (3) $\frac{1}{2}$ (4) $\frac{3}{7}$

A-11. If 12 tickets numbered 0, 1, 2, ...11 are placed in a bag, and three are drawn out, then the chance that the sum of the numbers on them is equal to 12 is -

(1) $\frac{2}{3}$ (2) $\frac{1}{5}$ (3) $\frac{3}{59}$ (4) $\frac{3}{55}$

A-12. In drawing of a card from a well shuffled ordinary deck of playing cards the events 'card drawn is spade' and 'card drawn is an ace' are

(1) mutually exclusive (2) equally likely

(3) forming an exhaustive system (4) none of these

A-13. If A and B are any event of an experiment, then $A^c - B$ =

(1) $(A \cap B)^c$ (2) $A^c - (A \cap B)$ (3) $(A \cup B)^c$ (4) A – B

A-14. A die is thrown. Let A be the event 'an odd number turns up' and B be the event 'a number divisible by 3 turns up'. Write which of the following are true.

(i) $B \subset A$ (ii) $B - A \subset A$ (iii) $B - A \subset A^c$ (iv) $A - B = A \cap B^c$

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(1) (i) and (ii) (2) (i), (iii) (3) (ii) and (iii) (4) (iii) and (iv)

A-15. An experiment results in four possible out comes S_1, S_2, S_3 & S_4 with probabilities p_1, p_2, p_3 & p_4 respectively. Which one of the following probability assignment is possbile.

[Assume S_1 S_2 S_3 S_4 are pair wise exclusive]

(1) $p_1 = 0.25$, $p_2 = 0.35$, $p_3 = 0.10$, $p_4 = 0.05$ (2) $p_1 = 0.40$, $p_2 = -0.20$, $p_3 = 0.60$, $p_4 = 0.20$

(3) $p_1 = 0.30$, $p_2 = 0.60$, $p_3 = 0.10$, $p_4 = 0.10$ (4) $p_1 = 0.20$, $p_2 = 0.30$, $p_3 = 0.40$, $p_4 = 0.10$

A-16. There are two children in a family. The probability that both of them are boys is

(1) $\frac{1}{2}$ (2) $\frac{1}{3}$ (3) $\frac{1}{4}$ (4) None of these

A-17. If A and B are events such that $P(A \cup B) = \frac{3}{4}$, $P(A \cap B) = \frac{1}{4}$, $P(\bar{A}) = \frac{2}{3}$, then $P(\bar{A} \cap B)$ is

(1) $\frac{5}{12}$ (2) $\frac{3}{8}$ (3) $\frac{5}{8}$ (4) $\frac{8}{15}$

Section (B) : Addition theorem

B-1. Out of 13 applicants for a job, there are 5 women and 8 men. It is desired to select 2 persons for the job. The probability that at least one of the selected persons will be a woman is

(1) 25/39 (2) 14/39 (3) 5/13 (4) 10/13

B-2. There are three events A, B, C, one of which must, and only one can, happen; the odds are 8 to 3 against A, 5 to 2 against B. The odds against C are

(1) 34 : 43 (2) 43 : 34 (3) 53 : 45 (4) 43:53

B-3. If $\frac{(1+3p)}{3}, \frac{(1-p)}{4}$ & $\frac{(1-2p)}{2}$ are the probabilities of three pair wise exclusive events then the set of all values of p is.

(1) $\left[\frac{1}{2},\frac{2}{3}\right]$ (2) $\left[\frac{1}{3},\frac{1}{2}\right]$ (3) $\left[\frac{1}{4},\frac{1}{2}\right]$ (4) $\left[\frac{1}{3},\frac{2}{3}\right]$

B-4. If 3 events A, B, C are exhaustive, then value of P(A) + P(B) + P(C) can be

(1) $\frac{4}{3}$ (2) $\frac{3}{4}$ (3) $\frac{1}{3}$ (4) $\frac{3}{5}$

Section (C) : Conditional probability, dependent and independent events

C-1. In throwing a pair of dice, the events 'coming up of 6 on Ist die' and 'a total of 7 on both the dies' are

(1) mutually exclusive (2) forming an exhaustive system

(3) independent (4) dependent

C-2. A fair die is tossed. If the number is odd, find the probability that it is prime is

(1) $\frac{2}{3}$ (2) $\frac{1}{2}$ (3) 1 (4) $\frac{1}{3}$

C-3. A card is drawn from a well shuffled ordinary deck of 52-playing cards. The card drawn is found to be a spade. Then the probability that the card is an ace, is

(1) $\frac{1}{13}$ (2) $\frac{1}{52}$ (3) $\frac{1}{4}$ (4) $\frac{1}{8}$

C-4. A pair of dice is thrown. If total of numbers turned up on both the dies is 8, then the probability that the number turned up on the second die is 5' is

(1) $\frac{5}{36}$ (2) $\frac{1}{6}$ (3) $\frac{1}{5}$ (4) $\frac{2}{5}$

C-5. A bag contains 2 white & 4 black balls. A ball is drawn 5 times, each being replaced before another is drawn. The probability that atleast 4 of the balls drawn are white is:

(1) 4/81 (2) 10/243 (3) 11/243 (4) 8/243

C-6. A & B having equal skill, are playing a game of best of 5 points. After A has won two points & B has won one point, the probability that A will win the game is:

(1) 1/2 (2) 2/3 (3) 3/4 (4) 1/4

C-7. If odds against solving a question independently by three students are 2 : 1 , 5 : 2 and 5 : 3 respectively, then probability that the question is solved only by one student is

(1) $\frac{31}{56}$ (2) $\frac{24}{56}$ (3) $\frac{25}{56}$ (4) $\frac{29}{56}$

C-8. A die is weighted so that the probability of different faces to turn up is as given

Number	1	2	3	4	5	6
Probability	0.2	0.1	0.1	0.3	0.1	0.2

If $P(A/B) = p_1$ and $P(B/C) = p_2$ and $P(C/A) = p_3$ then the values of p_1, p_2, p_3 respectively are -
Take the events A, B & C as A = {1, 2, 3}, B = {2, 3, 5} and C = {2, 4, 6}

(1) $\frac{2}{3},\frac{1}{3},\frac{1}{4}$ (2) $\frac{1}{3},\frac{1}{3},\frac{1}{6}$ (3) $\frac{1}{4},\frac{1}{3},\frac{1}{6}$ (4) $\frac{2}{3},\frac{1}{6},\frac{1}{4}$

C-9. If A and B are independent events and $P(A \cap B) = \frac{1}{6}$, $P(\bar{A}) = \frac{2}{3}$, then 6P(B/A) =

(1) 1 (2) 2 (3) 3 (4) 4

C-10. If P(A) = 0.3, P(A ∪ B) = 0.6 and P(A / B) = 0.25 , P(A – B) =
(1) 0.1 (2) 0.2 (3) 0.3 (4) 0.4

C-11. Let A, B , C be three events such that :
P(A) = 0.3, P(B) = 0.4, P(C) = 0.5, P(A ∩ B') = 0.2, P(B ∩ C)=0.3, P(A' ∩ B' ∩ C') = 0.3 and
P (A ∩ B|C') = 0.1. Find the value of P(B'|C')
(1) $\frac{1}{5}$ (2) $\frac{2}{5}$ (3) $\frac{3}{5}$ (4) $\frac{4}{5}$

C-12. If P(A) = 0.4, P(B) = 0.48 and P(A ∩ B) = 0.16, then the value of P(A / B) is
(1) 1/3 (2) 2/3 (3) 1/4 (4) 1/6

C-13. Let 0 < P(A) < 1, 0 < P(B) < 1 & P(A ∪ B) = P(A) + P(B) − P(A). P(B), then:
(1) P(B/A) = P(B) − P(A) (2) $P(A_c \cup B_c) = P(A_c) + P(B_c)$
(3) $P((A \cup B)_c) = P(A_c).\ P(B_c)$ (4) P(A/B) = P(A)– P(B)

C-14. If M & N are independent events such that 0 < P(M) < 1 & 0 < P(N) < 1, then choose the incorrect option
(1) M & N are mutually exclusive (2) M & $\bar{N}$ are independent
(3) $\bar{M}$ & $\bar{N}$ are independent (4) $P\left(M/N\right) + P\left(\bar{M}/N\right) = 1$

Section (D) : Total probability theorem, Baye's theorem

D-1. 2/3rd of the students in a class are boys & the rest girls. It is known that probability of a girl getting a first class is 0.25 & that of a boy is 0.28. The probability that a student chosen at random will get a first class is :
(1) 0.26 (2) 0.265 (3) 0.27 (4) 0.275

D-2. In a Aeroplane there are 2 pilots and 3 doctors and in another Aeroplane there are 4 pilots and 2 doctors one Aeroplane is selected at random and a person is selected . Then the probability the chosen person is pilot is
(1) $\frac{2}{15}$ (2) $\frac{7}{15}$ (3) $\frac{8}{15}$ (4) $\frac{14}{15}$

D-3. A basket contains 5 apples and 7 oranges and another basket contains 4 apples and 8 oranges. one fruits is picked out form each basket . Find the probability that both fruits are apples or both are oranges
(1) $\frac{24}{144}$ (2) $\frac{56}{144}$ (3) $\frac{68}{144}$ (4) $\frac{76}{144}$

D-4. Consider two sets P = {a,b,c,d,e} and Q = {f, g, h, i, j} A person selects a set P with probability $\frac{1}{3}$ or set Q with probability $\frac{2}{3}$ and forms a subset R of two elements both selected from set P or Q . Find probability that set R consists of one vowel & one consonants
(1) $\frac{1}{5}$ (2) $\frac{3}{11}$ (3) $\frac{2}{15}$ (4) $\frac{7}{15}$

D-5. There are 4 urns. The first urn contains 1 white & 1 black ball, the second urn contains 2 white & 3 black balls, the third urn contains 3 white & 5 black balls & the fourth urn contains 4 white & 7 black balls. The selection of each urn is not equally likely. The probability of selecting i_{th} urn is $\frac{i^2+1}{34}$ (i = 1, 2, 3, 4). If we randomly select one of the urns & draw a ball, then the probability of ball being white is :

(1) $\frac{569}{1496}$ (2) $\frac{27}{56}$ (3) $\frac{8}{73}$ (4) $\frac{729}{1496}$

D-6. Two cards are drawn successively from a well-shuffled ordinary deck of 52-playing cards without replacement and is noted that the second card is a king. The probability of the event 'first card is also a 'king' is

(1) $\frac{2}{19}$ (2) $\frac{1}{17}$ (3) $\frac{3}{49}$ (4) $\frac{4}{5}$

D-7. A bag contains (n + 1) coins. It is known that one of these coins has a head on both sides, whereas the other coins are normal. One of these coins is selected at random & tossed. If the probability that the toss results in head, is 7/12, then the value of n is.

(1) 5 (2) 6 (3) 4 (4) 3

D-8. The contents of urn I and II are as follows,

Urn I: 4 white and 5 black balls

Urn II: 3 white and 6 black balls

One urn is chosen at random and a ball is drawn and its colour is noted and replaced back to the urn. Again a ball is drawn from the same urn, colour is noted and replaced. The process is repeated 4 times and as a result one ball of white colour and 3 of black colour are noted. Find the probability the chosen urn was I.

(1) $\frac{125}{287}$ (2) $\frac{64}{127}$ (3) $\frac{25}{287}$ (4) $\frac{79}{192}$

D-9. A box contains 4 white and 3 black balls. Two balls are drawn successively and is found that second ball is white, then the probability that Ist ball is also white is

(1) $\frac{5}{16}$ (2) $\frac{1}{2}$ (3) $\frac{1}{5}$ (4) $\frac{1}{3}$

Section (E) : Probability distribution and binomial probability distribution

E-1. Mean and variance of a Binomial variate are in the ratio of 3 : 2. The most probable number of happening of the variable in 10 trials of the experiment is

(1) 2 (2) 3 (3) 4 (4) 5

E-2. A die is tossed thrice. A success is getting 1 or 6 on a toss. The mean and the variance of number of successes

(1) $\mu = 1, \sigma_2 = 2/3$ (2) $\mu = 2/3, \sigma_2 = 1$ (3) $\mu = 2, \sigma_2 = 2/3$ (4) None of these

E-3. In a series of 3 independent trials the probability of exactly 2 success is 12 times as large as the probability of 3 successes. The probability of a success in each trial is:

(1) 1/5 (2) 2/5 (3) 3/5 (4) 4/5

E-4. If on an average 1 vessel in every 10 is wrecked, then the chance that out of 5 vessels expected 4 at least will arrive safely is

(1) $\frac{45981}{50000}$ (2) $\frac{1}{10}$ (3) $\frac{45927}{50000}$ (4) 1

E-5. A fair coin is tossed 99 times. If X is the number of times heads occur, then P (X = r) is maximum when r is
(1) 49 (2) 50 (3) 51 (4) 49 or 50

E-6. An unbiased coin is tossed n times. Let X denote the number of times head occurs. If P(X = 4), P (X = 5) and P(X = 6) are in AP, then the value of n can be
(1) 9 (2) 10 (3) 12 (4) 14

E-7. India decides to destroy one of the militants holdings. In the bombing attack there is 50% chance of a bomb hitting the target, only two direct bomb hits are required to destroy the target completely. Least number of bombes required to give 99% chance or better of completely destroying the target is
(1) 9 (2) 10 (3) 11 (4) 12

E-8. A pair of dice is thrown 5 times, then the probability of getting a doublet exactly two times is -
(1) $\frac{25}{377}$ (2) $\frac{625}{3888}$ (3) $\frac{625}{1944}$ (4) $\frac{25}{972}$

Exercise-2

Marked Questions may have for Revision Questions.

PART - I : OBJECTIVE QUESTIONS

1. A 9 digit number using the digits 1, 2, 3, 4, 5, 6, 7, 8 & 9 is written randomly without repetetion. The probability that the number will be divisible by 9 is:
(1) 1/9 (2) 1/2 (3) 1 (4) $9!/9_9$

2. Two balls are drawn in succession from a box containing 4 red, 3 white and 5 blue balls. The probability of the event 'one ball is red and other ball is white' is
(1) 1/11 (2) 3/11 (3) 5/11 (4) 2/11

3. A bag contains 6 white, 7 red and 5 blue balls. Three balls are drawn at random. The probability of the event 'balls drawn are, one of each colour' is
(1) $\frac{37}{136}$ (2) $\frac{35}{36}$ (3) $\frac{35}{136}$ (4) $\frac{2}{3}$

4. A coin whose faces are marked 3 and 5 is tossed 4 times : what is the probability that the sum of the numbers thrown being less, than 15 ?
(1) $\frac{5}{16}$ (2) $\frac{1}{2}$ (3) $\frac{1}{5}$ (4) $\frac{1}{3}$

5. A bag contains 7 tickets marked with the numbers 0, 1, 2, 3, 4, 5, 6 respectively. A ticket is drawn & replaced. Then the chance that after 4 drawings the sum of the numbers drawn is 8 is:
(1) 165/2401 (2) 149/2401 (3) 3/49 (4) none of these

6. Two whole numbers are randomly selected & multiplied. If the probability that the units place in their product is "Even" is p & the probability that the units place in their product is "Odd" is q, then p/q is:
(1) 4 (2) 3 (3) 2 (4) 1

Probability

7. Two whole numbers are randomly selected & multiplied. The probability that the unit's place in their product is 0 or 5 is :
(1) 1/3 (2) 16/25 (3) 9/25 (4) 1/5

8. An urn contains 6 red and 4 blue balls. Two balls are drawn without replacement. If the probability of the event that 'the second ball drawn is red' is $\frac{p}{q}$, where p and q are coprime, then the value of p + q is
(1) 10 (2) 8 (3) 5 (4) 4

9. If the probability that units digit in square of an even integer is 4 is p, then the value of 5p is
(1) 1 (2) 2 (3) 3 (4) 4

10. A letter is known to have come either from "KRISHNAGIRI" or "DHARMAPURI". On the post mark only the two consecutive letters "RI" are visible. Then the chance that it came from Krishnagiri is:
(1) 3/5 (2) 2/3 (3) 9/14 (4) none of these

11. A card is drawn from a pack, the card is replaced & the pack shuffled. If this is done 6 times, the probability that the cards drawn are 2 hearts, 2 diamonds & 2 black cards is :
(1) 90/1024 (2) 45/1024 (3) 1/1024 (4) 45/256

12. In an experimental performance of a single throw of a pair of unbiased normal dice, three events E_1, E_2 & E_3 are defined as follows:
E_1: getting a prime numbered face on each dice
E_2: getting the same number on each dice
E_3: getting a sum on two dice equal to 8. Then:
(1) the events E_1, E_2 & E_3 are not mutually exclusive
(2) the events E_1, E_2 & E_3 are not pairwise mutually exclusive
(3) $P(E_3 \cap E_1) = 2/9$.
(4) All of these

13. A student appears for tests I, II & III. The student is successful if he passes either in tests I & II or tests I & III. The probabilities of the student passing in the tests I, II & III are p, q & 1/2 respectively. If the probability that the student is successful is 1/2, then:
(1) p = 1, q = 0 (2) p = 2/3, q = 1/2 (3) p = 3/5, q = 2/3 (4) All of these

14. In throwing a die let A be the event 'coming up of an odd number', B be the event 'coming up of an even number', C be the event 'coming up of a number ≥ 4' and D be the event 'coming up of a number < 3', then
(1) A and B are mutually exclusive and exhautive
(2) A and C are mutually exclusive and exhautive
(3) B, C and D form an exhautive system
(4) All of these

15. In a purse there are 10 coins, all 5 paise except one which is a rupee. In another purse there are 10 coins all 5 paise. 9 coins are taken out from the former purse & put into the latter & then 9 coins are taken out from the latter & put into the former. Then the chance that the rupee is still in the first purse is:
(1) 9/19 (2) 10/19 (3) 4/9 (4) none of these

16. A, B, C in order draw a card from a pack of cards, replacing them after each draw, on condition that the first who draws a spade shall win a prize. Their respective chances of winning are

(1) , $\frac{16}{37}\frac{12}{37}, \frac{9}{37}$ (2) $\frac{12}{37}, \frac{16}{37}, \frac{9}{37}$ (3) $\frac{1}{2}, \frac{1}{3}, \frac{1}{6}$ (4) None of these

17. Among 2 children, a child may equally be a boy or a girl if the probability that exactly one of them is a boy is p, then 6p =

(1) 1 (2) 2 (3) 3 (4) 4

18. A local post office is to send M telegrams which are distributed at random over N communication channels, (N > M). Each telegram is sent over any channel with equal probability. Chance that not more than one telegram will be sent over each channel is:

(1) $\frac{{}^{N}C_{M} \cdot M!}{N^{M}}$ (2) $\frac{{}^{N}C_{M} \cdot N!}{M^{N}}$ (3) $1 - \frac{{}^{N}C_{M} \cdot M!}{M^{N}}$ (4) $1 - \frac{{}^{N}C_{M} \cdot N!}{N^{M}}$

19. Out of 11 persons sitting at a round table, 3 persons A, B & C are chosen at random, then the probability that no two of these are sitting next to one another is

(1) $\frac{2}{15}$ (2) $\frac{7}{11}$ (3) $\frac{7}{15}$ (4) $\frac{4}{9}$

20. A biased coin with probability p, $0 < p < 1$ of heads is tossed until a head appears for the first time. If the probability that the number of tosses required is even is 2/5, then p equals

(1) $\frac{5}{16}$ (2) $\frac{1}{2}$ (3) $\frac{1}{5}$ (4) $\frac{1}{3}$

21. A boy has 20% chance of hitting at a target. Let p denote the probability of hitting the target for the first time at the n_{th} trial. If p satisfies the inequality $625p_2 - 175p + 12 < 0$, then value of n is

(1) 1 (2) 3 (3) 2 (4) 4

22. The probability of a hit in a single shot is 3/5. Then the probability that three shots will yield atleast one hit is -

(1) $\frac{117}{125}$ (2) $\frac{9}{125}$ (3) $\frac{119}{125}$ (4) $\frac{121}{125}$

PART - II : MISCELLANEOUS QUESTIONS

Section (A) : ASSERTION/REASONING

DIRECTIONS :

Each question has 4 choices (1), (2), (3) and (4) out of which ONLY ONE is correct.

(1) Both the statements are true.

(2) Statement-I is true, but Statement-II is false.

(3) Statement-I is false, but Statement-II is true.

(4) Both the statements are false.

A-1. **Statement-1 :** Since sample space of the experiment 'A coin is tossed if it turns up head, a die is thrown' is {(H, 1), (H, 2), (H, 3), (H, 4), (H, 5), (H, 6), T}.

$\therefore$ Prob. of the event {(H, 1), (H, 2), (H, 5)} is $\frac{3}{7}$

Statement-2 : If all the sample points in the sample space of an experiment are pair wise mutually exclusive, equally likely and exhaustive, then probability of an event E is defined as

$$P(E) = \frac{\text{number of sample points favourable to the event E}}{\text{Total number of sample points in the sample space}}$$

A-2. **Statement-1 :** If A and B are two independent events such that P(A) ≠ 0, P(B) ≠ 0, then A and B can not be mutually exclusive.

Statement-2 : For non-zero independent events A and B, we have P(A/B) = P(A) which is not so for mutually exclusive events.

A-3. **Statement 1 :** If $\frac{1+4P}{4}$, $\frac{1-P}{4}$, $\frac{1-2P}{4}$ are probabilities of three pair-wise mutually exclusive events, then the possible values of P belong to the set $\left[-\frac{1}{4},\frac{1}{2}\right]$.

Statement 2 : If $\frac{1+4P}{4}$, $\frac{1-P}{4}$, $\frac{1-2P}{4}$ three events are pair wise mutually exclusive and exhaustive then sum of their probabilities is equal to 1.

A-4. Consider the system of equations
ax + by = 0 ; cx + dy = 0, where a, b, c, d ∈ {0, 1}

Statement-1 : The probability that the system of equations has a unique solution is $\frac{3}{8}$.
and
Statement-2 : The probability that the system of equations has a solution is 1.

Section (B) : MATCH THE COLUMN

B-1. 5 Card and 5 envelopes are numbered 1,2, 3,4,5 and cards are to be placed in envelopes so that each envelope contains exaclty one card. Then match the probability of the following

	Column - I		**Column - I**
(P)	Exaclty 2 card goes to correct envelopes	(1)	$\frac{1}{12}$
(Q)	Exaclty 3 card goes to correct envelopes	(2)	$\frac{11}{120}$
(R)	At least two cards goes to the correct envelopes	(3)	$\frac{1}{6}$
(S)	No card is placed in envelop bearing the same number and moreover the card number 1 is always placed envelope numbered 2	(4)	$\frac{31}{120}$

Codes :

	P	Q	R	S
(1)	1	2	4	3
(2)	2	1	3	2
(3)	3	4	1	2
(4)	3	1	4	2

Section (C) : ONE OR MORE THAN ONE OPTIONS CORRECT

C-1. A, B, C are three events for which P(A) = 0.4, P(B) = 0.6, P(C) = 0.5, P(A ∪ B) = 0.75, P(A ∩ C) = 0.35 and P(A ∩ B ∩ C) = 0.2. If P(A ∪ B ∪ C) ≥ 0.75, then P(B ∩ C) can take values
(1) 0.1 (2) 0.2 (3) 0.3 (4) 0.5

C-2. A bag contains four tickets marked with 112, 121, 211, 222 one ticket is drawn at random from the bag. Let E_i (i = 1, 2, 3) denote the event that ith digit on the ticket is 2. Then
(1) E_1 and E_2 are independent (2) E_2 and E_3 are independent
(3) E_3 and E_1 are independent (4) E_1, E_2, E_3 are independent

C-3. For P(A) = $\frac{3}{8}$; P(B) = $\frac{1}{2}$; P(A ∪ B) = $\frac{5}{8}$ which of the following do/does hold good?
(1) $P(A_C/B) = 2P(A/B_C)$ (2) P(B) = P(A/B)
(3) $P(A_C/B_C) = P(A \cup B)$ (4) $P(A/B_C) = P(A \cap B)$

C-4. Two players A and B toss a fair coin in the cyclic order A, A, B, A, A, B,..... till a head appears. Let α and β denote the probabilities that A and B respectively get the head first, then
(1) α = $\frac{6}{7}$ (2) α = $\frac{5}{7}$ (3) β = $\frac{1}{7}$ (4) β = $\frac{2}{7}$

C-5. Two whole numbers are randomly selected and multiplied. Consider two events E_1 and E_2 defined as
E_1 : Their product is divisible by 5
E_2 : Unit's place in their product is 5
Which of the following statement(s) is/are correct?
(1) E_1 is twice as likely to occur as E_2 (2) E_1 and E_2 are disjoint
(3) $P(E_2/E_1) = 1/4$ (4) $P(E_1/E_2) = 1$

Exercise-3

Marked Questions may have for Revision Questions.

*** Marked Questions may have more than one correct option.**

PART - I : JEE (MAIN) / AIEEE PROBLEMS (PREVIOUS YEARS)

1. A problem in mathematics is given to three students A, B, C and their respectively probability of solving the problem is $\frac{1}{2}, \frac{1}{3}$ and $\frac{1}{4}$. Probability that the problem is solved, is **[AIEEE 2002, (3, –1), 225]**
(1) 3/4 (2) 1/2 (3) 2/3 (4) 1/3

2. A and B play a game where each is asked to select a number from 1 to 25. If the two numbers match, both of them win a prize. The probability that they will not win a prize in a single trial, is **[AIEEE 2002, (3, –1), 225]**
(1) $\frac{1}{25}$ (2) $\frac{24}{25}$ (3) $\frac{2}{25}$ (4) None of these

3. If A and B are two mutually exclusive events, then **[AIEEE 2002, (3, –1), 225]**
(1) $P(A) < P(\bar{B})$ (2) $P(A) > P(\bar{B})$ (3) P(A) < P(B) (4) None of these

Probability

4. The probability of India winning a test match against West-Indies is 1/2 assuming independence from match to match. The probability that in a match series India's second win occurs at the third test is **[AIEEE 2002, (3, –1), 225]**

(1) $\frac{1}{8}$ (2) $\frac{1}{4}$ (3) $\frac{1}{2}$ (4) $\frac{2}{3}$

5. A biased coin with probability p, $0 < p < 1$, of heads is tossed until a head appears for the first time. If the probability that the number of tosses required is even, is 2/5, then p equals **[AIEEE 2002, (3, –1), 225]**

(1) $\frac{1}{3}$ (2) $\frac{2}{3}$ (3) $\frac{2}{5}$ (4) $\frac{3}{5}$

6. A fair die is tossed eight times. The probability that a third six is observed on the eight throw, is **[AIEEE 2002, (3, –1), 225]**

(1) $\frac{{}^7C_2 \times 5^5}{6^7}$ (2) $\frac{{}^7C_2 \times 5^5}{6^8}$ (3) $\frac{{}^7C_2 \times 5^5}{6^6}$ (4) None of these

7. Five horses are in a race. Mr. A selects two of the horses at random and bets on them. The probability that Mr. A selected the winning horse, is : **[AIEEE 2003, (3, –1), 225]**

(1) $\frac{4}{5}$ (2) $\frac{3}{5}$ (3) $\frac{1}{5}$ (4) $\frac{2}{5}$

8. Events A, B, C are mutually exclusive events such that P(A) = $\frac{3x+1}{3}$, P(B) = $\frac{1-x}{4}$ and P(C) = $\frac{1-2x}{2}$. The set of possible values of x are in the interval : **[AIEEE 2003, (3, –1), 225]**

(1) $\left[\frac{1}{3}, \frac{1}{2}\right]$ (2) $\left[\frac{1}{3}, \frac{2}{3}\right]$ (3) $\left[\frac{1}{3}, \frac{13}{3}\right]$ (4) [0, 1]

9. The mean and variance of a random variable X having a binomial distribution are 4 and 2 respectively, then P(X = 1) is : **[AIEEE 2003, (3, –1), 225]**

(1) $\frac{1}{32}$ (2) $\frac{1}{16}$ (3) $\frac{1}{8}$ (4) $\frac{1}{4}$

10. The probability that A speaks truth is 4/5 while this probability for B is 3/4. The probability that they contradict each other when asked to speak on a fact, is : **[AIEEE 2004 (3,–1), 225]**

(1) 3/20 (2) 1/5 (3) 7/20 (4) 4/5

11. A random variable X has the probability distribution : **[AIEEE 2004 (3,–1), 225]**

X :	1	2	3	4	5	6	7	8
P(X) :	0.15	0.23	0.12	0.10	0.20	0.08	0.07	0.05

For the events E = {X is a prime number} and F = {X < 4}, the probability P(E ∪ F) is :

(1) 0.87 (2) 0.77 (3) 0.35 (4) 0.50

12. The mean and the variance of a binomial distribution are 4 and 2 respectively. Then the probability of 2 successes is : **[AIEEE 2004 (3, –1), 225]**

(1) $\frac{37}{256}$ (2) $\frac{219}{256}$ (3) $\frac{128}{256}$ (4) $\frac{28}{256}$

Probability

13. Let A and B be two events such that $P(\overline{A \cup B}) = \frac{1}{6}$, $P(A \cap B) = \frac{1}{4}$ and $P(\bar{A}) = \frac{1}{4}$, where $\bar{A}$ stands for complement of event A. Then events A and B are : **[AIEEE 2005 (3, –1), 225]**

(1) mutually exclusive and independent (2) independent but not equally likely

(3) equally likely but not independent (4) equally likely and mutually exclusive

14. Three houses are available in a locality. Three persons apply for the houses. Each applies for one house without consulting others, The probability that all the three apply for the same house, is : **[AIEEE 2005 (3, –1), 225]**

(1) 7/9 (2) 8/9 (3) 1/9 (4) 2/9

15. A pair of fair dice is thrown independently three times. The probability of getting a score of exactly 9 twice is **[AIEEE 2007 (3, –1), 120]**

(1) 1/729 (2) 8/9 (3) 8/729 (4) 8/243

16. Two aeroplanes I and II bomb a target in succession. The probability of I and II scoring a hit correctly are 0.3 and 0.2, respectively. The second plane will bomb only if the first misses the target. The probability that the target is hit by the second plane is **[AIEEE 2007 (3, –1), 120]**

(1) 0.06 (2) 0.14 (3) 0.32 (4) 0.7

17. It is given that the events A and B are such that P(A) = $\frac{1}{4}$, P $\left(\frac{A}{B}\right)$ = $\frac{1}{2}$ and P $\left(\frac{B}{A}\right)$ = $\frac{2}{3}$. Then, P(B) is **[AIEEE 2008 (3, –1), 105]**

(1) $\frac{1}{6}$ (2) $\frac{1}{3}$ (3) $\frac{2}{3}$ (4) $\frac{1}{2}$

18. A die is thrown. Let A be the event that the number obtained is greater than 3. Let B be the event that the number obtained is less than 5. Then P(A ∪ B) is **[AIEEE 2008 (3, –1), 105]**

(1) $\frac{3}{5}$ (2) 0 (3) 1 (4) $\frac{2}{5}$

19. In a binomial distribution B $\left(n, p = \frac{1}{4}\right)$, if the probability of at least one success is greater than or equal to $\frac{9}{10}$, then n is greater than : **[AIEEE 2009 (4, –1), 144]**

(1) $\frac{1}{\log_{10} 4 + \log_{10} 3}$ (2) $\frac{9}{\log_{10} 4 - \log_{10} 3}$ (3) $\frac{4}{\log_{10} 4 - \log_{10} 3}$ (4) $\frac{1}{\log_{10} 4 - \log_{10} 3}$

20. One ticket is selected at random from 50 tickets numbered 00, 01, 02, ..., 49. Then the probability that the sum of the digits on the selected ticket is 8, given that the product of these digits is zero, equal : **[AIEEE 2009 (4, –1), 144]**

(1) $\frac{1}{7}$ (2) $\frac{5}{14}$ (3) $\frac{1}{50}$ (4) $\frac{1}{14}$

21. Four numbers are chosen at random (without replacement) from the set {1,2,3,.....,20}.

Statement -1 : The probability that the chosen numbers when arranged in some order will form an AP is $\frac{1}{85}$. **[AIEEE 2010 (8, –2), 144]**

Statement -2 : If the four chosen numbers form an AP, then the set of all possible values of common difference is {±1, ±2, ±3, ±4, ±5}

(1) Statement -1 is true, Statement-2 is true ; Statement -2 is not a correct explanation for Statement -1.
(2) Statement-1 is true, Statement-2 is false.
(3) Statement -1 is false, Statement -2 is true.
(4) Statement -1 is true, Statement -2 is true; Statement-2 is a correct explanation for Statement-1.

22. An urn contains nine balls of which three are red, four are blue and two are green. Three balls are drawn at random without replacement from the urn. The probability that the three balls have different colours is **[AIEEE 2010 (4, –1), 144]**

(1) $\frac{2}{7}$ (2) $\frac{1}{21}$ (3) $\frac{2}{23}$ (4) $\frac{1}{3}$

23. Consider 5 independent Bernoulli's trials each with probability of success p. If the probability of at least one failure is greater than or equal to $\frac{31}{32}$, then p lies in the interval : **[AIEEE 2011, I, (4, –1), 120]**

(1) $\left(\frac{1}{2}, \frac{3}{4}\right]$ (2) $\left(\frac{3}{4}, \frac{11}{12}\right]$ (3) $\left[0, \frac{1}{2}\right]$ (4) $\left(\frac{11}{12}, 1\right]$

24. If C and D are two events such that C D and P(D) ≠ 0, then the correct statement among the following is : **[AIEEE 2011, I, (4, –1), 120]**

(1) P(C|D) = P(C) (2) P(C|D) ≥ P(C) (3) P(C|D) < P(C) (4) P(C|D) = $\frac{P(D)}{P(C)}$

25. Let A, B, C be pariwise independent events with P(C) > 0 and $P(A \cap B \cap C) = 0$. **[AIEEE 2011, II, (4, –1), 120]**

Then $P(A^c \cap B^c / C)$.

(1) P(A) – P(Bc) (2) P(Ac) + P(Bc) (3) P(Ac) – P(Bc) (4) P(Ac) – P(B)

26. Three numbers are chosen at random without replacement from {1, 2, 3, ..., 8}. The probability that their minimum is 3, given that their maximum is 6, is : **[AIEEE-2012, (4, –1)/120]**

(1) $\frac{3}{8}$ (2) $\frac{1}{5}$ (3) $\frac{1}{4}$ (4) $\frac{2}{5}$

27. A multiple choice examination has 5 questions. Each question has three alternative answers of which exactly one is correct. The probability that a student will get 4 or more correct answers just by guessing is : **[AIEEE - 2013, (4, – 1) 120]**

(1) $\frac{17}{3^5}$ (2) $\frac{13}{3^5}$ (3) $\frac{11}{3^5}$ (4) $\frac{10}{3^5}$

28. Let A and B be two event such that $P\left(\overline{A \cup B}\right) = \frac{1}{6}$, $P(A \cap B) = \frac{1}{4}$ and $P\left(\overline{A}\right) = \frac{1}{4}$, where $\overline{A}$ stands for the complement of the event A. Then the events A and B are : **[JEE(Main) 2014,(4,– 1), 120]**

(1) independent but not equally likely (2) independent and equally likely
(3) mutually exclusive and independent (4) equally likely but not independent

29. If 12 identical balls are to be placed in 3 identical boxes, then the probability that one of the boxes contains exactly 3 balls is **[JEE(Main) 2015, (4, – 1), 120]**

(1) $\frac{55}{3}\left(\frac{2}{3}\right)^{11}$ (2) $55\left(\frac{2}{3}\right)^{10}$ (3) $220\left(\frac{1}{3}\right)^{12}$ (4) $22\left(\frac{1}{3}\right)^{11}$

30. Let two fair six-faced dice A and B be thrown simultaneously. If E_1 is the event that die A shows up four, E_2 is the event that die B shows up two and E_3 is the event that the sum of numbers on both dice is odd, then whic h of the following statements is NOT True ? **[JEE(Main) 2016, (4, – 1), 120]**

(1) E_2 and E_3 are independent (2) E_1 and E_3 are independent

(3) E_1, E_2 and E_3 are independent (4) E_1 and E_2 are independent

31. For three events A, B and C, P(Exactly one of A or B occurs) = P(Exactly one of B or C occurs) = P(Exactly one of C or A occurs) = $\frac{1}{4}$ and P (All the three events occur simultaneously) = $\frac{1}{6}$. Then the probability that at least one of the events occurs, is : **[JEE(Main) 2017, (4, – 1), 120]**

(1) $\frac{7}{32}$ (2) $\frac{7}{16}$ (3) $\frac{7}{64}$ (4) $\frac{7}{16}$

32. It two different numbers are taken from the set {0,1,2,3,....., 10}; then the probability that their sum as well as absolute difference are both multiple of 4, is **[JEE(Main) 2017, (4, – 1), 120]**

(1) $\frac{6}{55}$ (2) $\frac{12}{55}$ (3) $\frac{14}{45}$ (4) $\frac{7}{55}$

33. A box contains 15 green and 10 yellow balls. If 10 balls are randomly drawn, one-by-one, with replacement, then the variance of the number of green balls drawn is **[JEE(Main) 2017, (4, – 1), 120]**

(1) $\frac{12}{5}$ (2) 6 (3) 4 (4) $\frac{6}{25}$

PART - II : JEE (ADVANCED) / IIT-JEE PROBLEMS (PREVIOUS YEARS)

1. If P (B) = $\frac{3}{4}$, P (A ∩ B ∩ $\overline{C}$) = $\frac{1}{3}$ and P$\left(\overline{A} \cap B \cap \overline{C}\right)$ = $\frac{1}{3}$, then P (B ∩ C) is: **[IIT-JEE 2003, Scr. (3, –1), 84]**

(A) 1/12 (B) 1/6 (C) 1/15 (D) 1/9

2. Two numbers are selected randomly from the set S = {1, 2, 3, 4, 5, 6} without replacement one by one. The probability that minimum of the two numbers is less than 4 is: **[IIT-JEE 2003, Scr. (3, –1), 84]**

(A) 1/15 (B) 14/15 (C) 1/5 (D) 4/5

3. Three distinct numbers are selected from first 100 natural numbers. The probability that all the three numbers are divisible by 2 and 3 is **[IIT-JEE 2004, Scr. (3, –1), 84]**

(A) $\frac{4}{25}$ (B) $\frac{4}{35}$ (C) $\frac{4}{55}$ (D) $\frac{4}{1155}$

4. Let E_c denote the complement of an event E. Let E, F, G be pairwise independent events with P(G) > 0 and P(E ∩ F ∩ G) = 0. Then P (E_c ∩ F_c |G) equals **[IIT-JEE 2007, Paper-2, (3, –1), 81]**

(A) P(E_c) + P(F_c) (B) P(E_c) – P(F_c) (C) P(E_c) – P(F) (D) P(E) – P(F_c)

5. One Indian and four American men and their wives are to be seated randomly around a circular table. Then the conditional probability that the Indian man is seated adjacent to his wife given that each American man is seated adjacent to his wife is **[IIT-JEE 2007, Paper-1, (3, –1), 81]**

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

6. An experiment has 10 equally likely outcomes. Let A and B be non-empty events of the experiment. If A consists of 4 outcomes, the number of outcomes that B must have so that A and B are independent, is **[IIT-JEE 2008, Paper-2, (3, –1), 81]**

(A) 2, 4 or 8 (B) 3, 6 or 9 (C) 4 or 8 (D) 5 or 10

Comprehension # 1 (7 to 9)

A fair die is tossed repeatedly until a six is obtained. Let X denote the number of tosses required.

7. The probability that X = 3 equals **[IIT-JEE 2009, Paper-1, (4, –1), 80]**

(A) $\frac{25}{216}$ (B) $\frac{25}{36}$ (C) $\frac{5}{36}$ (D) $\frac{125}{216}$

8. The probability that X ≥ 3 equals **[IIT-JEE 2009, Paper-1, (4, –1), 80]**

(A) $\frac{125}{216}$ (B) $\frac{25}{36}$ (C) $\frac{5}{36}$ (D) $\frac{25}{216}$

9. The conditional probability that X ≥ 6 given X > 3 equals **[IIT-JEE 2009, Paper-1, (4, –1), 80]**

(A) $\frac{125}{216}$ (B) $\frac{25}{216}$ (C) $\frac{5}{36}$ (D) $\frac{25}{36}$

10. A signal which can be green or red with probability $\frac{4}{5}$ and $\frac{1}{5}$ respectively, is received by station A and then transmitted to station B. The probability of each station receiving the signal correctly is $\frac{3}{4}$ If the signal received at station B is green, then the probability that the original signal was green is **[IIT-JEE 2010, Paper-2, (5, –2), 79]**

(A) $\frac{3}{5}$ (B) $\frac{6}{7}$ (C) $\frac{20}{23}$ (D) $\frac{9}{20}$

11. Let ω be a complex cube root of unity with ω ≠ 1. A fair die is thrown three times. If r_1, r_2 and r_3 are the numbers obtained on the die, then the probability that $\omega^{r_1} + \omega^{r_2} + \omega^{r_3} = 0$ is **[IIT-JEE 2010, Paper-1, (3, –1), 84]**

(A) $\frac{1}{18}$ (B) $\frac{1}{9}$ (C) $\frac{2}{9}$ (D) $\frac{1}{36}$

12*. Let E and F be two independent events. The probability that exactly one of them occurs is $\frac{11}{25}$ and the probability of none of them occurring is $\frac{2}{25}$ If P(T) denotes the probability of occurrence of the event T, then **[IIT-JEE 2011, Paper-2, (4, 0), 80]**

(A) P(E) = $\frac{4}{5}$, P(F) = $\frac{3}{5}$ (B) P(E) = $\frac{1}{5}$, P(F) = $\frac{2}{5}$

(C) P(E) = $\frac{2}{5}$, P(F) = $\frac{1}{5}$ (D) P(E) = $\frac{3}{5}$, P(F) = $\frac{4}{5}$

13*. Let X and Y be two events such that $P(X \mid Y) = \frac{1}{2}$, $P(Y \mid X) = \frac{1}{3}$ and $P(X \cap Y) = \frac{1}{6}$. Which of the following is (are) correct ? **[IIT-JEE 2012, PAPER- 2, (4, 0)/66]**

(A) $P(X \cup Y) = \frac{2}{3}$ (B) X and Y are independent

(C) X and Y are not independent (D) $P(X_c \cap Y) = \frac{1}{3}$

14. Four fair dice D_1, D_2, D_3 and D_4 each having six faces numbered 1,2,3,4,5 and 6 are rolled simultaneously. The probability that D_4 shows a number appearing on one of D_1, D_2 and D_3 is **[IIT-JEE 2012, Paper-2, (3, –1), 66]**

(A) $\frac{91}{216}$ (B) $\frac{108}{216}$ (C) $\frac{125}{216}$ (D) $\frac{127}{216}$

15. Four persons independently solve a certain problem correctly with probabilities $\frac{1}{2}, \frac{3}{4}, \frac{1}{4}, \frac{1}{8}$. Then the probability that the problem is solved correctly by at least one of them is **[JEE (Advanced) 2013, Paper-1, (2, 0)/60]**

(A) $\frac{235}{256}$ (B) $\frac{21}{256}$ (C) $\frac{3}{256}$ (D) $\frac{253}{256}$

Comprehension # 2 (16 to 17)

A box B_1 contains 1 white ball, 3 red balls and 2 black balls. Another box B_2 contains 2 white balls, 3 red balls and 4 black balls. A third box B_3 contains 3 white balls, 4 red balls and 5 black balls.

16. If 1 ball is drawn from each of the boxes B_1, B_2 and B_3, the probability that all 3 drawn balls are of the same colour is **[JEE (Advanced) 2013, Paper-2, (3, –1)/60]**

(A) $\frac{82}{648}$ (B) $\frac{90}{648}$ (C) $\frac{558}{648}$ (D) $\frac{566}{648}$

17. If 2 balls are drawn (without replacement) from a randomly selected box and one of the balls is white and the other ball is red, the probability that these 2 balls are drawn from box B_2 is **[JEE (Advanced) 2013, Paper-2, (3, –1)/60]**

(A) $\frac{116}{181}$ (B) $\frac{126}{181}$ (C) $\frac{65}{181}$ (D) $\frac{55}{181}$

18. Three boys and two girls stand in a queue. The probability, that the number of boys ahead of every girl is at least one more than the number of girls ahead of her, is **[JEE (Advanced) 2014, Paper-2, (3, –1)/60]**

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

Comprehension # 3 (19 to 20)

Let n_1 and n_2 be the number of red and black balls, respectively, in box I. Let n_3 and n_4 be the number of red and black balls, respectively, in box II. **[JEE (Advanced) 2015, P-2 (4, –2)/ 80]**

19. One of the two boxes, box I and box II, was selected at random and a ball was drawn randomly out of this box. The ball was found to be red. If the probability that this red ball was drawn from box II is $\frac{1}{3}$, then the correct option(s) with the possible values of n_1, n_2, n_3 and n_4 is(are)

(A) $n_1 = 3$, $n_2 = 3$, $n_3 = 5$, $n_4 = 15$ (B) $n_1 = 3$, $n_2 = 6$, $n_3 = 10$, $n_4 = 50$

(C) $n_1 = 8$, $n_2 = 6$, $n_3 = 5$, $n_4 = 20$ (D) $n_1 = 6$, $n_2 = 12$, $n_3 = 5$, $n_4 = 20$

20. A ball is drawn at random from box I and transferred to box II. If the probability of drawing a red ball from box I, after this transfer, is $\frac{1}{3}$, then the correct option(s) with the possible values of n_1 and n_2 is(are)

(A) $n_1 = 4$ and $n_2 = 6$ (B) $n_1 = 2$ and $n_2 = 3$

(C) $n_1 = 10$ and $n_2 = 20$ (D) $n_1 = 3$ and $n_2 = 6$

21. A computer producing factory has only two plants T_1 and T_2. Plant T_1 produces 20% and plant T_2 produces 80% of the total computers produced. 7% of computers produced in the factory turn out to be defective. It is known that

P(computer turns out to be defective given that it is produced in plant T_1)

= 10 P(computer turns out to be defective given that it is produced in Plant T_2),

where P(E) denotes the probability of an event E. A computer produced in the factory is randomly selected and it does not turn out to be defective. Then the probability that it is produced in plant T_2 is

[JEE (Advanced) 2016, Paper-1, (3, –1)/62]

(A) $\frac{36}{73}$ (B) $\frac{47}{79}$ (C) $\frac{78}{93}$ (D) $\frac{75}{83}$

Comprehension # 4 (22 and 23)

Football teams T_1 and T_2 have to play two games against each other. It is assumed that the outcomes of the two games are independent. The probabilities of T_1 winning, drawing and losing a game against T_2 are $\frac{1}{2}$, $\frac{1}{6}$ and $\frac{1}{3}$, respectively. Each team gets 3 points for a win, 1 point for a draw and 0 point for a loss in a game. Let X and Y denote the total points scored by teams T_1 and T_2, respectively, after two games.

[JEE (Advanced) 2016, Paper-2, (3, –1)/62]

22. P (X > Y) is

(A) $\frac{1}{4}$ (B) $\frac{5}{12}$ (C) $\frac{1}{2}$ (D) $\frac{7}{12}$

23. P (X = Y) is

(A) $\frac{11}{36}$ (B) $\frac{1}{3}$ (C) $\frac{13}{36}$ (D) $\frac{1}{2}$

24. Let X and Y be two events such that P(X) = $\frac{1}{3}$, P(X|Y) = $\frac{1}{2}$ and P(Y|X) = $\frac{2}{5}$ Then

[JEE(Advanced) 2017, Paper-1,(4, –2)/61] (A) P(Y) = $\frac{4}{15}$ (B) P(X'|Y) = $\frac{1}{2}$ (C) P(X ∪ Y) = $\frac{2}{5}$ (D) P(X ∩ Y) = $\frac{1}{5}$

25. Three randomly chosen nonnegative integers x, y and z are found to satisfy the equation x + y + z = 10. Then the probability that z is even, is **[JEE(Advanced)2017,Paper-2,(3,–1)/61]**

(A) $\frac{1}{2}$ (B) $\frac{36}{55}$ (C) $\frac{6}{11}$ (D) $\frac{5}{11}$

Probability

Answers

EXERCISE # 1

Section (A) :

A-1.	(1)	**A-2.**	(1)	**A-3.**	(3)	**A-4.**	(4)	**A-5.**	(4)	**A-6.**	(1)	**A-7.**	(4)
A-8.	(1)	**A-9.**	(2)	**A-10.**	(1)	**A-11.**	(4)	**A-12.**	(4)	**A-13.**	(3)	**A-14.**	(4)
A-15.	(4)	**A-16.**	(3)	**A-17.**	(1)								

Section (B) :

B-1.	(1)	**B-2.**	(2)	**B-3.**	(2)	**B-4.**	(1)

Section (C) :

C-1.	(3)	**C-2.**	(1)	**C-3.**	(1)	**C-4.**	(3)	**C-5.**	(3)	**C-6.**	(3)	**C-7.**	(3)
C-8.	(4)	**C-9.**	(4)	**C-10.**	(2)	**C-11.**	(4)	**C-12.**	(1)	**C-13.**	(3)	**C-14.**	(1)

Section (D) :

D-1.	(3)	**D-2.**	(3)	**D-3.**	(4)	**D-4**.	(4)	**D-5.**	(1)	**D-6.**	(2)	**D-7.**	(1)
D-8.	(1)	**D-9.**	(2)										

Section (E) :

E-1.	(2)	**E-2.**	(1)	**E-3.**	(1)	**E-4.**	(3)	**E-5.**	(4)	**E-6.**	(4)	**E-7.**	(3)
E-8.	(2)												

EXERCISE # 2

PART - I

1.	(3)	**2.**	(4)	**3.**	(3)	**4.**	(1)	**5.**	(2)	**6.**	(2)	**7.**	(3)
8.	(2)	**9.**	(2)	**10.**	(3)	**11.**	(1)	**12.**	(4)	**13.**	(4)	**14.**	(1)
15.	(2)	**16**	(1)	**17.**	(3)	**18.**	(1)	**19.**	(3)	**20.**	(4)	**21.**	(2)
22.	(1)												

PART - II

Section (A) :

A-1.	(3)	**A-2.**	(1)	**A-3.**	(1)	**A-4.**	(1)

Section (B) :

B-1. (4)

Section (C) :

C-1.	(2,3)	**C-2.**	(1,2,3)	**C-3.**	(1,2,4)	**C-4.**	(1,3)	**C-5.**	(3,4)

EXERCISE # 3

PART - I

1.	(1)	**2.**	(2)	**3.**	(1)	**4.**	(2)	**5.**	(1)	**6.**	(2)	**7.**	(4)
8.	(1)	**9.**	(1)	**10.**	(3)	**11.**	(2)	**12.**	(4)	**13.**	(2)	**14.**	(3)
15.	(4)	**16.**	(2)	**17.**	(2)	**18.**	(3)	**19.**	(4)	**20.**	(4)	**21.**	(2)
22.	(1)	**23.**	(3)	**24.**	(2)	**25.**	(4)	**26.**	(2)	**27.**	(3)	**28.**	(1)
29.	(1)	**30.**	(3)	**31.**	(2)	**32.**	(1)	**33.**	(1)				

PART - II

1.	(A)	**2.**	(D)	**3.**	(D)	**4.**	(C)	**5.**	(C)	**6.**	(D)	**7.**	(A)
8.	(B)	**9.**	(D)	**10.**	(C)	**11.**	(C)	**12*.**	(A,D)	**13*.**	(A,B)	**14.**	(A)
15.	(A)	**16.**	(A)	**17.**	(D)	**18.**	(A)	**19.**	(A,B)	**20.**	(C,D)	**21.**	(C)
22.	(B)	**23.**	(C)	**24.**	(A,B)	**25.**	(C)						