MASTER’S P.U COLLEGE, HASSAN, 573201.

KCET ONLINE TEST-25, MAY-2020  **MATHEMATICS**  **TIME: 45Mins MARKS: 30**

**TOPIC**: **PROBABILITY, RANDOM VARIABLES & STATISTICS. DATE: 19/05/2020**

**KEY**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 |
| **C** | **D** | **B** | **B** | **B** | **B** | **A** | **C** | **B** | **B** | **D** | **C** | **A** | **C** | **B** |
| 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 |
| **D** | **B** | **A** | **A** | **B** | **B** | **B** | **D** | **A** | **D** | **D** | **B** | **B** | **B** | **D** |

**HINTS AND SOLUTIONS**

1. (c) Let .......  be *n* items. Then, 

Let 

Then the mean of the new series is .

1. (d) The required mean is

 =  .

1. (b) Sum of 100 items = 45×100 = 4500

Sum of items added = 19 +31 = 50

Sum of items replaced = 91+ 13 = 104

New sum = = 4446

∴ New mean = 44.46

1. (b)  *i.e.*, 

∴ New average.

1. (b) Arranging the data in ascending order of magnitude, we obtain

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Height(in *cm*) | 150 | 152 | 154 | 155 | 156 | 160 | 161 |
| Number of students | 8 | 4 | 3 | 7 | 3 | 12 | 4 |
| Cumulative frequency | 8 | 12 | 15 | 22 | 25 | 37 | 41 |

Here, total number of items is 41 *i*.*e*., an odd number.

Hence, the median is *th* *i.e.,* 21st item.

From cumulative frequency table, we find that median *i.e.,* 21st item is 155,

1. (b) Corrected 

∴ Corrected 

Incorrect

Correct 

∴ Corrected  .

1. (a) We have ****

and 

Now,    ,  ⇒ 

⇒ ⇒ 

⇒ .

1. (c) Let *a*, *a*, ........*n* times and – *a*, – *a*,– *a*, – *a*, ........*n* times *i.e.,* mean = 0 and S.D.

. Hence .

1. (b) Let  *i.e.,* 

*i.e.*, , where ,

∴ 

∴  ⇒ 

⇒ 

⇒  ⇒ 

⇒  ⇒ 

Thus, new S.D..

1. (b) Here  and  where  denotes head or tail.

If the sequence of  consecutive heads starts from the first throw, we have . Chance of this event 

 and subsequent throws may be head or tail since we are considering at least  consecutive heads. If the sequence of  consecutive heads starts from the second throw, the first must be a tail and we have, the chance of this event 

If the sequence of heads starts from  throw then the first  throws may be head or tail but  throw must be a tail and we have,

 

The chance of this event also 

Since all the above events are mutually exclusive, so the required probability 

.

1. (d) Let    and 

(the gun hits the plane)  (the plane is hit in once)

 (the plane is hit in none of the shots)

.

1. (c) Let  denote the event of drawing a white ball at any draw and  that for a black ball.

Then  

 wins the game)ororor …..)





Also  wins the game)

According to the given condition,



1. (a) Since  and  are the probabilities of the three events, we must have

 and  and 

 and 

Also as  and  are the probabilities of three mutually exclusive events



Thus the required value of  are such that

Max. min. 

1. (c) The last digit of the product will be  or 9 if and only if each of the  positive integers ends in any of these digits. Now the probability of an integer ending in  or 9 is  Therefore the probability that the last digit of the product of  integers in  or 9 is  The probability for an integer to end in  or 9 is  Therefore the probability for the product of  positive integers to end in  or 9 is  Hence the required probability .
2. (b) Required probability = probability that either the number is 7 or the number is 8.

*i.e.,* Required Probability 

Now 





1. (d) There will be no  because  can never be less than 
2. (b) Probability [Person  will die in 30 years] 



Similarly, 

There are two ways in which one person is alive after 30 years.  and  and event are independent.

So, required probability



1. (a) The probability of hitting in one shot 

If he fires  shots, the probability of hitting at least once

(from the question)

, 

 (nearly)

 For 6 shots, the probabilty is about 53% while for 7 shots it is nearly 48%.

1. (a) Since  and  are selected between 1 and 100, hence sample space 

Also , , , ,  etc. Hence  and 9 will be the last digits in the powers of 7. Hence for favourable cases





……………………………………



For 

 Favourable cases = 25

For 

 Favourable cases = 25

Similarly for every  favourable  are 25.

 Total favourable cases 

Hence required probability 

1. (b) This is a problem of without replacement.



Hence required probability 

**Aliter :** Number of ways in which two faulty machines may be detected (depending upon the test done to indentify the faulty machines) 

Number of favourable cases = 1

[When faulty machines are identified in the first and the second test]

Hence required probability 

1. (b) The probability of throwing 9 with two dice 

The probability of not throwing  with two dice 

If *A* is to win he should throw 9 in 1st or 3rd or 5th attempt

If *B* is to win, he should throw, 9 in 2nd, 4th attempt

*B*′s chances .

1. (b) Favorable number of cases = 

Sample space =   Required probability = .

1. (d) Let  denotes the event that the student is selected in IIT entrance test and  denotes the event that he is selected in Roorkee entrance test. Then

 and  Required probability 

.

1. (a) Let  total number of ways 

and  favourable number of ways 

Since the boys and girls can sit alternately in  ways if we begin with a boy and similarly they can sit alternately in  ways if we begin with a girl

Hence required probability 

1. (d) The required probability.
2. (d) Let 

;  

So the probability that none egg is rotten.

1. (b) Required probability =  {Here strictly one is swimmer}
2. (b) Here (without defected) 

(defected)  and  

Hence required probability 



1. (b) Probability that head occurs 6 times  and probability that head occurs 8 times 



 ⇒ .

1. (d) Required probability

