HG(3) – Math(8) Prob. Th.(Sc & Art)

2021

Time : 3 Hours

Maximum Marks : 70

Candidates are required to give their answers in their own words as far as practicable.

Answer any five questions.

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1. (a) Explain Random Experiment, Sample Space and Event with suitable examples.

   (b) Prove that the probability of occurrence of an event is a number lying between 0 and 1.

2. (a) If A and B are independent events, then prove :

   (i) A and B^1 are independent events.

   (ii) A^1 and B are independent events.

   and (iii) A^1 and B^1 are independent events.

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   (b) A person is known to hit a target 3 out of 4 shots and another person s known to hit the target 2 out of 3 shots. Find the probability that the target will be hit when they both try.

3. (a) State and prove Tehebichev's inequality.

   (b) A man is known to speak the truth 3 out of 4 times. He throws a die and reports that it is a six. Find the probability that it is actually a six.

4. (a) Find the mean and variance of a Random Variable.

   (b) A bag contains 4 white and 6 black balls. A ball is drawn at random and replaced and then again a ball is drawn. If this is repeated 4 times, what is the probability that 3 black and 1 white ball will be drawn in these 4 trials.

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5. Write notes on any two of the following :

(a) Total probability rule

(b) Gamma random variable

(c) Conditional intro[y.

6. (a) Introduce the concept of jointly distributed random variables. Prove that the correlation coefficient between two jointly distributed random variables always lie between -1 and 1.

(b) A man with n keys wants to open his door and tries the keys independently and at random. Find the mean and variance of the number of trials required to open the door if unsuccessful keys are not eliminated.

7. State and prove Central Limit Theorem.

8. Define characteristic function. Find the necessary and sufficient conditions for a function to the characteristic function.

9. (a) State and prove the theorem on total probability.

(b) 30 tickets are numbered from 1 to 30. One ticket is drawn at random out of these tickets. What is the chance that the number on the ticket is a multiple of 5 or 7 ?

10. Discuss Equi-probable sample space and Bernoullian case events.

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