INTERNAL EXAMINATION – 2021- 2022

SEM: V   SUBJECT: MATHEMATICS   PAPER: DSE-2

Full Marks: 10

Answer any five questions: $(\mathbf{5 \times 2 = 10})$

1. Two points are selected at random on the circumference of a circle. Find the probability that they do not lie on the same semi-circle.

2. Show that the probability of obtaining no heads in an infinite sequence of independent tosses of a fair coin is 0.

3. If there is a war every 15 years on the average, then find the probability that there will be no war in 25 years.

4. The probability of hitting a target by a bullet is $\frac{1}{3}$. Two direct hits are required to destroy the target. Find the probability of destroying the target if 6 bullets are thrown independently.

5. Show that a function is given by $f(x) = kx(1-x)\,, 0 < x \le 1$

   $\qquad\qquad\qquad\qquad 0,\qquad\quad$ elsewhere

   is a probability density function for a suitable value of the constant k.

6. A die is thrown 108ntimes in succession. Find the expectation and variance of the number of six appeared.

7. Find the variance for the continuous random variable x with probability density function

   $$f(x) = 1 - |1 - x|, 0 < x \le 2$$

   $\qquad\qquad 0\,,\qquad\quad$ elsewhere.