# THE AMERICAN COLLEGE, MADURAI

(An Autonomous Institution Affiliated to Madurai Kamaraj University)

Re-accredited (2nd Cycle) by NAAC with Grade "A", CGPA – 3.46 on a 4-point scale

## Backlog Arrear Examination, March 2021

**MAT/MAS 2411/2445/235** **STATISTICS- I**

**Time: 3 Hrs** **Marks: 75**

**Answer any Five questions** **(5×15=75)**

1. (a) If X and Y are two random variables having joint density function

$$f(x,y)=\begin{cases}\frac{1}{8}(6-x-y) & 0<x<2,\ 2<y<4\\ 0 & \text{otherwise}\end{cases}$$

Find (i) $P(X<1\cap Y<3)$ (ii) $P(X<1\ Y>3)$ (iii) $P(X+Y<3)$.

(b) If X is a continuous random variable with p.d.f is given by

$$f(x)=\begin{cases}x & if\ 0<x<1\\ 2-x & if\ 1\le x<2\\ 0 & if\ x\ge 2 \text{ and } x\le 0\end{cases}$$

Find the distribution function of X.

2. (a) Obtain the (i) mean (ii) median and (iii) mode for the following distribution.

$$f(x)=\begin{cases}6(x-x^2) & if\ 0<x<1\\ 0 & elsewhere\end{cases}$$

(b) A random variable X is defined as the sum of the numbers on the faces when two dice are thrown. Find the expected value of X.

3. (a) Fit a Poisson distribution to the following data and calculate expected frequencies.

| x | 0 | 1 | 2 | 3 | 4 |
|---|---|---|---|---|---|
| f | 123 | 59 | 14 | 3 | 1 |

(b) Six dice are thrown 729 times. How many times do you expect atleast 3 dice to show a five or six.

4. The following data relate to the marks of 10 students

| Internal marks | 25 | 28 | 30 | 32 | 35 | 36 | 38 | 39 | 42 | 45 |
|---|---|---|---|---|---|---|---|---|---|---|
| University marks | 20 | 26 | 29 | 30 | 25 | 18 | 26 | 35 | 35 | 46 |

Obtain the two regression equation y on x.

5. Find the correlation coefficient between x and y from the following table.

| y \ x | 5 | 10 | 15 | 20 |
|---|---|---|---|---|
| 4 | 2 | 4 | 5 | 4 |

| | | | | |
|---|---|---|---|---|
| 6 | 5 | 3 | 6 | 2 |
| 8 | 3 | 8 | 2 | 3 |

6. Fit a second degree parabola by taking $x_i$ as the independent variable.

| x | 0 | 1 | 2 | 3 | 4 |
|---|---|---|---|---|---|
| y | 1 | 5 | 10 | 22 | 38 |

7. (a) From the following data of marks obtained by 10 students in physics and chemistry calculate the rank correlation coefficient.

| Physics | 35 | 56 | 50 | 65 | 44 | 38 | 44 | 50 | 15 | 26 |
|---|---|---|---|---|---|---|---|---|---|---|
| Chemistry | 50 | 35 | 70 | 25 | 35 | 58 | 75 | 60 | 55 | 35 |

(b) A random variable X has the probability function $p(x) = 1/2^x$; $x = 1,2,3....$
Find (i) m.g.f (ii) mean (iii) variance.