**VELAMMAL INSTITUTE OF TECHNOLOGY, CHENNAI- 601204**

**DEPARTMENT OF ECE**

ASSIGNMENT QUESTIONS

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| **Academic Year** | **2017-2018** |
| **Batch** | **2016-2020** |
| **Year/Semester/section** | **II / IV / \_\_\_** |
| **Subject Code-Title**  | **MA 6451-PROBABILITY AND RANDOM PROCESSES** |
| **Name of the Instructor** |  | **Dept** | **Mathematics** |

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| **Assignment No: 1 Total marks:20****Date of Issue: Date of Submission:**  |
| **Sl.No** | **Assignment Questions** | **K Level** | **CO** | **Marks** |
| 1. | A random variable X has the following probability distribution.  X: 0 1 2 3 4 5 6 7  f(x): 0 *k* 2*k* 2*k 3k k2 2k2 7k2+ k*  Find (i) the value of *k*(ii) p(1.5 < X < 4.5 | X > 2) and (iii) the smallest value of λ such that p(X≤λ) > . KEY:(i) 1/10 (ii) 5/7 (iii) 4 | Apply | CO1 | 3 |
| 2. |  If the density function of a continuous R.V. *X* is given by  *f* (*x*) = 1. find the value of *a*
2. find the cdf of *X*.

KEY:(i) 1/2 (ii) F(*x*) =  | Apply | CO1 | 3 |
| 3. | The atoms of a radioactive element are randomly disintegrating. If every gram of this element, on an average, emits 3.9 alpha particles per second, what is the probability that during the next second the number of alpha particles emitted from 1 gram is (i) atmost 6 (ii) atleast 2 (iii) atleast 3 and atmost 5 ?  KEY:(i) 0.8994 (ii) .901 (iii).5474 | Apply | CO1 | 3 |
| 4. | The daily consumption of milk in excess of 20,000 gallons is approximately exponentially distributed with  The city has a daily stock of 35,000 gallons. What is the probability that of two days selected at random, the stock is insufficient for both days. KEY: 2P(X>35000)=0.000045 | Apply  | CO1 | 3 |
| 5. | The joint probability mass function of (X, Y) is given by Find all the marginal and conditional probability distributions. Also find the probability distribution of (X+Y) and KEY: K=1/72

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| X | 0 | 1 | 2 |
| P(X=x) | 1/4 | 1/3 | 5/12 |

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| X+Y | 1 | 2 | 3 | 4 | 5 |
| P(X+Y ) | 3/72 | 11/72 | 24/72 | 21/72 | 13/72 |

 =34/72 | Apply | CO2 | 4 |
| 6. | If X and Y are random variables having the joint density function .  Find (i)(ii)  (iii) KEY ; (i)= 3/8(ii) =5/24 (iii) =3/5 | Apply | CO2 | 4 |
| **Assignment No: 2 Total marks:20****Date of Issue: Date of Submission:**  |
|  | The transition probability matrix of a Markov chain , having the three states  is  and the initial distribution is . Find and .KEY; (i) 0.279 ii) 0.0048  | Apply | CO3 | 4 |
|  | A man either drives a car or catches a train to go to office each day. He never goes 2 days in a row by train, but if he drives one day, then the next day he is just as likely to drive again as he is to travel by train. Now suppose that on the first day of the week, the man tossed a fair die and drove to work if and only if a 6 appeared. Find (i) the probability that he takes a train on the third day (ii) the probability that he drives to work in the long run.KEY : P$=\left(\begin{matrix}0&1\\0.5&0.5\end{matrix}\right)$,i) 11/24 ii) 2/3 | Apply | CO3 | 3 |
|  | If customers arrive at a counter in accordance with a Poisson process with a mean rate of 2 per minute, find the probability that the interval between 2 consecutive arrivals is (1) more than 1 minute (2) between 1 minute and 2 minute and (3) 4 min or less.KEY:1. 0.1353
2. 0.117
3. 0.9997
 | Apply | CO4 | 3 |
| 4. | Find the power spectral density of a WSS process with auto correlation function. KEY:$\sqrt{\frac{π}{α}} e^{\frac{-ω^{2}}{4α}}$ | Apply | CO4 | 4 |
| 5. | Given the power spectral density  . Use residue theory to find the average in the process x(t).KEY: 11/12 | Apply | CO4 | 3 |
| 6. | A stationary random process X(t) has auto correlation function given byFind the mean and variance of X(t) KEY: 2 and 5 | Solve | CO4 | 3 |
| **Assignment No: 3 Total marks:20****Date of Issue: Date of Submission:**  |
| 1 | Rayleigh distribution in real life phenomena | Apply | CO6 | 20 |

**Course In charge Course Coordinator Module Coordinator HOD/Mathematics**