Reg. No. \_\_\_\_\_\_\_\_\_\_\_\_\_



**End Semester Examination – Nov / Dec – 2019**

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| **Code :** | **18MA2006** | **Duration :** | **3hrs** |
| **Sub. Name :** | **PROBABILITY AND STOCHASTIC PROCESSES** | **Max. Marks :** | **100** |

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| **Q. No.** | **Questions** | **Course Outcome** | **Marks** |
|  | **PART – A (10X1=10 MARKS)** | | |
| 1. | Probability of an impossible event is \_\_\_\_\_\_\_ | CO1 | 1 |
| 2. | If A and B are two independent events such that P(A)=1/2,P(B)=1/3 then find P(A∩B) =\_\_\_\_\_\_\_ | CO1 | 1 |
| 3. | Find the value of k, If is to be a density function. | CO2 | 1 |
| 4. | If is the cumulative distribution function of two dimensional random variable then | CO2 | 1 |
| 5. | Write the probability mass function of poisson distribution. | CO3 | 1 |
| 6. | Mean and variance of standard normal distribution is \_\_ and \_\_. | CO3 | 1 |
| 7. | Write the formula of Liapounoff’s form in central limit theorem. | CO4 | 1 |
| 8. | If X and Y are independent random variables and Z=X+Y then Mz(t) = \_\_\_\_\_\_ | CO4 | 1 |
| 9. | What is the nature of , when ‘s’ is fixed? | CO5 | 1 |
| 10. | A random process that is not stationary in any sense is called \_\_\_\_\_\_. | CO5 | 1 |

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|  | **PART – B (6 X 3 = 18 MARKS)** | | |
| 11. | From 6 positive and 8 negative numbers, 4 numbers are chosen at random (without replacement) and mulitiplied. What is the probability that the product is positive? | CO1 | 3 |
| 12. | A random variable X has the following probability distribution.   |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | | *x* | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | | *p(x)* | 0 | K | 2K | 2K | 3K | K2 | 2K2 | 7K2+K |   Find (i) the value of K (ii) P(X>2) | CO2 | 3 |
| 13. | A random variable X has a mean μ = 12 and variance σ2= 9 and an unknown distribution. Find P(6<X<18) | CO3 | 3 |
| 14. | Determine the pdf of Y=1/X, if the RV X is uniformly distributed in (1,2). | CO4 | 3 |
| 15. | Find the mean and variance of the stationary process , whose autocorrelation is given by | CO5 | 3 |
| 16. | If is a Gaussian process with μ(t)=10 and C(,) = 16 . Find P | CO6 | 3 |

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|  | **PART – C (6 X 12 = 72 MARKS)** | | | |
| 17. | a. | In a bolt factory machines A, B, C produce 25%, 35% and 40% of the total output respectively of their output 5% , 4% and 2% respectively are defective bolts. If a bolt chosen at random from the combined output. What is the probability that it is defective? If a bolt chosen at random is found to be defective, what is the probability that it was produced by B? | CO1 | 6 |
| b. | A and B alternatively throw a pair of dice. A wins if he throws 6 before B throws 7 and B wins if he throws 7 before A throws 6. If A begins, What is the chance of his winning? | CO1 | 6 |
| 18. | a. | If the joint pdf of two dimensional RV (X, Y) is given by . Find ‘k’ and also find the marginal density function of X and Y. | CO2 | 12 |

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| 19. | a. | Fit a Poisson distribution for the following distribution:   |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | | x | 0 | 1 | 2 | 3 | 4 | 5 | | f | 142 | 156 | 69 | 27 | 5 | 1 | | CO3 | 6 |
| b. | In test of 2000 electric bulbs, it was found that the life of a particular make, was normally distributed with an average life of 2040 hours and standard deviation of 60 hrs. Estimate the number of bulbs likely to burn for (i) More than 2150 hrs (ii) Less than 1950 hrs(iii) more than 1920 but less than 2160 hrs. | CO3 | 6 |
| 20. | a. | Find the moment generating function of binomial distribution and also find its mean. | CO4 | 6 |
| b. | If (X,Y) be a two dimensional non-negative continuous random variable having the joint density: then prove that | CO4 | 6 |
| 21. | a. | Two random processes{ and are defined by  and Show that and are jointly wide sense process, where‘’ and ‘’ are random variables. with | CO5 | 12 |
| 22. | a. | For the bivariate probability distribution of given below:   |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | | X/Y | 1 | 2 | 3 | 4 | 5 | 6 | | 0 | 0 | 0 |  |  |  |  | | 1 |  |  |  |  |  |  | | 2 |  |  |  |  | 0 |  |   Find , and | CO2 | 12 |
| 23. | a. | In a certain city, the daily consumption of electric power in millions of kilowatt hours can be treated as a random variable having an gamma distribution with parameters λ=1/2 and k=3. If the power plant of this city has a daily capacity of 12 millions kilowatt hours, what is the probability that this power supply will be inadequate on any given day? | CO3 | 6 |
| b. | In a shooting test the probability of hitting the target is  for A,  for B and  for C. If all of them fire at the target, find the probability that (i) None of them hits the target (ii) Atleast one of them hits the target (iii) Exactly two of them hits the target. | CO1 | 6 |
|  | **Compulsory:** | | | |
| 24. | a. | 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 intereval between 2 consectives arrivals is (i) more than 1 min (ii) between 1 min and 2 min (iii) less than 4 min | CO6 | 6 |
| b. | A fair die is tossed repeatedly. If Xndenotes the maximum of the numbers occurring in the first n tosses, find the transition probability matrix P of the markov chain and also find and6).  Question No.24 from Module 6 | CO6 | 6 |