Final! 01.11.2021

Course Code: **1930414** Roll No: **MLRS- R19**

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**INSTITUTE OF TECHNOLOGY AND MANAGEMENT**
(AN AUTONOMOUS INSTITUTION)
(Approved by AICTE, New Delhi & Affiliated to JNTUH, Hyderabad)
Accredited by NBA and NAAC with 'A' Grade & Recognized Under Section2(f) & 12(B)of the UGC act,1956

II B.Tech I Sem Supply End Examination, October 2021

**PROBABILITY THEORY AND STOCHASTIC PROCESSES**

(ECE)

Time: 3 Hours. Max. Marks: 70

Note: 1. Answer any FIVE questions.
2. Each question carries 14 marks and may have a, b as sub questions.

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|---|---|---|---|---|---|
| 1 | a) | State and Prove Bayes Theorem | 7M | CO1 | BL3 |
| | b) | Determine the probability of the card being either red or king when one card is drawn from a regular deck of 52 cards? | 7M | CO1 | BL3 |
| 2 | a) | Classify random variables and explain with relevant examples. | 7M | CO1 | BL4 |
| | b) | Determine the real constant a, for arbitrary real constants m and 0<b, such that $f_X(x) = ae^{\frac{-\lvert x-m\rvert}{b}}$ is a valid density function. | 7M | CO1 | BL3 |
| 3 | a) | Find the mean of a binomially distributed random variable. | 7M | CO2 | BL3 |
| | b) | Define moment generating function and show moments can be generated using it. | 7M | CO2 | BL3 |
| 4 | a) | Autocorrelation function of an ergodic stationary random process with no periodic component is given as $100+ 4/(1+6\tau^2)$. Find the mean and variance of the process. | 7M | CO3 | BL3 |
| | b) | Find the average power in random process $X(t) = A_o\cos(\omega_o t+\Theta)$, where $A_o$, $\omega_o$ are constants and $\Theta$ is a uniformly distributed random variable over $(0, \Pi/2)$. | 7M | CO3 | BL3 |
| 5 | a) | Two random variables X and Y are zero mean independent variables, obtain the density function of W. Given W =X+Y | 7M | CO2 | BL3 |
| | b) | State the properties of cross correlation function of random processes and prove any two. | 7M | CO3 | BL1 |
| 6 | a) | State and prove Weiner-Khintchine relations. | 10M | CO4 | BL3 |
| | b) | Determine the cross-correlation function corresponding to the cross power spectrum $S_{XY}(\omega)=8/(\alpha+j\omega)$, where $\alpha$ is a constant. | 4M | CO4 | BL3 |
| 7 | a) | Derive the relation between input and output power spectral densities of a linear system | 8M | CO4 | BL5 |
| | b) | Write notes on effective noise temperature. | 6M | CO5 | BL1 |
| 8 | a) | A source emits different symbols a, b, c, d, e with respective probabilities 0.1.0.2,0.1,0.1,0.5. Obtain the code words using Shannon-Fano coding and also calculate entropy. | 7M | CO5 | BL3 |
| | b) | Prove that $F=F_1+\frac{F_2-1}{g_{a1}}+\frac{F_3-1}{g_{a1}g_{a2}}+$ ..... For cascade of two port networks. | 7M | CO5 | BL3 |

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Key prepared by
8/11/21
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