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



**End Semester Examination – Nov/Dec – 2017**

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| **Code :** | **17MA3006** | **Duration :** | **3hrs** |
| **Sub. Name :** | **GRAPH THEORY AND RANDOM PROCESS** | **Max. marks :** | **100** |

**ANSWER ALL QUESTIONS (5 x 20 = 100 Marks)**

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| **Q. No.** | **Sub Div.** | **Questions** | **Course**  **Outcome** | | | **Marks** |
| 1. | a. | State and Prove Euler’s Theorem. | CO1 | | | 10 |
| b. | Use Fleury's algorithm to produce an Euler circuit for the following graph.  A  B  C  E  F  G  H      D | CO1 | | | 10 |
| (OR) | | | | | | |
| 2. | a. | Find the Chromatic Number and Chromatic Polynomial for the following graph: | CO1 | | 10 | |
| b. | Find the maximum flow in the following network.  9  8  2  5  4  3  4  4  6 | CO1 | | 10 | |
| 3. | a. | Construct the tree of the algebraic expression (x ÷ y) ÷ ((x \* 3) – (z ÷ 4)). Represent the tree in doubly linked list and implement this linked list in three arrays. | CO1 | | 10 | |
|  | b. | Evaluate i. 3 7 X 4 – 9 X 6 5 X 2 + ÷ ii. ÷ - X 3 2 X 4 3 + 15 X 2 – 6 3 iii. 4 3 2 ÷ - 5 × 4 2 × 5 × 3 ÷ ÷ | CO1 | | 10 | |
| (OR) | | | | | | |
| 4. | a. | Prove that a tree with n vertices has n-1 edges. | CO1 | | | 8 |
|  | b. | State Krushkal’s algorithm and find the minimal spanning tree for the  following graph. | CO1 | | | 12 |
| 5. | a. | Urn I has 2 white and 3 black balls, urn II has 4 white and 1 black balls and urn III has 3 white and 4 black balls. An urn is selected at random and a ball drawn at random is found to be white. Find the probability that urn I was selected. | CO2 | | | 10 |
|  | b. | A continuous RV X has a pdf  ; x > 0. Find k, mean and variance. | CO2 | | | 8 |
| (OR) | | | | | | |
| 6 |  | The probability function of an infinite discrete distribution is given by P(x =j) = 1/2j j = 1, 2, …, ∞. Verify that the total probability is 1 and find the mean and variance of the distribution. Find also P(X is even), P(X ≥ 5) and P(X is divisible by 3) | | CO2 | | 20 |
| 7. | a. | The process {X(t)} whose probability distribution under certain conditions is given by    Show that it is not stationary. | | CO2 | | 10 |
|  | b. | Show that the process X(t) = A cos λt + B sin λt where A and B are RVs is WSS if E(A) = E(B) = 0, E(A2) = E(B2) and E(AB)=0. | | CO2 | | 10 |
| (OR) | | | | | | |
| 8. | a. | Given that the autocorrelation function for a stationary ergodic process with no periodic components is . Find the mean and variance of the process {X(t)}. | | CO2 | | 8 |
|  | b. | The autocorrelation function of the random telegraph signal process is given by R(τ) = a2e - 2γ |τ|. Determine the power spectral density spectrum of the random telegraph signal. | | CO2 | | 12 |
|  | | **Compulsory:** | |  | |  |
| 9. | a | A telephone exchange has two long distance operators. The telephone company finds that during the peak load long distance calls arrive in a Poisson fashion at an average rate of 15 per hour. The length of service on these calls is approximately exponentially distributed with mean length 5 minutes.   1. What is the probability that a subscriber will have to wait for his long distance call during the peak hours of the day? 2. If the subscribers will wait and are serviced in turn, what is the expected waiting time? | | CO3 | | 10 |
|  | b. | Car arrives at a petrol pump having one petrol unit in Poisson fashion with an average of 10 cars per hour. The service time is distributed exponentially with a mean of 3 minutes. Find i. average numbers of cars in the system ii. average waiting time in the queue iii. average queue length iv. the probability that the number of cars in the system is 2. | | CO3 | | 10 |

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