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



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

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| **Code :** | **17MA3013** | **Duration :** | **3hrs** |
| **Sub. Name :** | **GRAPH THEORY AND PROBABILITY** | **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. | Detemine whether the following graphs are isomorphic by maping the vertices and edges. | CO1 | 10 |
| b. | Prove that a connected graph G is an Euler graph if and only if all vertices of G are of even degree. | CO1 | 10 |
| **(OR)** | | | | |
| 2. | a. | Prove that if G is 2-connected, then any two vertices of G lie ona  common cycle. | CO1 | 10 |
| b. | Prove that if G is a simple graph with  and  , then G is Hamiltonian. | CO1 | 10 |
|  |  |  |  |  |
| 3. | a. | Prove that a complete graph of five vertices is non planar. | CO2 | 10 |
| b. | State and prove the five colour theorem. | CO2 | 10 |
| **(OR)** | | | | |
| 4. | a. | Prove that in a simple connected planar graph with  region  edges and  vertices the following inequalities hold.      ii) . | CO2 | 10 |
| b. | Prove that a tree with vertices has edges. | CO2 | 10 |
|  |  |  |  |  |
| 5. | a. | What is the number of spanning trees the graph  have. Enumerate them. | CO3 | 10 |
| b. | Give the Prim’s algorithm and hence find the minimum spanning tree for the given weighted graph. | CO3 | 10 |
| **(OR)** | | | | |
| 6. | a. | Write the description of Dijkstra’s algorithm to find the shortest path between a specified pair of vertices. | CO3 | 10 |
| b. | Give the algorithm for the Breadth first search and hence find the spanning tree for the graph given. | CO3 | 10 |
|  |  |  |  |  |
| 7. | a. | The joint probability density function of is , , . Find  i) Marginal density functions.  ii) Conditional density functions.  iii) Examine whether X and Y are independent. | CO4 | 10 |
| b. | In a bolt manufacturing company, machine A, B and C produce 25%, 35% and 40% of the total output respectively. Of their outputs 5%, 4% and 2 % respectively are defective bolts.  If a bolt is 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 machine B? | CO4 | 10 |
| **(OR)** | | | | |
| 8. | a. | In a large consignment of electric bulbs, 5% are defective. A random sample of 15 is taken for inspection. Use Binomial Distribution to find the probability that  (i) All are good bulbs.  (ii) Exactly 3 are defective bulbs.  (iii) Atmost 3 are defective bulbs. | CO5 | 10 |
| b. | Fit a Poisson distribution to the given data and calculate the expected frequencies.   |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | | x | 0 | 1 | 2 | 3 | 4 | |  | 43 | 38 | 22 | 9 | 1 | | CO5 | 10 |
|  | | **Compulsory**: |  |  |
| 9. | a. | A group of five patients treated with medicine A have the weights 42, 39, 48, 60, 41 kgms. Another group of seven patients treated with medicine B have the weights 38, 42, 56, 64, 68, 69, 62 kgms. Do you agree with the claim that on an average medicine B increases weight significantly? | CO6 | 10 |
| b. | Samples of three kinds of materials, subjected to extreme temperature changes produced the results shown in the following table.   |  |  |  |  |  | | --- | --- | --- | --- | --- | |  | Material | | | Total | |  | A | B | C |  | | Crumbled | 41 | 27 | 22 | 90 | | Remained intact | 79 | 53 | 78 | 210 | | Total | 120 | 80 | 100 | 300 |   Use the 0.05 level of significance to test whether, under the stated conditions the probability of crumbling is the same for the three kinds of materials. | CO6 | 10 |