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**PRESIDENCY UNIVERSITY**

**Bengaluru**

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| **Ph.D. Course Work End Term Examinations – JAN-FEB 2025** |
| **Date:** 31- 01- 2025 **Time:** 09:30 am – 12:30 pm |

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| **School:** SOE | **Program:** Ph.D. | |
| **Course Code :** MAT806 | **Course Name :** Advanced Graph Theory | |
| **Semester**: | **Max Marks**:100 | **Weightage**:50% |

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| --- | --- | --- | --- | --- |
| **CO - Levels** | **CO1** | **CO2** | **CO3** | **CO4** |
| **Marks** | **25** | **25** | **30** | **20** |

**Instructions:**

1. *Read all questions carefully and answer accordingly.*
2. *Do not write anything on the question paper other than roll number.*

**Part A**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Answer ALL the Questions. Each question carries 10 marks. 6Q x 10M=60Marks** | | | | |
| **1** | Define cut vertex and prove that 𝜏(𝐾n ) = 𝑛n-2 | **10 Marks** | **L** | **CO1** |
| **2** | Define Ramsey graph and clique with an example and prove that 𝑟(𝑘, 𝑘) ≥ 2 𝑘k/2 | **10 Marks** | **L** | **CO2** |
| **3** | Prove that if a simple graph G contains no 𝐾𝑚+1, then G is degree majorized by some complete m-partite graph H, if G has same degree sequence as H, then 𝐺 ≅ H | **10 Marks** | **L** | **CO2** |
| **4** | Describe the Algorithm of Planarity testing. | **10 Marks** | **L** | **CO3** |
| **5** | Describe the Algorithm of Isomorphism. | **10 Marks** | **L** | **CO3** |
| **6** | Define and brief about fuzzy interval and fuzzy interval graph. | **10 Marks** | **L** | **CO4** |

**Part B**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Answer the Questions. Each question carries 20 marks 2Q x 20 = 40 Marks** | | | | | | |
| **7.** | **a.**  **b.** | Briefly elaborate the applications of spanning tree.  Define independent set and dominating set with an example and prove that if 𝛿 > 0, then 𝛼 ′ + 𝛽 ′ = | **15 Marks**  **5 Marks** | **L** | | **CO1**  **CO2** |
|  | | | | | | |
| **8.** | **a.**  **b.** | Describe the shortest path algorithms.  Define fuzzy clique and orientation. Also explain the steps involved in the algorithm of fuzzy rule –based inference. | **10 Marks**  **10 Marks** | | **L** | **CO3** |

**\*\*\*\*\* BEST WISHES \*\*\*\*\***