UNIVERSITY OF MADRAS

M.Sc. DEGREE PROGRAMME IN MATHEMATICS

SYLLABUS WITH EFFECT FROM 2023-2024

<table>
<tr><td colspan="2">Titleofthecourse</td><td colspan="6">GRAPHTHEORY</td></tr>
<tr><td colspan="2">PaperNumber</td><td colspan="6"></td></tr>
<tr><td rowspan="2">Category</td><td rowspan="2">Elective</td><td>Year</td><td>I</td><td rowspan="2">Credits</td><td rowspan="2">3</td><td rowspan="2">Course Code</td><td rowspan="2">428E1D</td></tr>
<tr><td>Semester</td><td>I</td></tr>
<tr><td colspan="2">Pre-requisite</td><td colspan="6">Basics ingraph theory</td></tr>
<tr><td colspan="2">CourseOutline</td><td colspan="6">UNIT – I Graphs, Subgraphs and Trees: Graphs and simple graphs – Graph isomorphism – The incidence and adjacency matrices – Subgraphs – Vertex degrees – Path and connection – Cycles – Trees – Cut Edges and Bonds – Cut vertices.
Chapter 1 : Sections 1.1 to 1.7
Chapter 2 : Sections 2.1 to 2.3</td></tr>
<tr><td colspan="2"></td><td colspan="6">UNIT – II Connectivity, Euler tours and Hamilton Cylcles:
Connectivity – Blocks – Euler tours – Hamilton Cycles.
Chapter 3: Sections 3.1 to 3.2
Chapter 4 : Sections 4.1 to 4.2</td></tr>
<tr><td colspan="2"></td><td colspan="6">UNIT – III Matchings, Edge Colouring:Matchings – Matchings and coverings in bipartite graphs – Edge Chromatic number – Vizing’s theorem.
Chapter 5 : Sections 5.1 to 5.2
Chapter 6 : Sections 6.1 to 6.2</td></tr>
<tr><td colspan="2"></td><td colspan="6">UNIT – IV Indpendent sets and Cliques, Vertex colourings:
Independent sets – Ramsey’s theorem – Chromatic number – Brook’s theorem – Chromatic polynomials.
Chapter 7 : Sections 7.1 to 7.2Chapter 8 : Sections 8.1 to 8.2, 8.4</td></tr>
<tr><td colspan="2"></td><td colspan="6">UNIT – V Planar Graphs :Plane and planar graphs – Dual graphs – Euler’s formula – The five – colour theorem and the Four – colour conjecture.
Chapter 9 : Sections 9.1 to 9.3, 9.6</td></tr>
<tr><td colspan="2">Recommended Text</td><td colspan="6">J.A.BondyandU.S.RMurty,GraphTheorywithApplications,Macmillan,London1976</td></tr>
<tr><td colspan="2">ReferenceBooks</td><td colspan="6">1. K.R.Parthasarathy,BasicGraph Theory,TataMcGraw-Hill, NewDelhi,1994
2. NarsinghDeo,GraphTheorywithApplicationstoEngineeringand ComputerScience,Prentice-HallofIndia, 2007
3. DouglasB.West,IntroductiontoGraphTheory,PearsonPrenticeHall,2006</td></tr>
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