Guidelines for B.Sc. (H) Computer Science VI SEM

Combinatorial Optimization

Topic	Unit	Reference	No. Of Lectures
Introduction to Combinatorial Optimization Problems, Linear and Integer Programs	**1**	[1] Ch 1: 1.1 [1] Ch 2: 2.1, 2.2, 2.4, 2.7 [1] Ch 3: 3.1, 3.2 (theorem 3.2.1 not to be covered as a theorem, first explain through an example and then explain the proof in the form of a procedure), 3.3 (excluding remark on combinatorial approximation algorithms for vertex cover), 3.4 **P.S. spend sufficient time on formulation of the problems in this chapter; avoid the use of terms such as NP hardness, NP completeness, approximation algorithms – only intuition to be given** [2] Ch 1: 1.2	12
Theory of Linear Programming and Algorithmic Perspective to Simplex Method	**2**	[1] Ch 4: 4.1, 4.2, 4.3 (except proof of 4.3.1), 4.4 [1] Ch 5: 5.1, 5.2, 5.3 [3] Ch 2: Figure 2.14 in Section 2.6 (geometric interpretation of degeneracy) [1] Ch 5: 5.4, 5.5 (without proof of lemma), 5.6 (except proof of 5.6.1 and Organization of the computations), 5.8 (only Bland's anti cycling rule 5.8.1 without proof)	20
Primal-Dual Algorithms	**3**	[1] Ch 6: 6.1, 6.2 (except physical interpretation of duality) complementary slackness from matousek (glossary)	10
Network Flows	**4**	[1] Ch 8: 8.2 [2] Ch 6: 6.1, 6.2, 6.4	18

NOTE: Refer [2] Ch-2 for more examples and additional material for unit 2

Readings/Reference Texts:
[1] Matousek & Gartner (2007). *Understanding and Using Linear Programming*. Springer.
[2] Papadimitriou, C.H. & Steiglitz, K. (1998). *Combinatorial Optimization: Algorithms and complexity*. Dover Publications.

Additional Resources:

[3] Bazaraa, M.S., Jarvis, J.J., & and Sherali, H.D. (2008). *Linear Programming and Network Flows*. 2nd edition. Wiley.

[4] Korte, B., & Vygen, J. (2006). *Combinatorial Optimization*. 5th edition. Springer.