Required material for the theoretical part of the exam

File A

(1) Definitions from slides 18-20,
(2) Chapman-Kolmogorov equation slide 44,
(3) Definitions from slides 51-53,
(4) everything: 87-108,
(5) everything: 139-146.

File B

(1) everything: 2-5
(2) Doubly stochastic MC: 18
(3) recurrence of SSRW 24
(4) detailed ballence condition, time reversal 27-37
(5) birth and death process 38-43
(6) gamber's ruin fair and unfair cases 61-67
(7) everything: 99-120
(8) generator function and branching processes 135-148
(9) everything: 151-175

File C Everything from File C

File D

(1) everything 3-53
(2) Birth and Death Chains 57-59
(3) $M/M/s$ queuing with balking, pure birth processes 65-72
(4) Kolmogorov's Three-Series Theorem 73
(5) everything 79-92
(6) $M/M/1$ queuing again and with finite waiting room 99- 109
(7) Barber shop last time 110-112

File E

(1) Review slides: 3-8
(2) Lemma 2.4 slide 16
(3) Some measure theory: 17-20
(4) Properties of Conditional expectation 21-22
(5) Conditional expectation for σ-algebras slide 23
(6) Review of measure theory slides 31-35
(7) Conditional expectation for σ-algebras slides 37-47
(8) Martingales: slides 49-55
(9) Some further properties of martingales slides 58-64
(10) Doubling strategy and related comments (process W_n) slides 65-70
(11) Stopping times slides 71- 74
(12) Theorem 5.22 and $M_{n\wedge T}$ slides 78-80

(13) Exit distributions slides, Doob's optional stopping time theorem 80-88
(14) Wald equality slide 89
(15) Convergence theorem for non-negative supermartingales: slides 90-95
(16) Polya Urn slides 96-101

File F

(1) Review of the properties of the normal distribution on $\mathbb{R}$: slides 3-7
(2) Definition of the one-dimensional Brownian motion:slide 10-11
(3) Construction of the one-dimensional Brownian motion: slides 12-20
(4) Equivalent definition of the Brownian motion: slide 21
(5) Basic properties of the one-dimensional Brownian motion: slides 22-24
(6) Brownian motion in $\mathbb{R}^n$ and Hölder property slides 25-28.

File G

(1) Definition of Fracatal Percolation Cantor set. slides 3-19
(2) Corollary 1.1 slide 20
(3) Definition of the Hausdorff dimension slide 23
(4) Lemma 2.2 slide 25-27
(5) Dimension formula: proof of the upper bound
(6) Dimension formula: proof of the lower bound
(7) Percolation phenomenon and the Chayes, Chayes Durrett Theorem slides 41-42
(8) Dekking Pakes Theorem slide 46
(9) Part of the proof of Chayes, Chayes Durrett Theorem if $M \geq 3$.