

TITLE: PROBABILITY AND STOCHASTIC PROCESS

TIME: 3 HOURS

CORE: MAJOR CORE

MAX: 100 MARKS

SECTION - A

Answer all the questions

2×4=8

1. Explain with an example memory less property.
2. Derive C-K equations.

SECTION - B

Answer any two questions

2×12=24

3. State and prove Borel Cantelli lemma.
4. Prove that communication between states is an equivalence relation.
5. State and prove Azuma's inequality.

SECTION - C

Answer any two questions

2×34=68

6. a) Find the expected number of isolated points in 1D packing problem.
b) If walking up and down has the same probability then find the probability that a node is visited last for 1D & 2D r.w.

(17+17)

7. a) For positive i.i.d r.v. Y_1, Y_2, \dots that are independent of $\{\tau_1, \dots, \tau_n\} \in U(0, t)$, prove that $P\{Y_1 + \dots + Y_k < \tau_k, k = 1, \dots, n \mid Y_1 + \dots + Y_n = y\} = 1 - \frac{y}{t}, 0 < y < t$ & 0 otherwise.

- b) What are the two classes, that an irreducible aperiodic M.C. belongs to?

Justify your answer.

(17+17)

8. a) Derive Wald's equation.
b) Define Martingale and give two examples.
c) Compute mean time for gambler's problem for a specific run

(10+10+14)
