

**21MAB204T – Probability and Queueing Theory**  
**II Year- Academic Year: 2023-24 (EVEN Semester)**

**REVISED HANDOUT**

**Course Objective:**

The primary goal of the course is to provide students with an understanding of probability principles and standard distributions that apply to real-world situations. The handling of scenarios involving random variables is explored throughout the course. Applying probability ideas to queueing models with Poisson arrivals, exponential service rate, and Markov chain applications is a major focus of the course.

**Course Content:**

- ❖ Unit I - Random Variables: 12 sessions
- ❖ Unit II - Theoretical Distributions: 12 sessions
- ❖ Unit III - Two-Dimensional Random Variables: 12 sessions
- ❖ Unit IV - Queueing Theory: 12 sessions
- ❖ Unit V - Markov Chain: 12 sessions

Total hours allotted for the course: 60 sessions

**Course Outcomes:**

**At the end of the course, students will be able to**

- ❖ evaluate the characteristics of discrete and continuous random variables and apply them in science and engineering.
- ❖ identify the random variables and model them using various distributions.
- ❖ infer results from two-dimensional random variables that describe real-life phenomena.
- ❖ examine the significant results of various queueing models.
- ❖ determine the transition probabilities and classify the states of the Markov chain.

**Lesson Plan:**

- ❖ The lesson plan will be supplied by the course-handling faculty.

**Reference Books:**

- ❖ Sheldon Ross, A First Course in Probability, Pearson, 9<sup>th</sup> Edition, 2019
- ❖ S.C. Gupta, V.K. Kapoor, Fundamentals of Mathematical Statistics, Sultan Chand & Sons, 12<sup>th</sup> Edition, 2018.
- ❖ K. S Trivedi, Probability and Statistics with Reliability, Queueing and Computer Science Applications, Prentice Hall of India. New Delhi, 2<sup>nd</sup> Edition, 2016.
- ❖ Arnold O. Allen, Probability, Statistics and Queueing Theory with Computer Science Applications, Academic Press, 2<sup>nd</sup> Edition, 1990.
- ❖ D. Gross, John F. Shortle, James M. Thompson, Carl M. Harris- Fundamentals of Queueing Theory, Wiley India Pvt. Ltd. 4<sup>th</sup> Edition, 2013.
- ❖ T. Veerarajan, Probability, Statistics and Random Processes with Queueing Theory and Queueing Networks, Tata McGraw-Hill, New Delhi, 4<sup>th</sup> Edition 2015.

**Sessions Schedule:**

- ❖ Four sessions per week, each lasting 50 minutes.
- ❖ There are three lecture sessions and one tutorial session.

**Teaching Methods:**

- ❖ To promote problem-solving and critical thinking, lectures are delivered utilizing a variety of methods, including the classic chalk-and-talk technique, the digital board, and tutorial sessions.

**Consultation Hour:**

- ❖ The appropriate instructor will notify email and office hours.

### Schedule of Cycle Tests: A1& A2 Slots:

Retest will not be conducted

| CLA1 - T1   | CLA1 - T2  | CLA1 - T3   |
|---|--|---|
| Date: 16.02.2024  | Date: 22.03.2024   | Date: 24.04.2024  |
| Portions: Unit 1 – 30 marks   | Portions: Units 2 & 3 – 50 marks   | Portions: Units 4 & 5 – 15 marks  |
| <b>Pattern</b><br><b>Part A</b> (Any 2 out of 3)<br>(2 x 8 = 16 marks)<br><b>Part B</b> (1 x 14 = 14 marks) | <b>Pattern</b><br><b>Part A</b> (11 x 1 = 11 marks)<br><b>Part B</b> (Any 3 out of 4)<br>(3 x 8 = 24 marks)<br><b>Part C</b> (Any 1 out of 2)<br>(1 x 15 = 15 marks) | <b>Practice Assessment: 5 marks</b><br><br><b>ICT Tools Test: 5 marks</b> |
| <b>Hands-on practice: 5 marks</b>   |  | <b>Oral Presentation: 5 marks</b>   |

### Remedial Measures:

- ❖ Failures in cycle tests have to attend booster mathematics classes as well as complete booster assignment sheets to perform better on subsequent cycle tests.

### Internal Component Mark Breakup: (20 + 15 + 15 + 10 = 60 marks)

- ❖ CLA1 T1 is conducted for 30 marks and converted to 15 internal marks. Hands-on practice is graded for 5 internal marks (Total 15+5 = 20 internal marks).
- ❖ CLA1 T2 is conducted for 50 marks and converted to 15 internal marks.
- ❖ CLA1 T3 Practice Assessment is graded for 5 internal marks; the ICT Tools Test is graded for 5 internal marks and Oral Presentation is graded for 5 internal marks (Total 5+5+5 = 15 internal marks).
- ❖ CLA2 – Assignment (Life-long learning) is graded for 10 internal marks.

### Attendance Requirements:

- ❖ To take an exam, 75% attendance is mandatory. Therefore, it is required that students give full cooperation and support by attending all sessions.

### Classroom Etiquette:

- ❖ To ensure a better learning environment, turn off your devices and arrive on time for the sessions.
- ❖ Take notes during lectures in a separate notebook, and engage fully in tutorial sessions.

*H. Merlyn Margaret*

Course Coordinator

(Dr. H. Merlyn Margaret)

*V. Subburayan*  
HOD / Mathematics 03/02/2024

(Dr. V. Subburayan)