

Course Title:					Queuing Theory					
Course Code:					MTE-7261					
Course Coordinator					Dr. Rakesh Kumar					
Credits					4-1-0 = 05					
Evaluation Scheme Total 100 Marks										
Quiz (Total 20 Marks)				Assignment/Project (Total 20 marks) (Minimum Two Assignments or one Project)		Mid-Term	Major Examination		Total	
Quiz I (5 marks)	Quiz II (5 marks)	Quiz III (5 marks)	Quiz IV (5 marks)			20 marks) (1 ½ Hour Duration)	(40 marks) (3 Hour Duration)	100 Marks		
WEEKS					TOPICS TO BE COVERED					
Week 1					Concept of Stochastic Process, Markov Chains: Discrete-Time Markov Chains (Classification of States, Ergodicity)					
Week 2					Markov Chains with continuous time parameter (Poisson Process, Birth-death Process)					
Week 3					Objectives and different characteristics of a queuing system, Performance measures, Steady-state solution of M/M/1 queuing model					
Week 4					Steady-state solution of M/M/c, M/E _k /1 and E _k /M/1 queuing models					
Week 5					Bulk Queues: Steady-state analysis of M ^[X] /M/1 and M/M ^[Y] /1 queuing models					
Week 6					Transient solution of M/M/1 queuing model and its busy period distribution					
Week 7					Transient solution of M/M/c, and M/M/∞ queuing models					
Week 8					Imbedded Markov chain technique and its use to the Queuing models: M/G/1, GI/M/1					
Week 9					Design and control of queuing systems					
Week 10					Queuing Networks: Open and Closed Queuing Networks, Jackson network, Jackson Theorem					
Week 11 (17th -21st March, 2025)					Mid-Term					
2nd April, 2025					Showing of Mid-Term Answer Sheets					
Week 13					Tandem queuing networks, Applications of Queuing networks					

Week 14	Applications of queuing networks, Numerical exercises
Week 15	Simulation procedures: Data generation and Book- keeping aspects
Week 16	Simulation of a single server queuing model
Week 17 (5 th -9 th May, 2025)	Revision Week
Week 18 (13 th – 22 nd May, 2025)	Major Examinations
29 th May, 2025	Showing of Major Exams Answer Sheets

Course Outcomes:

After successful completion of this course, students shall be able to:

CO1: understand the concept and applications of Markov chains

CO2: develop and solve the Markovian as well as non-Markovian queuing models, and apply them

CO3: derive the transient solutions of Markovian queuing systems

CO4: develop and apply bulk queuing models, and queuing network models

CO5: apply simulation procedures for solving queuing problems

Recommended Books:

- 1.Cooper, R.B., Introduction to Queuing Theory, 2nd Ed., North Holland, 1981.
- 2.Cox, D.R. and Smith W.L., Queues, 1st Ed., Chapman and Hall/CRC, 1991.
- 3.Gross, D., Shortle, J. F., Thompson, J.M., and Harris, C.M., Fundamentals of Queuing Theory, 5th Ed., Wiley, 2018.
- 4.Kleinrock, L., Queuing Systems, Vol. I, John Wiley and Sons, 1975.
- 5.Medhi, J., Stochastic Models in Queuing theory, 2nd Ed., Academic Press, 2002.
- 6.Saaty, T.L., Elements of Queuing Theory with Applications, Mc-Graw Hill, 1961.

Tentative Calendar of Quizzes and Assignments. The exact dates and time will be informed in due course of time.

Component	Date
Quiz-I	27 th -31 st , January 2025
Quiz-II	24 th -28 th February, 2025
Assignment-I	10 th -12 th February, 2025

Mid-Term	17-21 st March, 2025
Assignment-II/ Project Submission	21 st – 24 th April, 2025
Quiz-III	7 th – 11 th April, 2025
Quiz-IV	28 th April-2 nd , May, 2025
Major Exam	13 th – 22 nd May, 2025

Signature of Course Coordinator :

