Dr. A. KRISHNAMOORTHY, FELLOW (INDIAN SOCIETY OF PROBABILITY & STATISTICS)
(Retd. Professor of Mathematics, Cochin University of Science & Technology, Kochi)
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Date of Birth and age : **7th December 1948**; **75 years (as on 07.12.2023).**

Academic Degrees : **M.Sc., Ph.D. (both in Mathematics)**

Present positions : **Honorary Director,**
Centre for Research in Mathematics,
CMS College, Kottayam & Hon. Visiting Professor, Department of Mathemaics, Central University, Kasargod)

Positions held earlier:
Professor of Applied Mathematics*(retired on 30 April, 2009), Department of Mathematics, Cochin University of Science & Technology (CUSAT), Kochi 682022, INDIA,* ***from January 1987 to April 2009****,*
Subsequently Professor Emeritus and later Emeritus Scientist during 2013-2016 (Kerala State Council for Science Technology & Environment) *at Department of Mathematics, CUSAT;2017-2019--* ***Emeritus Fellow of University Grants Commission(UGC), Government of India,*** *whch was operated at CMS College, Kottayam. I also served as Visiting Professor, Department of Mathematics, University of Calicut during January to March 2013.*

From ***October 20, 1978 to 4 March 1983, Lecturer in Applied Mathematics,*** *CUSAT;* ***from 5th March 1984 to January 26, 1987****, Reader at Dept. of Mathematics, CUSAT.*

Meritorious Awards*:* UGC RESEARCH AWARD FOR DISTINGUISHED RESEARCH--- July 1999 to June 2002 (3 years).

UGC Emeritus Fellow during April 2017 to March 2019*.*
UGC Research Award—1999 to 2002.
Emeritus Scientist, Kerala State Council for Science, Technology and Environment (2013 to 2016

Field of Specialization *: Probability Theory & Stochastic Processes, Operations Research.*

Current Research Interests *: Deterministic & Stochastic Modeling, especially in Queues, Inventory, Reliability, Network theory, Insurance and RiskTheory.*

FURTHER RESEARCH HIGHLIGHTS:

Research publications: 265; completely updated list is not contained in this (# of research papers published in 2023 is 12; in 2022 it was 10; 2021, 7 papers and 2021 there were 8 papers, all in SCI journals belonging to Quartiles 1, 2 and 3) publications starting from 2012 up to 2020 , is given at the end.
Number of Research students successfully completed Ph.D. 49
Number of students currently being supervised: 2

Research Projects :
I have operated major research projects as Principal Investigator.

1. ***2014-2017: Indo-Russian Scientific Project supported by DST(Department of Science & Technology) on the Indian side and by Russian Science Foundation (RSF) supporting the Russian counterparts: This project was titled:*** Elaboration of the mathematical models, methods, algorithms and computer tools for Quality of service evaluation of broad band wireless materials, multimedia information transmission along main transport systems and their safety control. ***This project was operated at the Department of Mathematics, Cochin University of Science & Technology***
2. ***2016-2019: Title of Project: Next Generation Networks—5G and Beyond, under the Indo-Russian (DST-RSF) Scientific collaboration was successfully completed in 2017.***
3. A new project titled: ***Development of the theoretical foundations of design and an experimental prototype of a tethered high-altitude unmanned telecommunications platform of long-term operation*** **by Russian Science Foundation, is under the active consideration of Russian Science Foundation.**
4. At present member of 2 research projects, funded respectively by NPOL and DST (International Project: Indo-Russian).

4-6. **2 Major Projects funded by NBHM (National Board for Higher Mathematics, of the DAE—Department of Atomic Energy) projects and one project, funded by General Motors.**

I. RESEARCH HIGHLIGHTS

Introduced several new notions in stochastic modeling, individually as also in collaboration with research students, as indicated below (Those introduced starting from 1999):

i. Search of orbital customers in Retrial Queues
ii. Self generation of priority in queues
iii. Customer induced interruption in classical/retrial queues
iv. Introduced a random timer to control interruption in queues with server breakdown.
v. Internal generation of new queues in ordinary queues (with or without priority) and also in feedback queues with a single primary queue.
vi. Single server queue offering several distinct services, not exactly knowing the service requirement of arriving customers.
vii. Introduction of protection to items being produced at certain stages of production, to avoid damage to the item being produced.
viii. the analysis of classical queue through retrial concept
ix. N-policy in working vacation queues where, for serving customers additional item is required.
x. inter-dependence of consecutive arrival/service batch sizes in BMAP/BMSP queues
xi. common life time of stored items, reservation of items and their cancellation and more recently the case of overbooking.
xii. Retrial of failed components for repair in system reliability context.
xiii. Higher dimensional (> 1) Markov Chains—Distribution of the time till absorption is obtained.
xiv. Distribution of time till events occur in a correlated process is derived
xv. Reservation, Cancellation, Overbooking and Common Life Time of inventoried items for the next K time frames ahead.
xvi. Modified Generalized Erlang distribution for the transport system
xvii. BMAP/BMSP/1 queue with Markov chain dependence of the arrival and service batch sizes.
xviii. Processes with interdependent evolution.
xix. Random Networks
xx. Reliability of k-out-of-n (G/F) system, viewed as a multi-server queue (most recent work)

***The salient feature of analysis of the models described above is that they are studied in the most general frame work*. A few of these are being applied successfully to two Indo-Russian projects that I have with a group at the Russian Academy of Sciences. The priority generation/self generation of priority models indicated in item 2 above is also being successfully implemented by a research team in the medical field in Canada**.

II. Details of association with Journals: Editor & Guest Editor

Associated with several journals *as:* **Advisory Editor** *(Queueing Methods and Service Management: QMSM),*
Chief Editor*: Bulletin of Kerala Mathematical Association (BKMA)*
Deputy Editor *(Electronic Journal of Reliability: Theory & Applications)*
Editorial Board Member *of several journals, including* ***Journal of Dependability****)*
Also reviewer of several Indian and foreign Research Journals related to Applied Probability and Stochastic Modeling (numbering about 50).
Guest edited two special issues of the journal ***STOCHASTIC MODELS*** *and was Editor of three conference proceedings, published by Notable Publishers, INC. New Jersey.*
Lead Guest Editor of a special issue of Annals of Operations Research: Queueing-Inventory—mathematical and Simulation modelling (the SI will be published in about two months)

III. Research Projects and Positions:

Two major International projects of DST (of Govt. of India)-RSF(of Russian Federation) Indo-Russian projects on Telecommunication during 2014-2018 (2014-1016 and 2015-2018).
Co-investigator of an Indo-Russian (DST-RSF) Scientific project, of which the Principal Investigator was Professor B. Krishnakumar, Department of Mathematics, Anna University, Chennai. (2019-2021)

UGC Research Award: 1999-2002

Kerala State Science Technology and Environment—Emeritus Scientist: 2013-2016

UGC Emeritus Fellow: 2017-2019
Two major Projects funded by National Board for Higher Mathematics (DAE, Govt. of India)

IV. Conferences Organised & Participation in Conferences

Conferences organized & Participation in Conferences:
Organized 5 National and 11 International conferences during 1996-2009

Also I participated and gave Key Note address/Plenary talk/Invited talk to several International conferences held abroad and within India.

VISITS ABROAD*: Visited 22 countries, and about 40 Universities and Institutions abroad as research collaborator, Visiting Professor, Plenary, Key-Note, Invited speaker and contributed paper presentation to conferences.*

A partial list of Research publications during 2012-2020.
(Details of 50 research papers, published/accepted for publication during 2019-2023, are NOT included in this list).

1. INVENTORY WITH POSITIVE SERVICE TIME: A SURVEY, 40 pages John Wiley, 2019, Advanced Trends in Queueing Theory":series of books "Mathematics and Statistics", **Editors**:V.Anisimov and N.Limnios, Sciences ISTE & J. Wiley, London (paper coauthored with Dhanya Shajin and Viswanath C. Narayanan)

2. A two-priority single server retrial queue with additional items, Journal of Industrial Management & Optimization, 2019, 22 pages, doi:10.3934/jimo.2019085 (with Dhanya Shajin, A.N.Dudin and Olga Dudina)

3. STOCHASTIC DECOMPOSITION IN RETRIAL QUEUEING-INVENTORY SYSTEM, RAIRO Operations Research, 2019. 20 pages, https://doi.org/10.1051/ro/2018118 (with Dhanya Shajin)
4. On a queueing-inventory problem in passenger transport system, Telecommunication Systems, 2019, Lecture Notes in Computer Science series, Springer, 15 pages (with Dhanya Shajin, Jaison Jacob and Vishnevsky).

5. (M,MAP)/(PH,PH)/1 queue with Non-pre-emptive Priority, Working Interruption and Protection. *Reliability: Theory and Applications*, Vol.13, No.2 (49), June 2018 (with Divya V).

6. On a Queueing System with processing of Service items under Vacation and N- policy, CCIS Springer, Vol. 919 (with V. Divya, V. M. Vishnevsky).

7. (M,MAP)/(PH,PH)/1 queue with Non-preemptive Priority and Working Vacation under N-policy, *Queueing Models and Service Management, 2019,* **(**with Divya V, V.Vishnevsky and Dmitry Kozyrev**).**

8. On a queueing-inventory system with advanced reservation and

cancellation for the next *K* time frames ahead: the case of overbooking**,** Queueing Systems, 2019, 35pages, https://doi.org/10.1007/s11134- 019-09631-0 (with Dhanya Shajin, A.N.Dudin, V.C.Joshua and Varghese Jacob).

9. ON PARTIAL AND COMPLETE BLOCKING SET OF STATES IN QUEUEING-INVENTORY MODEL, Applied & Computational Mathematics, 2019, 15 pages (with Dhanya Shajin and A.Melikov)

10. On a queueing-inventory system with impatient customers,advanced reservation, cancellation, overbooking and common life time, Operational Research: An Interenational Journal, 2019, 25 pages, https://doi.org/10.1007/s12351-019-00475-3, (with Dhanya Shajin).

11. Two-Server Queueing System with Processing of Service Items by a Server, CCIS, 2019, 16 pages.(with V. Divya).

12. Infinite Server Queueing-inventory Models**,** Journal of Indian Society for Probability & Statistics, 2019 (accepted for publication) (with S.R. Chakravarthy & Dhanya Shajin) **-***on line publication is available.*

13. On Queues with Priority Determined by Feedback, Calcutta Statistical Association Bulletin, https://doi.org/10.1177/0008068318767271, 2018. (with A. S. Manjunath)

14. Single Server, Multi-Class Queues with Markovian Arrival and Ambiguity of Class Determination, Queuing Models & Service Management (QMSM), Vol. 1 (1), 1-16,2018 (with V. Vishnevsky, Dhanya Shajin and A.S.Manjunath).

15 Queueing-inventory system with two modes of service, (with Dhanya Shajin, Binitha Benny and Rasimechik) Accepted in Automation and Remote Control 2018.

16. A Two-Server Queue with Mutual Consultations (with T. Reshmi and B. Lakshmy),Journal of Indian Society for Probability & Statistics, https://doi.org /10.1007/s41096-018-0040-5, 2018.

17. (M;MAP)/(PH; PH)/1 queue with Nonpremptive Priority,Working Interruption and Protection (with Divya V), Reliability: Theory and Applications-Gnedenko Forum, No 2 (49), Volume 13, June 2018.

18. On a Queueing System with processing of Service items under Vacation and N-policy (with V. Divya, and V. M. Vishnevsky), Distributed Computer and Communication Networks, Springer series 919, 2018.

19. GI/M/1 type Queueing-Inventory with two commodities (with Binitha Benny and S.R. Chakravarthy), Journal of Indian Society for Probability & Statistics,(accepted for publication), 2018.

20. A Retrial Queueing System with Orbital Search of Customers lost from an Offer Zone (with Ambily P. Mathew, and Varghese C. Joshua), ITMM 2018 (accepted for publication).

21. Retrial queue with Search of Interrupted Customers from the Finite Orbit (with Dhanya Babu, and V.C. Joshua), ITMM 2018 (accepted for publication).

22. A Retrial queueing System with Multiple Hierarchial Orbits and Orbital Search(with V.C. Joshua and Ambily P. Mathew,), Distributed Computer & Communication Systems, Springer Series Volume 919, 15 pages, 2018.

23. MAP/P/H/1 Retrial Queue with Abandonment, Flush out and Search of Customers(with Dhanya Babu, and V.C. Joshua), Distributed Computer & Communications, Springer Series Volume 919, 15, 2018.

24. Single server queues with several services (with Vishnevsky, A. S. Manjunath,Dhanya Shajin), Reliability: Theory and Applications-Gnedenko Forum, No 4 (47),Volume 12, 14-30, December 2017.

25. On an BMAP/G/1 Retrial System with Two Types of Search of Customers from the Orbit (with T.G.Deepak, A.N.Dudin. V.C.Joshua, and Vladimar Vishnevsky), Information Technologies and Mathematical Modelling (ITMM 2017), 16th International Conference, CCIS (Springer).

26. A retrial Queueing System with Abandonment and Search for Priority Customers (with V.C. Joshua and Ambily P. Mathew), Distributed Computer and Communication Network, 20th International Conference, DCCN2017, Moscow, September 25-29,2017, CCIS, Springer, Page 98-107.

27. A Token Based Parallel Processing Queueing System with Priority, Distributed Computer and Communication Network (with V.C.Joshua and Dhanya Babu), 20th International Conference, DCCN2017, Moscow, September 25-29, 2017, CCIS, Springer, Page 231-240.

28. On a multi-server priority queue with pre-emption in crowdsourcing (with Dhanya Shajin, Manjunath A.S) Analytical and Computational Methods in Probability Theory and its Applications (ACMPT-2017), CCIS, Springer.

29. MAP/PH/1 retrial queueing-inventory system with orbital search and reneging of customers (with Dhanya Shajin). Analytical and Computational Methods iProbability Theory and its Applications (ACMPT-2017), CCIS 700, 2017.

30. A Token Based Parallel Processing Queueing System with Priority (with V.C.Joshua & Dhanya Babu), Springer International Publishing AG 2017, CCIS 700, PP 231-239, 2017.

31. A Retrial Queueing System with Abandonment and Search for Priority Customers (jointly with V. C. Joshua and Ambily P. Mathew), Springer International Publishing AG 2017, CCIS 700, PP 98-107, 2017.

32. Multiservice Queueing Systems with MAP Arrivals for Modelling LTE Cell with H2H M2M Communications and M2M Aggregation (jointly with Vishnevsky,M., K.E. Samouylov, V.A. Naumov and N. Yarkina), Springer International Publishing AG 2017, CCIS 700, PP 63-74, 2017.

33. Reliability of a k-out-of-n System with Repair Facility { Essential and Inessential Services (with M.K. Sathian, Viswanath C. Narayanan and Vladimir Vishnevsky), Springer International Publishing AG 2016, CCIS 678, pp 89-97, 2016.

34. Performance Measures and Optimization of Queueing System with Reserve Server (jointly with V.Klimenok, A.N. Dudin, V.Vishnevsky, V. Shumchenya), Springer International Publishing AG 2016, CCIS 678, pp 74-88, 2016.

35. Reliability of a K-OUT-OF-N System with Repair by a Single Server Extending Service to External Customers with Pre-emption, (with Sathian, M.K. and V.C.Narayanan) Electronic Jl. of Reliability Theory & Applications, No2 (41) Volume 11, 61-93, June 2016.

36. Reliability of a k-out-of-n system with a single server extending non-preemptive service to external customers-Part I, (with Sathian, M.K. and V.C. Narayanan) Electronic Jl. Of Reliability Theory & Applica-tions, to appear in No3 (42) Volume 11, September 2016, 23 pages.

37. Review of methods for research and design of broadband wireless networks with linear topology, (with V.M. Vishnevsky, Dmitry Kozyrev and Andrei Larionov)INVITED PAPER, Indian J. Pure Appl. Math., 47(2): 329-342, June 2016 Special issue Guest Edited by Professor M.K.Ghosh, 2016.

38. A revisit to queueing-inventory with reservation, cancellation, common life time and retrial, (with Dhanya Shajin and Binitha) OPSEARCH 2016.

39. A relook at queueing-inventory system with reservation, cancellation and common life time, (with Dhanya Shajin, Binitha Benny, T.G. Deepak) Communication in Applied Analysis 2016.

40. MAP/PH/1 Retrial Queue with Constant Retrial Rate, Working Vacations and a Finite Buffer for Arrivals, (with C.Sreenivasan) Neural, Parallel, and Scientific Computations 24 (2016) 107-120.

41. GI/M/1 type queueing-inventory systems with postponed work, reservation, cancellation and common life time, (with Dhanya Shajin and B.lakshmy) Indian J. Pure Appl. Math., 47(2): 357-388, June 2016 INVITED PAPER, Guest Edited by Professo M.K. Ghosh.

42. Queues with interruption in random environment, (with S. Jaya, and B. Lakshmy) Annals of Operations Research, Volume 233, Issue 1, pp 201219, 2015.

43. On Priority Queues Generated Through Customer Induced Service Interruption, (with Manjunath, A.S.) Neural, Parallel, and Scienti_c Computations, 23, 459-486, 2015.

44. On a queueing-inventory with reservation, cancellation, common life time and retrial, (with Dhanya Shajin and B.Lakshmy) Annals of Operations Research, April 2015,DOI: 10.1007/s10479-015-1849-x

45. Product form solution for Some Queuing Inventory Supply Chain Problem, (with Dhanya Shajin and B.Lakshmy) OPSEARCH, DOI. 10-1007/s12597, 015-0215-8,2015.

46. The multi server M=M=(s; S) queueing inventory system, (with Anoop Nair and M.J. Jacob) Annals of Operations Research (Springer), Volume 233, Issue 1, pp 321-333, 2015.

47. A multi-server queueing system with service interruption, partial protection and repetition of service, (with A.N.Dudin and Varghese Jacob) Annals of Oper. Res.(Springer), 233, 101-121, 2015.

48. Analysis of a Multi-server Queueing System, (with R.Manikandan and Dhanya Shajin) Advances in Operations Research, Article ID: 747328, 2015.

49. Analysis of Customer induced interruption and retrial of interrupted customers(with Varghese Jacob) American Journal of Mathematical and management Sciences, 34, 343-366, 2015.

50. On an M/G/1 with vacation in random environment, (with S. Jaya and B. Lakshmy), 2015: Queueing Theory & Applications, CCIS, Springer,16 pages, 2015.

51. Optimal Control Policy of an Inventory System with Postponed Demands, (with Chitra Devi and B. Sivakumar), RAIRO OPER. RES.DOI. http://dx.doi.org/10.1051/ro/2015021, December 2014.

52. An (S,Q) inventory system with positive lead time and service time under N-policy. (with Resmi and B.Lakshmy) Calcutta Statistical Association Bulletin,Volume 66, December 2014.

53. Production Inventory with Positive Service Time and Loss. (jointly with R.Manikandan and B. Lakshmy), In “On Recent Trends in Dynamical Systems and Mathematical Modelling”, University of Madras, Volume 18, 57-64, 2014.

54. On anM[X]/G/1 Retrial System with Two Types of Search of Customers from the Orbit, (with T.G.Deepak, A.N.Dudin and Joshua C.Varghese) Stochastic Analysis and Applications, 31: 116, 2013.

55. A Note on Characterizing Service Interruptions with Phase Type Distributions,(with P.K.Pramod and S.R.Chakravarthy), Journal of Stochastic Analysis and Applications (Taylor & Francis), 31, 14, 2013.

56. An M/M/2 Queueing System with Heterogeneous Servers Including one Vacation Server, (with C.Sreenivasan), Calcutta Statistical Association Bulletin, 2013.

57. Stochastic Decomposition in Production Inventory with Service Time, (with Viswanath C.Narayanan), European Journal of Operational Research (Elsevier), 2013, 228, 358-366.

58. A Revisit to Inventory with Positive Service Time, (with R.Manikandan and B.Lakshmy), Annals Of Operations Research (Springer), 2013.

49. MAP/PH/1 Queue with Working Vacations, Vacation Interruptions and N-Policy, (with C.Sreen-ivasan and S.R.Chakravarthy), Applied Mathematical Modeling, 37, 6, 3879-3893, 2013.

60. Queue with Interruption: A survey, (with P.K.Pramod and S.R.Cha-kravarthy), TOP-Spanish Journal of Operational Research (Springer),2012,DOI 10.1007/s11750-012-0256-6.

61. On customer induced interruption in a service system (with S.R.Chakravarthy and Varghese Jacob), Journal of Stochastic Analysis and Application,), 2012.

62. Analysis of Customer Induced Interruption in a Multi-server system, (with Varghese Jacob), Neural, Parallel and Scientific Computations (Dynamic Publishers, Atlanta), 2012.