



**SYMPOSIUM ON
OPERATIONAL RESEARCH AND PURE MATHEMATICS**
organized by
Department of Mathematics, BITS Pilani, Pilani Campus
on
FEBRUARY 26, 2017

Schedule of the Symposium

Session 1: 9:30 AM-10:45 AM Invited talk by Prof. Madhu Jain	Lunch Break 1:00 PM-2:30 PM	Session 3: 2:30 PM-3:30 PM Invited talk by Prof. Pankaj Gupta
Tea Break		Tea Break
Session 2: 11:15 AM-1.00 PM Invited talk by Prof. S. Ponnusamy Presentation by Research Scholars		Session 4: 4:00 PM-6:00 PM Invited talk by Prof. Sugata Gangopadhyay Presentation by Research Scholars

Venue of the Symposium

Room Number 6156 (NAB)

Title and Abstract of the Invited Speakers and Research Scholars

Speaker 1: Prof. Madhu Jain, Department of Mathematics, IIT Roorkee

Title of the talk: Reliability growth modeling for software systems with imperfect debugging and change points

Abstract: Reliability which is an important attribute of the quality assessment of the software (S/w) depends on the fault contents in spite of thorough testing during the development of the software. The number of faults in the S/w can be reduced by debugging process which includes the observing or locating the faults and then put appropriate efforts for the removal of the faults. Most of the reliability growth models available in literature are based on the assumption that the debugging process is perfect process; however this is not the case in real world scenarios due to fact that some faults may be introduced during the debugging process also. Therefore for the prediction of the software reliability indices, an imperfect debugging process should be taken into account while developing the software reliability growth models. The assessment of software reliability by constructing the differential equation for the mean value function of the fault contents in the software can be done to evaluate the total system testing costs including warranty cost and is helpful for determining the optimal release time of the software. In the present talk, the reliability modelling of the software system with imperfect debugging based on the non homogeneous Poisson process (NHPP) will be discussed. The key concepts for formulating the generalized software reliability models with imperfect debugging, change point, testing effort function (TEF) and fault reduction factor (FRF) will be described to solve the optimization problem associated with reliability constraint in the context of software testing. The numerical simulation and sensitivity analysis will be presented in order to determine the optimal release policies based on cost and reliability criterion.

Speaker 2: Prof. S. Ponnusamy, Indian Statistical Institute, Chennai Centre

Title of the talk: Title of my talk: Recent Development on Bohr's Inequality on power series

Abstract: Bohr's phenomenon, first introduced by Harald Bohr in 1914, deals with relationship bounded analytic function defined on the unit disk and with the corresponding majorant series of the power series represented by the analytic function. The aim of the lecture is to introduce the topic to audience and provide some related recent developments on this topic.



Speaker 3: Prof. Pankaj Gupta, Department of Operational Research, University of Delhi, Delhi

Title of the talk: Multicriteria Optimization

Abstract: Many real-world decision making problems are multi-dimensional by nature, where in decisions are more than often made according to multiple and conflicting criteria, e.g. profit against capital, profit against employees welfare, etc. In such problem, there is no unique optimal solution but rather a set of trade-off or compromising solutions. The field of multi-criteria decision making (MCDM) deals with the methods which take into account more than one objective function in the problem formulation and seek to find a set of the trade-off solutions. Recent techniques in the field of MCDM are now focussing on consideration of both qualitative and quantitative criteria for evaluation and selection of the best alternative(s).

Speaker 4: Prof. Sugata Gangopadhyay, Department of Computer Science and Engineering, IIT Rookee

Title of the talk: Construction of bent functions based on Z-bent functions.

Abstract: Bent Boolean functions are Boolean functions which maximally resist affine approximation. They have applications in cryptography, error correcting codes and recently message authentication codes. Even after four decades of research on bent function we know very little about majority of the bent functions when the number of variables are more than six. Maiorana-McFarland and Partial Spreads are the two classes of bent functions which were constructed in mid-sixties by researcher working for NSA. These constructions were declassified around mid-seventies. It was also proved later that asymptotically bent functions are outside these classes with probability tending to one. Thus construction of bent functions remain an elusive problem. In his last paper, published posthumously, Hans Dobbertin embedded the problem of construction of bent functions in a recursive framework by using a generalization of bent functions called Z-bent functions. In this lecture we will start from the first two classes of bent functions and then discuss the essence of Dobbertin's idea. We will also consider a primary construction of bent Boolean functions proposed by Gangopadhyay et al. which is obtained by generalizing the partial spreads construction in the Z-bent environment.

Research Scholar 1: KS Pritam

Title of the talk: Geometric Interpretation on Riemann-Liouville Fractional Integral

Abstract: In this presentation, we explain a possible geometric interpretation of Riemann-Liouville fractional integral based on geometric interpretation of Riemann- Stieltjes integral proposed by Bullock.

Research Scholar 2: Shreekant Varshney

Title of the talk: Optimal Analysis of Unreliable Multi Server Queueing System with balking

Abstract: With technological advancement, the service system is becoming more complex and suitable policies have to identify for long uninterrupted service period. In this paper, we consider the single vacation policy for an unreliable multi-server system with impatience behavior of the customers. Time-to-arrival of the customer, time-to-service, and vacation time follow an exponential distribution. We have also considered the state-dependent realistic behavior of customers (balking) and servers (faster service rate) for a long queue to make our study more useful. For the validity of the present model, we compute steady-state probabilities using matrix-geometric method and various performance measures have also been evaluated. Sensitivity analysis and optimal analysis have also been done for various parameters numerically by developing code in MATLAB. The studied Markovian model with many noble features is applicable in various systems like computer and communication system, manufacturing and production system, etc. The conclusion is also inferred that may helpful for the service provider to design service policy. Future scopes are also discussed.

Research Scholar 3: Priyanka Kumari

Title of the talk: Group Ring Identity for Bent Functions

Abstract: We will explore CAS Macaulay2 to verify group ring identity for bent functions, hence a method to test a bent function.

Research Scholar 4: Amit Kumar

Title of the talk: Transient solution of queues with feedback using Modified Bessel's function

Abstract: In multi-access systems, scheduling mechanism often require a proper feedback policy. In this paper, the direct and simple transient solution technique for the state of the system in a single server/processor Markovian queueing model with feedback is presented using modified Bessel function of the second kind. This technique appears to economize in algebra. The expression for a time-dependent measure of effectiveness such as an expected number of the customers in the



system is also derived. We demonstrate how fast the state probabilities tend to their equilibrium limits when it exist. The sensitivity of the state of the system and expected number of the customers in the system has been also analyzed and the results are depicted in the tables and graphs.

Research Scholar 5: Satyendra Singh Chauhan

Title of the talk: Flow of Casson fluid through a stenotic tube with varying viscosity

Abstract: Present work concerns the flow of Casson fluid through a rigid cylindrical tube with time dependent stenosis and position dependent viscosity. No slip condition has been used on wall and pressure gradient has been taken as periodic with time. Regular perturbation approach has been used to solve the governing equations up to first order of approximation. Flow rate, wall shear stress and velocity profile have been graphically analyzed and compared with constant viscosity model.

