



School of Sciences
Netaji Subhas Open University

**UGC-DEB SPONSORED ONE-DAY
NATIONAL CONFERENCE**

ON

*Distance Education and its Obscurities :
Addressing the “Inaccessibility”
Conundrum in Mathematics and
Other Disciplines*



School of Sciences
Netaji Subhas Open University



Date : 9th June, 2018

Seminar Room (1st Floor), DD-26, Salt Lake, Sector-1, Kolkata - 700 064

*UGC-DEB sponsored One Day National Conference on Distance Education and its Obscurities:
Addressing the “Inaccessibility” Conundrum in Mathematics and Other Disciplines’*



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Message from The Organizers

Dear Delegates and Participants,

On behalf of the organizing committee, we are honored and delighted to welcome you to the UGC-DEB sponsored One-Day National Conference bearing the theme 'Distance Education and its Obscurities: Addressing the "Inaccessibility" Conundrum in Mathematics and other discipline' organized by the School of Sciences, Netaji Subhas Open University.

Netaji Subhas Open University, one of the premiere Open University in the country has been tirelessly working in the field of open and distance education to achieve its goal to 'Reach the Unreached'. While doing so we have experienced some serious challenges due to the limited face-to-face interactivity inherent in distance learning system. This issue becomes more critical when the subject being taught is highly technical as well as conceptual in nature like Mathematics and other science subjects. The aim of the conference is therefore to provide a platform for academics, researchers, professionals, administrators, educational policy makers, enthusiastic students and anyone in the domain of interest to discuss the strategies to mitigate the challenges faced while spreading education in Mathematics and similar subjects in a larger spectrum of society. With the advent of distance learning technology, and its anticipated widespread use in different subjects, we hope this conference is very relevant and fruitful particularly in a country like India.

Our technical program is rich and varied with one keynote speech, one invited talk, one presentation and around eighteen papers split between 4 parallel oral sessions, ending with a panel discussion on the theme by academicians of different higher education institutions of this state.

As the members of organizing committee of the conference, we know that the success of the conference depends ultimately on many people who have worked with us in planning and organizing both the technical program and supporting social arrangements. In particular, we express our gratitude to the Hon'ble Vice Chancellor of the University Prof. S. S. Sarkar for his wise advice and brilliant suggestion on organizing the conference, all the members of NSOU, at large and School of Sciences in particular, the reviewers for their thorough and timely reviewing of the papers, and the delegates and participants for their presentation and participation.

Organizing Secretaries

Dr. Sanjoy Kumar Ghosal

Assistant Professor of Mathematics

Sri Mrinal Nath

Assistant Professor of Computer Science

Chairperson

Prof. Kajal De

Director School of Sciences



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Programme

Registration: 10:30 a.m. – 11:00 a.m.

Inaugural session: 11:00 a.m. – 12:00 p.m.

Welcome Address: *Prof. Kajal De, Director, School of Sciences & Professor of Maths, NSOU.*

Address of the Guest of Honour: *Prof. Nageswar Rao, Vice-Chancellor, Uttarakhand Open University.*

Release of Edited Volumes of School of Sciences

Address by the Key Note Speaker: *Padma Shri Prof. Ajoy Kumar Ray, Professor, IIT Kharagpur and Former Director, IEST, Shibpur*

Presidential Address: *Prof. Subha Sankar Sarkar, Vice Chancellor, NSOU.*

Vote of Thanks: *Dr. Sanjoy Kumar Ghosal, Asst. Prof. of Mathematics, NSOU.*

Tea Break: 12:00 p.m. - 12:15 p.m.

Plenary Session: 12:15 p.m. – 12:40 p.m.

Chairperson: *Prof. Ajoy Kumar Ray, IIT Kharagpur*

Invited Speaker: *Dr. Malay Banerjee, Associate Professor, Department of Mathematics and Statistics, IIT Kanpur*

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Parallel Session I : 12:45 p.m. – 1: 30 p.m. (Seminar Room)

Chairperson: *Prof. Ajoy Kumar Ray, Professor, Electronics & Electrical Communication Engineering, IITKharagpur*

<i>Name</i>	<i>Title of the Paper</i>	<i>Duration</i>
Sandeep Bhattacharjee	Bridging the ICT gap: A study of ICT accessibility and usage in the city of Kolkata	10 Mins
Manosanta Biswas	Academic counseling system in open and distance learning: prospects and problems in personal contract programme (PCP) in Netaji Subhas Open University	10 Mins
Payel Mandal	Application of a two-warehouse integrated inventory model with imperfect production process in open and distance learning (ODL) system	10 Mins
Mrinal Nath	Students retention in open and distance learning (ODL) system: some mathematical and computational model to analyze and predict the potential risk of being dropout	10 Mins

Parallel Session II : 12:45 p.m. - 1:30 p.m. (Board Room)

Chairperson: *Prof. Sanjay Sen, Retd. Professor of Applied Mathematics, Calcutta University*

<i>Name</i>	<i>Title of the Paper</i>	<i>Duration</i>
Madhusri Ghosh Upadhyay	Necessity of library support service in open and distance learning: An ignored part of the system	10 Min
Kajal De and Basudeb Mondal	Mitigation of ‘inaccessibility’ in open and distance learning (ODL) systems: A fuzzy graph approach	10 Min
Monita Mitra	Bridging the gap-meeting the challenges of quality assurance in the integration of ICT in ODL	10 Min
Prabhat Kumar Ray	Online education in the 21st century: Its relevance and threats	10 Min

Lunch Break 1:30 p.m. – 2:15 p.m.



Parallel Session III : 2:15 p.m. – 3:15 p.m. (Seminar Room)

Chairperson: *Dr. Malay Banerjee, Associate Professor, Department of Mathematics and Statistics, IIT Kanpur*

<i>Name</i>	<i>Title of the Paper</i>	<i>Duration</i>
Shouvik Datta Choudhury, Santu Dey and Arindam Bhattacharyya	New Volume Formula for a General Tetrahedron	10 Mins
Sanjib Kumar Datta and Aditi Biswas	Sum and product theorems depending on higher order relative growth indicators of entire algebroidal functions	10 Mins
Bapi Saha	Impact of density regulated growth in prey on a three-species food chain model	10 Mins
Gopal Das	Weaving frames in separable Hilbert spaces	10 Mins
Rupak Bhattacharjee	Strategic selection of a two-echelon supply chain model between admissible advanced and delayed payment mode	10 Mins

Parallel Session IV : 2:15 p.m. – 3:15 p.m. (Board Room)

Chairperson: *Prof. Arindam Bhattacharya, Professor of Mathematics, Jadavpur University*

<i>Name</i>	<i>Title of the Paper</i>	<i>Duration</i>
Sumit Som	A note on convergence in probability and distribution	10 Mins
Sanjib Kumar Datta and Satavisha Dey	Special type of higher order exponent of convergence of zeros of entire functions	10 Mins
Avishek Ghosh	Some development on quasi weighted statistical convergence	10 Mins
Sanjoy Kumar Ghosal and Nihar Sarkar	Weighted convergence in probability	10 Mins
PulakSahoo and Samar Halder	Uniqueness results related to I-functions and certain differential polynomials	10 Mins



Tea Break: 3:15 p.m. – 3:30 p.m.

3:30 p.m. – 3:40 p.m. (Seminar Room)

Presentation on 'ICT in HEI' : Mr. Vipendra Singh, VP, Sales & Operations, School Guru

Panel Discussion: 3:40 p.m. – 4:30 p.m.

Coordinator: Prof. Kajal De, Director, School of Sciences & Professor of Mathematics, NSOU

Panellists:

1. **Dr. Prabhat Ranjan Ghosh, (Retd.)** Department of Mathematics, Vidyasagar Evening College.
2. **Prof. Sanjib Kumar Dutta, Professor of Mathematics, Kalyani University**
3. **Prof. Samiran Ghosh, Professor of Applied Mathematics, Calcutta University**
4. **Prof. Arijit Ghosal, Professor of Mathematics, Burdwan University.**

Valedictory Ceremony and Distribution of Certificates: 4:30 p.m. – 5:00 p.m.

Chairperson: Prof. N.D. Paria, Professor of Botany, NSOU



NECESSITY OF LIBRARY SUPPORT SERVICE IN OPEN AND DISTANCE LEARNING: AN IGNORED PART OF THE SYSTEM

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This paper gives an account on various library services as prerequisite for distance learning. Distance learners are from various sectors of the society. Towards fulfilment of the learner's need SLMs are not always sufficient. Various library services are there to complement ever increasing needs of distance learners. Some services such as reading and reference service, lending service, e- library service, OPAC, document delivery, bibliographic service, current awareness service, new arrival service, social network services etc. are elaborately discussed which directly support distance learners.

Keywords: OPAC, document delivery, bibliographic service, current awareness service, new arrival service, social network services

BRIDGING THE ICT GAP: A STUDY OF ICT ACCESSIBILITY AND USAGE IN THE CITY OF KOLKATA

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Today's era is also popularly known as the age of information. People across all ages have more access to information than ever before. All this has been possible due to growth of hardware and software technologies and growing acceptance of Information and communication technology as means of survival. In this research paper, we have tried to understand the gap between accessibility and usage of Information and communication technology in the town of Kolkata. For such purpose, we have collected data from 120 samples across different age groups using non probability convenience sampling. The collected data has been analyzed using statistical methods using Microsoft Excel and SPSS version 16. The analysis revealed the existence of information and communication



technologies as a key tool for sustenance. Different analytical techniques such as descriptive statistics, cross-tab analysis and Decision tree using CHAID method has been used. It also indicated the various tasks and activities which people indulge in terms of ICT usage on a regular basis. The current research can be used for further research into the key aspects of such ICT usage.

Keywords: Information, communication, technologies, growth, education

**ACADEMIC COUNSELING SYSTEM IN OPEN AND DISTANCE
LEARNING: PROSPECTS AND PROBLEMS IN PERSONAL
CONTRACT PROGRAMME (PCP) IN NETAJI SUBHAS OPEN
UNIVERSITY**

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Academic counseling is a significant activity of learner support services offered by Open and Distance Learning (ODL) system. It is the key to the learners' triumph in ODL system. The geographical separation of the teachers and learners along with socio-psychological constraints i.e. language, culture, motivation, inadequate skill, anxiety etc., affects the distance learners in completing the courses successfully. The counseling sessions in the study centers for undergraduate learners and Personal Contract Programme (PCP) for PG learners offer the students an opportunity to interact with their peers. The counselors perform various roles, such as facilitating learners about the subject matter content, assessing assignments, providing motivation and encouragement and supervising research papers or project works. Since counseling is an important component of distance education, it is necessary to understand the concept. The Netaji Subhas Open University provides highly integrated learner support services through its network of study centers, regional centers and the PCP centers. One of the major objectives of NSOU has been to provide opportunities of higher education to a large segment of population and to develop new programme for adult learners for whom formal education system was quite difficult or impossible. In NSOU, the academic counselors are the faculty members drawn from the conventional higher education system. Consequently, the



academic counselors have the dual role to play in their twin job profiles. During the first five to six weekdays, they are classroom teachers and during week-ends, they have to play the role of academic counselors in the ODL system. It is well known that the conventional system of higher education is teacher-oriented while the ODL system is learner-oriented. The classroom teaching strategies of formal system cannot be practiced or implemented in an ODL system.

The counselors and learners both face several problems during the dealing period in study centers and PCP centers. This study finds the main academic problems in NSOU and recommends 'a comprehensive information system' of counseling as 'for solving the day to day experienced problems for betterment of counseling system in ODL in general and particular in NSOU.

Keywords: Academic-counseling, ODL system, Netaji Subhas Open University, Personal Contract Programme (PCP) etc.

BRIDGING THE GAP- MEETING THE CHALLENGES OF QUALITY ASSURANCE IN THE INTEGRATION OF ICT IN ODL

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'Excellence is the unlimited ability to improve the quality of what you have to offer.'

Rick Pitino

Today, in the era of globalization and fast paced technological growth, the demands of imparting quality education has taken precedence in the education field. This rapid growth and expansion is accompanied by an equal concern for quality, particularly in an environment where private higher education entities, including open universities and open and distance learning (ODL) institutions, are becoming prominent providers of learning opportunities for the masses. With the integration of ICT in open and distance learning, the way education is being delivered and accessed is changing the scenario of distance learning. Though most of the ODL and Open universities are paying more attention towards teaching and access by learners, the major issues of quality assurance are not



been adequately addressed. In this regard, ensuring quality is critical, as ODL has become synonymous with educating working adults – individuals who, as members of a nation’s labour force, are instrumental to national development. Additionally, the increasing use of information and communication technology (ICT) on educational practices has also called for more rigorous and stringent quality assurance (QA) systems and procedures. QA is important as a means to establish standards and accountability; ensure learner satisfaction; and enhance institutional image. This paper highlights and tries to identify what these issues are and how they pose major challenges to open and distance learning in India. The paper shall also suggest innovative ways to improve the quality and use of ICT in delivering quality education to the masses and bridging the gap.

Keywords: Information and computer technology, quality assurance, accountability, continuous improvement, learner satisfaction.

MITIGATION OF ‘INACCESSIBILITY’ IN OPEN AND DISTANCE LEARNING (ODL) SYSTEMS: A FUZZY GRAPH APPROACH

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Open and Distance Education system today has gained huge popularity and the horizon of ODL is ever expanding with the motto to ‘reach the unreached’. However, ‘inaccessibility’ poses challenge in many phases of ODL. In this paper, we tried to highlight such a problem related to ‘inaccessibility’ in ODL and subsequently prepared a model for the mitigation. The model is based on Fuzzy Graph Theory, which is a new area of study developed by combining Graph theory with fuzzy set theory.

Keywords: Uncertainty, Fuzzy Graph, Membership value, Strongness, Open and Distance Learning, Regional Centre, Study Centre, Network.



SUM AND PRODUCT THEOREMS DEPENDING ON HIGHER ORDER RELATIVE GROWTH INDICATORS OF ENTIRE ALGEBROIDAL FUNCTIONS

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Several ways of estimating of comparative growth analysis of entire algebroidal functions in the light of different kinds of higher order relative growth indicators have been elaborately studied in this paper. Some examples are also provided in order to justify the results proved. In open and distance learning system students and learners can be motivated for higher studies or research oriented programmes by reading or watching more research articles and the topics discussed in this paper. Thus, this paper may give a new dimensional platform of research for the next generation researchers from the view point of updated research in the field of entire algebroidal functions.

Keywords: Entire algebroidal function, growth, relative order, relative lower order, relative type, relative weak type.

IMPACT OF DENSITY REGULATED GROWTH IN PREY ON A THREE-SPECIES FOOD CHAIN MODEL

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In most of the ecological models, the growth of the prey population is considered as logistic function. Recently, many researchers analyzed empirical data and explored that there might be some density regulation mechanism in the per-capita growth rate of the population. To study the impact of density



regulation on the population dynamics, I consider a “n” trophic food chain model with theta-logistic growth in the prey population and the Holling type - II functional responses for predator-prey interactions. The probability of extinction of a species at an arbitrary level of the food chain is obtained through birth death process. The theoretical findings are simulated by numerical techniques.

Keywords: Food chain model, Theta-logistic growth, Functional response, probability of extinction, birth death process.

WEAVING FRAMES IN SEPARABLE HILBERT SPACES

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A frame for a Hilbert space is a countable sequence $\{f_k\}_{k \in I} \subset H$, if there exist constants $0 < A \leq B < \infty$, such that

$$A\|f\|^2 \leq \sum_{k \in I} |\langle f, f_k \rangle|^2 \leq B\|f\|^2 \text{ for all } f \in H.$$

In this paper, we study the conditions for weaving frames in terms of an operator. We also study the characterization of the weaving K-frames in terms of an operator, where K is a bounded linear operator on the underlying space.

Keywords: Weaving frames, separable Hilbert spaces.



STRATEGIC SELECTION OF A TWO-ECHELON SUPPLY CHAIN MODEL BETWEEN ADMISSIBLE ADVANCED AND DELAYED PAYMENT MODE

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Traditional Economic Order Quantity model leads the idea for the payment time of purchasing cost coincides with the receiving time of the order. But in practical scenario, installment of payment of lots is become very much usual between manufacturers and distributors, and many distributors adopt this approach in various dimensions. They pay the purchasing cost in equal installments (i.e., an upstream partial prepayment) or in a similar manner, distributors allow retailers to pay the cost of purchased goods after such goods are received (i.e., a downstream partial delay payment). This article presents a two-echelon supply chain model with a single-manufacturer and a single-retailer in which the manufacturer adopts a lot-for-lot policy for meeting the demand of the retailer. Market demand is kept as linear with selling price. In this proposed model, the effect of advanced payment and delayed payment is analyzed on the optimal payment time in the integrated inventory system. The driving factor for deciding the difference between the two wholesale prices is also calculated with its critical value for which the model tips its character. The digital results with implications and sensitivity are illustrated towards managerial outlook.

Keywords: Integrated inventory system, lot-for-lot policy, price-dependent demand, advanced payment, delayed payment



UNIQUENESS RESULTS RELATED TO L-FUNCTIONS AND CERTAIN DIFFERENTIAL POLYNOMIALS

Pulak Sahoo and Samar Halder

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L-functions are Dirichlet series with the Riemann zeta function $\zeta(s) = \sum_{n=1}^{\infty} n^{-s}$ as a prototype and are important objects in number theory. The value distribution of L-functions concerns distribution of zeros of L-functions and more generally, the c -points $L^{-1}(c)$, that is, the zeros of the function $L(s) - c$, or the values in the set of pre-images

$$L^{-1}(c) = \{s \in \mathbb{C} : L(s) = c\},$$

where s denotes a complex variable and c denotes a value in the extended complex plane $\mathbb{C} \cup \{\infty\}$. A function f is called meromorphic in the complex plane \mathbb{C} if the only possible singularities of f in \mathbb{C} are poles. In connection to meromorphic functions, Nevanlinna's uniqueness theorem states that a nonconstant meromorphic function f in \mathbb{C} is completely determined by five such pre-images. It is to be noted that L-functions can be analytically continued as meromorphic functions in \mathbb{C} .

Let f and g be two meromorphic functions in \mathbb{C} and let $c \in \mathbb{C} \cup \{\infty\}$. Then f and g are said to share the value c IM (ignoring multiplicities) if $f^{-1}(c) = g^{-1}(c)$ as two sets in \mathbb{C} ; f and g are said to share the value c CM (counting multiplicities) if $f(s) - c$ and $g(s) - c$ have the same zeros with the same multiplicities. In the paper by an L-function we shall always mean an L-function L in the Selberg class S that includes the Riemann zeta function ζ and essentially those Dirichlet series where one might expect a Riemann hypothesis.

In 2001, an idea of gradation of sharing of values known as weighted sharing of values was introduced by I. Lahiri which measures how close a shared value being shared IM or to being shared CM in Value Distribution Theory. In this paper, using the idea of weighted sharing we investigate the uniqueness problem of a meromorphic function and an L-function when certain differential polynomials generated by them share a nonzero finite value or have the same fixed points. Our results improve their recent results due to Liu-Li-Yi [Proc. Japan Acad. Ser. A, 93(2017), 41-46].

Keywords: Nevanlinna Theory, L-function, weighted sharing, differential polynomial, uniqueness.



A NOTE ON I- CONVERGENCE IN PROBABILITY AND DISTRIBUTION

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Abstract : In this paper we use the notion of convergence to the theory of convergence in probability and convergence in distribution and introduce the notions like convergence in probability and convergence in distribution. In this paper, we investigate their basic properties and make some observations about the relation between these two notions.

Keywords: Ideal, filter, I-convergence, I-convergence in probability, I-convergence in distribution.

SPECIAL TYPE OF HIGHER ORDER EXPONENT OF CONVERGENCE OF ZEROS OF ENTIRE FUNCTIONS

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Let be a non-decreasing unbounded function, satisfying the following two conditions:

$$\text{i) } \lim_{r \rightarrow \infty} \frac{\log^{[p]}(r)}{\log^{[q]}(\psi(r))} = 1$$

$$\text{ii) } \lim_{r \rightarrow \infty} \frac{\log^{[q]}(\alpha r)}{\log^{[q]}(\psi(r))} = 1 \text{ for some } \alpha \text{ and } q \text{ are any two positive integers.}$$

In the present paper we will focus on the ψ - exponent convergence of zeros of entire functions and some of their consequences which may improve some of the previous results related to it.

Research is vital for self-growth and knowledge. In Open and Distance Learning system students can be encouraged for research work by reading some new dimensional approach in various research articles. Thus this paper will improve the quality of knowledge and motivate the future researchers in the field of Complex Analysis and other relevant topics of Mathematics.

Keywords: Entire functions, exponent of convergence, ψ -order, slowly changing function.



SOME DEVELOPMENT ON QUASI WEIGHTED STATISTICAL CONVERGENCE.

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In this paper our aim is to extend the concept of quasi weighted statistical convergence and introduced the new notion of convergence. We also investigate some topological properties of the limit set of the corresponding convergence notion.

Keywords: Quasi statistical convergence, quasi weighted statistical convergence, weighted statistical convergence.

WEIGHTED CONVERGENCE IN PROBABILITY

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We will discuss about some fundamental limit theorems related to weighted convergence in Probability, weighted convergence in Mean Square, weighted convergence in Distribution, Law of Large Numbers and some other theorems and will compare the results with their simple convergency. Here we introduce some examples to make our discussions more interesting.

Keywords: Weighted sequence, weighted convergence in probability, weighted convergence in mean square, weighted convergence in distribution.



ONLINE EDUCATION IN THE 21ST CENTURY: ITS RELEVANCE AND THREATS

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Online education changes all components of teaching and learning in higher education. Many empirical studies have been conducted to examine issues in delivering online courses; however, few have synthesized prior studies and provided an overview on issues in online courses. Three major categories of findings were identified: issues related to online learners, instructors, and content development. Learners' issues included learners' expectations, readiness, identity, and participation in online courses. Instructors' issues included changing faculty roles, transitioning from face-to-face to online, time management, and teaching styles. Content issues included the role of instructors in content development, integration of multimedia in content, role of instructional strategies in content development, and considerations for content development. To address these challenges in online education, higher education institutions need to provide professional development for instructors, trainings for learners, and technical support for content development. However, online education carries following threats:

- i) Reliability of contents and data served by Online parent organization.
- ii) Lack of easy access of good study centres
- iii) Language problem of the study materials
- iv) Lack of absence online educators
- v) Unavailability of Laboratory for Practical based study courses.

Keywords: Online Education, teaching or learning strategies, time management, laboratory based online study centre.



APPLICATION OF A TWO-WAREHOUSE INTEGRATED INVENTORY MODEL WITH IMPERFECT PRODUCTION PROCESS IN OPEN AND DISTANCE LEARNING (ODL) SYSTEM

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This paper depicts a single-vendor, single-buyer integrated inventory model with an imperfect production process of the vendor. The buyer's own warehouse has a limited capacity but, if needed, he can use a rented warehouse of unlimited capacity. The demand at the buyer is dependent on the on-hand stock (both the own and rented warehouses) and the vendor offers a quantity discount to motivate the buyer to buy more quantities. The vendor fulfills the buyer's order quantity in multiple equal-sized shipments. The objective is to determine the vendor's shipment scheme in response to the buyer's order quantity so that the average total cost of the integrated system is minimized. For a numerical example, the optimal solution of the integrated inventory model is obtained and effects of key model-parameters on the optimal solution are examined.

In the context of ODL institute we can extend the above model to manage the dispatch of study materials from the printing house to the store of the institute in an optimum way. The printing house and the store of the institute can be thought as vendor's and buyer's inventory respectively. The stochastic demand of the study material can be determined based on the number of students enrolled in the institute in a particular year. We can minimize the total average cost of study material (printing and transporting from the printing house to the store) using our model for two-warehouse integrated system.

Keywords: Inventory, vendor-buyer, defective item, two-warehouse, quantity discount, stochastic demand, ODL.



**STUDENTS RETENTION IN OPEN AND DISTANCE LEARNING
(ODL) SYSTEM: SOME MATHEMATICAL AND COMPUTATIONAL
MODEL TO ANALYZE AND PREDICT THE POTENTIAL RISK OF
BEING DROPOUT**

Mrinal Nath

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Every year a significant no of students has been enrolled in different open universities/distance learning institutes in India as well as other countries to fulfil their career needs which in turn enhance their socio economic status in all respect. As a consequence, a significant amount of expenditure has been incurred by different institutes. This issue becomes more crucial particularly for the public funded institutes in developing countries like India. The return of investment of any academic institute therefore should be measured in terms of the no of students who successfully completed their diplomas, degrees and other professional certificates and contribute to build the nation directly or indirectly using their skills. In this context, it is very important to increase student retention rate by reducing the no of dropouts before

completing their courses. Few of the potential issues for which the students of a distance learning institute might be dropped out before completing their degrees are mentioned below:

1. Poverty
2. Lack of time for working professionals
3. Lack of understanding/information of the goals and career opportunities.
4. Limited interaction with the faculties/mentors.
5. Lack of proper guidelines and study material.
6. Other socio-economic problems.

In this paper, I have sketched few of the mathematical-statistical modelling techniques to predict



and estimate the amount of risk for a new student to be dropped out in near future. Once identified the institute/authority can follow up appropriate action to mitigate the risk. The paper also envisages the methods to highlight several early indicator of student retention and predict the dropout accurately. Different methods like Logistic Regression, Random Forest, Nearest Neighbor; Neural Network used in this paper is mainly used in Machine Learning area which has significant scope in further research in academic domain.

Keywords: ODL system, student retention, risk prediction, dropout, machine learning.

New Volume Formula for a General Tetrahedron

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In this paper we have investigated the relationship between several attributes of a general tetrahedron and deduced the volume of general tetrahedron in terms of them. The attributes are the radii of circumscribed, inscribed, escribed circles, the perpendiculars and medians from vertices of the triangular 12 faces of the tetrahedron. These methods are useful for Mathematics education in School levels.

Keywords: Tetrahedron, triangular 12 faces of tetrahedron, Median.