

# Abstract of Published Papers 2008



East West University  
**CENTER FOR RESEARCH AND TRAINING**  
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## TABLE OF CONTENTS

### Faculty of Business and Economics

#### *International Journals*

1. Water Productivity of Modern Variety of Paddy Production: Rice-prawn and Year-round Paddy Farming Systems in Bangladesh ..... 1
2. A Multivariate Model of Partitioned Country-of-Origin on Consumer Quality Perceptions..... 2
3. A Multivariate Model of Micro Credit and Rural Women Entrepreneurship Development in Bangladesh ..... 3
4. Opinion of Fishermen Towards their Well-being under Agricultural Diversification and Intensification Program (ADIP) in Bangladesh..... 4

#### *National Journals*

5. Consumer Evaluation of Brand Extensions: An Assessment from Bangladesh..... 5
6. Factors Affecting the Global Trend of Bank Services: Comment on Bangladesh..... 6
7. Challenges and Opportunities of Health Insurance Initiatives in Rural Bangladesh..... 7
8. An Analytical Study on Leadership Challenges for Human Service Administrators ..... 8
9. Trade Fair and Business- to-Business Promotion: A Study on BATEXPO Visitors/Clients ..... 9
10. The Empirical Evidence of Fisher Effect in Bangladesh: A Time-Series Approach..... 10

#### *Book Chapters*

11. Stock Returns Volatility in an Emerging Market: Evidence from Dhaka Stock Exchange..... 11
12. The Impact of Emergency Price Control Measures on Small Importers of Essential Commodities and Subsequent Long Term Affect on National Economy ..... 12

#### *Working Papers*

13. Export, Imports, Remittance and Growth in Bangladesh: An Empirical Analysis ..... 13

#### *Conference Papers*

14. Communication Skill of the Business Executives of Local Private Business Concerns in Bangladesh ..... 14
15. A Study on the Corporate Labor Market in Dhaka: Categorizing the Barriers Face by Women Executives..... 15
16. Women Managers and Glass Ceiling in Dhaka: An Empirical Investigation ..... 16
17. Identify the Barriers to Quality Research at Business Schools of Bangladesh: Some Empirical Findings ..... 17
18. Women Entrepreneurs in Dhaka: Some Barriers to Success ..... 18
19. Gender and Small Business: Entrepreneurship Experiences from Women Entrepreneurs of Dhaka ..... 19
20. A Study on Service Quality of the Bangladesh Police ..... 20
21. Service Quality in Retail Banking of Private Commercial Banks in Bangladesh..... 21
22. Testing Random Walk Hypothesis for Dhaka Stock Exchange: An Empirical Examination..... 22

## Faculty of Liberal Arts and Social Sciences

### *International Journals*

23. Kee's World: Reflections of Evolving Identity..... 24

### *National Journals*

24. Quest for Home in Amitav Ghosh's *The Glass Palace*..... 25  
25. A Critique of Critical Discourse Analysis ..... 26  
26. Institutional Elitism: Critical Discourse Analysis of Private Educational Institutions ..... 27  
27. Critical Discourse Analysis and the Rational Faculty ..... 28  
28. Teaching Speaking Skill at Tertiary Level in Bangladesh: An Empirical Investigation ..... 29

### *Book Chapters*

29. Decolonizing Space: Toni Morrison's *Song of Solomon*, *Tar Baby* and *Love*..... 30  
30. Exclusion in Recruitment: Confronting Discrimination in Printed Vacancy Advertisements ..... 31  
31. Discursive Construction of an Identity in Conflict: CDA Perspective ..... 32

### *Conference Papers*

32. Promoting Collaboration in Mixed Ability EFL Classrooms at Tertiary Level in Bangladesh..... 33

## Faculty of Sciences and Engineering

### *International Journals*

33. Performance Evaluation of Rake Receiver of DS-CDMA under AWGN Environments ..... 35  
34. Dynamic Channel Allocation in Mobile Cellular Networks ..... 36  
35. Gate Dielectric Scaling of Top Gate Carbon Nanoribbon on Insulator Transistors..... 37  
36. Dielectric Scaling of a Top Gate Silicon Nanowire on Insulator Transistor ..... 38  
37. Polarization Anisotropy of Spontaneous Emission Spectra in GaInAsP/InP Quantum-Wire Structures ..... 39  
38. Robust Multichannel LMS-type Algorithms with Fast Decaying Transient for Blind identification of Acoustic Channels..... 40  
39. Noise Robust Multichannel Frequency-Domain LMS-type Algorithms for Blind Channel Identification..... 41  
40. Implementation of Space Time Block Code Using Base Station Repeater Diversity ..... 42  
41. A Numerical Analysis of Plasma-particle Heat exchange during in-flight Treatment of Granulated Powders by Argon-oxygen Induction Thermal Plasmas ..... 43  
42. Effects of Feed rate and Particle size on the in-flight melting Behavior of Granulated powders in induction Thermal Plasmas ..... 44  
43. Application of In-Flight Melting Technology by RF Induction Thermal Plasmas to Glass Production..... 45  
44. A Multi-phase AC arc Discharge and its Application in in-flight Thermal Treatment of raw Glass Powders..... 46  
45. Optimum Location of a Switching Station of an Urban Network ..... 47  
46. Synthesis of Quaternary Reversible/Quantum Comparators..... 48  
47. A Recursive Method for Synthesizing Quantum/Reversible Quaternary Parallel Adder/Subtractor with Look-Ahead Carry ..... 49  
48. Design of Reversible/Quantum Ternary Comparator Circuits ..... 50

49. Cost Reduction in Nearest Neighbour Based Synthesis of Quantum Boolean Circuits.....	51
50. Solitary Waves in a Four Component Dusty Plasma with Nonthermal electron .....	52
<i>National Journals</i>	
51. Framework for Synthesis of Universal Networking Language .....	53
<i>Conference Papers</i>	
52. Performance Comparison of Zero-Schottky-Barrier Single and Double Walled Carbon Nanotube Transistors .....	54
53. The Effects of Doping, Gate Length, and Gate Dielectric on Inverse Subthreshold Slope and on/off Current Ratio of a Top Gate Silicon Nanowire Transistor .....	55
54. Effects of Uniaxial Strain on the Bandstructures of Silicon Nanowires .....	56
55. Specific Features of a Converter of Web Documents from Bengali to Universal Networking Language .....	57
56. Morphological Analysis of Bangla Words for Universal Networking Language .....	58
57. Decision Combining in Relay Networks .....	59
58. Optimization of k-Fold Multicast Wireless Network Using M/M/n/n+q Traffic Model.....	60
59. Performance Analysis and the Study of the behavior of MPLS Protocols.....	61
60. Evaluation of Traffic Parameters of Multidimensional Traffic of a Combined Link Using a Tabular Method.....	62
61. Direct Extraction of Interface Trap States from the Low Frequency Gate C-V Characteristics of MOS Devices with Ultrathin High-K Gate Dielectrics .....	63
62. Effect of Gate Bias on Channel in Depletion all-around Operation of the SOI Four-Gate Transistor.....	64
63. Gate C-V Characteristics of Si MOSFETs with Uniaxial Strain along <110> Direction .....	65
64. Inversion Layer Properties of <110> Uniaxially Strained Silicon n-Channel MOSFETs .....	66
65. On MIMO Channel Shortening for Cyclic-Prefixed System .....	67
66. A Multiband Approach for Voiced/unvoiced Discrimination of Speech Signals .....	68
67. Least-Squares Optimal Variable Step-size LMS for Nonblind System Identification with Noise .....	69
68. Noise Optimized Minimum Delay Spread Equalizer Design for DMT Transceivers.....	70
69. A Proposal for Enhancing The Security System of Short Message Service in GSM.....	71
70. Modeling and Numerical Analysis of Thermal Treatment of Granulated Porous Particles by Induction Plasma.....	72
71. Performance Evaluation of DODE of a Voice/Data Integrated Wireless Mobile Network .....	73
72. An Application Specific Integrated Circuit for Optimization of Fixed Polarity Reed-Muller Expressions.....	74
73. Genetic Algorithm Based Synthesis of Ternary Reversible/Quantum Circuit .....	75
74. Minimization of Quaternary Galois Field Sum of Products Expression for Multi-Output Quaternary Logic Function using Quaternary Galois Field Decision Diagram .....	76
75. Reversible Realization of Quaternary Decoder, Multiplexer, and Demultiplexer Circuits.....	77

76. A Comparison of the Quantum Mechanical Corrections in Surface Potential based MOSFET Compact Models.....	78
77. Improved VLSI Circuit Performance using Localized Power Decoupling.....	79
78. Reconfigurable Monocycle Pulse Based UWB Transmitter in 0.18 $\mu$ m CMOS for Intra/Inter Chip Wireless Interconnect.....	80
79. Modified Physical Configuration to Compensate Parasitic Effects in High Speed Systems .....	81

# BUSINESS AND ECONOMICS

*Asia-Pacific Journal of Rural Development*, Vol. 18, No. 2, pp. 99-118 December, 2008  
(ISSN 1018-5291)

**Water Productivity of Modern Variety of Paddy Production: Rice-prawn  
and Year-round Paddy Farming Systems in Bangladesh**

**Basanta Kumar Barmon\***, Takumi Kondo\*\*, Fumio Osanami\*\*

**Abstract**

Rice-prawn gher farming system is an indigenous technology combined form of aquaculture and agriculture solely developed by local farmers since 1980s in the southwestern Bangladesh. This paper aims to estimate the water productivity of modern variety (MV) of paddy production under rice-prawn gher (RPG) and year-round modern variety (YRMV) of paddy farming system. The findings of the study indicate that water productivity of MV paddy production was significantly higher (more than two times) in RPG farming than YRMV paddy farming system. Water use efficiency of irrigation system to MV paddy production was also higher in RPG farming than YRMV paddy farming. Water wastage such as water outflow and runoff were minimum in RPG farming because each gher plot has own canals that retain sufficient water for irrigation, and runoff and outflow water goes into same canals and recycle the water as irrigation again and again during crop growth period. On the other hand, a significant amount of water is used as unproductive purposes such as water outflow and runoff during irrigation to paddy field for long distance paddy field from the source of irrigation in YRMV paddy farming. Per hectare irrigation cost of MV paddy production was also lower in RPG farming than YRMV paddy farming system in Bangladesh.

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*Journal of Advances in Consumer Research (ACR)*, Vol. 36 (1), USA, 2008

**A Multivariate Model of Partitioned Country-of-Origin on Consumer Quality Perceptions**

**Md. Humayun Kabir Chowdhury\***

**Abstract**

This paper deals with the effects of partitioned country-of-origin associations on consumer product quality evaluations. The main objective of this research is to examine the cognitive processes by which country-of-origin information influences consumer's evaluation of a product. This research clarifies the roles of country-of-design, country-of-assembly, country-of-parts and brand image in evaluating consumer perceptions of product quality. Data were analyzed via structural equation models using Amos 5.0. Results of this study seemingly have implications for measurement, theory, and application. Finally, the study concluded with some limitations and directions for future research.

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### **A Multivariate Model of Micro Credit and Rural Women Entrepreneurship Development in Bangladesh**

Sharmina Afrin\*, Nazrul Islam\*\*, Shahid Uddin Ahmed\*\*\*

#### **Abstract**

In Bangladesh, micro credit programs have positive socioeconomic impact on the rural women borrowers. However, it is perceived that the micro credit programs help the rural women borrowers to survive only and do not help them to develop entrepreneurial capabilities. Hence, this study aims at identifying the factors related to the development of entrepreneurship among the rural women borrowers through micro credit programs. A multivariate analysis technique like Factor Analysis was conducted to identify the entrepreneurship development related factors. Structural Equation Modeling (SEM) was used to develop a model of micro credit program and the development of rural women entrepreneurship in Bangladesh. Results show that the financial management skills and the group identity of the women borrowers have significant relationship with the development of rural women entrepreneurship in Bangladesh. The experience from the parent's family of the borrowers and the option limit may also lead to the rural women borrowers to be entrepreneurial.

**Keywords:** Micro credit programs, Rural women borrowers, Entrepreneurship development, Financial management skills, and Group identity.

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*Pertanika Journal of Social Sciences and Humanities (JSSH)*, Universiti Putra Malaysia (Faculty of Economics and Management), Malaysia, 2008

### **Opinion of Fishermen Towards their Well-being under Agricultural Diversification and Intensification Program (ADIP) in Bangladesh**

Kazi Tarvir Mahmud\*, Zinal Abidin Mohammed\*\*, Murali Simvasavan\*\*\*, Sardana Islam Khan\*\*\*\*, Shahnawaz Mohammad Rafi\*\*\*\*\*

#### **Abstract**

Agricultural Diversification and intensification Project (ADIP) was the collaborative program of the Government of Bangladesh (GOB) and donor agencies. The program was implemented in four districts of Bangladesh in order to upgrade the living-standard of the poor people who were engaged in agricultural activities. This study took the initiative to assess the borrowers' opinion towards their well-being under ADIP's fishery program. Primary data was collected from landless and marginal borrowers through a simple random sampling technique from the project areas who took loan for the first time for fisheries activities. Logit model was used to examine the influence of socioeconomic variables on the dichotomous dependent variable "Economic well-being". The borrowers had a positive opinion towards the project for improving their socioeconomic plight. The study shows that five variables such as family labor, area of land leased-in by household, distance of NGO branch office and rural market from borrowers' dwelling place and mobility were significantly related to their well-being. The study also indicates amount of fishery credit did not have any significant influence on borrowers' well-being.

**Keywords:** ADIP, Microcredit, Borrowers, Well-being.

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*ASA University Review*, Bangladesh, Vol. 2, No. 1, pp. 9-17, January-June, 2008

### **Consumer Evaluation of Brand Extensions: An Assessment from Bangladesh**

**Md. Humayun Kabir Chowdhury\***, Md. Jashim Uddin\*\*, Md. Tabarak Hossain  
Bhuiyan\*\*\*

#### **Abstract**

This paper tests Aaker and Keller's (1990) brand extension model that has been designed and tested in a series of developed economies to see if it applies to Bangladesh, a developing country. A questionnaire was developed using similar rating scales to those used by Aaker and Keller. The dependent variable, the overall attitude toward the extension, was an average of two dimensions: the overall perceived quality of the extension and the purchase probability of buying the extension. 'Residual Centering' regression approach was used for analyzing the data. Results suggest that there is some international heterogeneity in the way that consumers evaluate brand extension. Major findings of this study, limitations, and directions for future research have been suggested.

**Keywords:** Quality, Transfer, Fit, Brand Extension, Residual Centering, Regression Approach

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*Journal of Business Studies*, Center for Business Research, South East University, Vol. IV, No. 1, January-June, 2008, (ISSN: 1815-3267)

## **Factors Affecting the Global Trend of Bank Services: Comment on Bangladesh**

**S. I. Nusrat A. Chaudhury \*, Mahmud Zubayer\*, Mamunur Rashid\***

### **Abstract**

Services are windows to reach customers and these are continuously changing with the changing needs of the customers. Banking services contribute significantly to the nation's GDP and employment. On an average ninety percent GDP of the financial sector in Bangladesh comes from the banking industry that is primarily result of effective mobilization of deposit and deployment of credit in different forms. Banking job has been treated as one of the lucrative career option with an increasing percentage of HR added every year (BBS Survey of Labor Force, 1995-2003). However, this sector is experiencing a substantial period of unsteadiness as the outside forces change with respect to globalization, deregulation, merger and acquisition, universal banking movement, technological development etc. Since banking is a service oriented global financial industry, bankers need to concentrate on these factors, which reshape the service development. This report entails to find out the factors, that closely affect the innovative development of banking services at present and those are expected to control the pace of the service development in future, from a global perspective. This review report recognizes the importance of banking service development, its dimensions, strengths and weakness for Bangladesh and also identifies international initiatives that might be applied to banking sector in Bangladesh.

**Keywords:** Technology, Relationship, Globalization, Banking Services

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*Journal of Business Administration*, Vol. 33, No. 3 & 4, IBA, University of Dhaka, July & October, 2007 (Published in 2008)

### **Challenges and Opportunities of Health Insurance Initiatives in Rural Bangladesh**

Muhammad Z. Mamun\*, Nazrul Islam\*\*

#### **Abstract**

This paper aims at identifying the present situation of the health insurance policies in the rural areas of Bangladesh and explores factors for successful introduction of health insurance schemes for the households living in these areas. The study noted that the rural health insurance schemes are still in a very formative stage in Bangladesh. Results show that the factors needed to be considered in introducing rural health insurance schemes are awareness about health insurance policy, capacity to pay premium, efforts of NGOs and other organizations, availability of modern medication facilities and certified doctors, and diversification in health insurance policies. These factors have significant relationships with the overall socioeconomic factors that include the level of socioeconomic development, purchasing power of the rural people, development of insurance industry, influence of international insurance market, etc.

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**An Analytical Study on Leadership Challenges for Human Service Administrators**

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**Abstract**

The present study addresses itself to the challenges that human service administrators face in maintaining and moving their organizations forward. The study has identified twelve leadership challenge dimensions, explored variations in these challenges across agencies and administrators, and finally draws a concluding line and discusses the policy implications based on the findings of the study for leadership development programs targeted at human service administrators.

**Keywords:** Leadership challenges, Human Service Administrators, Social Responsibility and Non-Profit Agencies.

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**Trade Fair and Business- to-Business Promotion: A Study on BATEXPO  
Visitors/Clients**

**Saadia Shabnam\*, Monowar Hossain Mahmood\*, Md. Mahbubul Arfin \*\***

**Abstract**

Marketing in business-to business arena demands close focus to the expectations of its valued clients. Tradeshows are the single most important means to come closer to the prospects. To reveal the insight on the expectation and evaluation of visitors for expensive expositions become an imperative now-a-days. This survey based article tries to articulate its findings to make some managerial implications in this regard.

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### **The Empirical Evidence of Fisher Effect in Bangladesh: A Time-Series Approach**

**Md Gazi Salah Uddin\***, Md. Mahmudul Alam\*\*, Kazi Ashraful Alam\*\*\*

#### **Abstract**

This paper is an attempt to trace the relationship between interest rates and rates of inflation in the economy of Bangladesh. In view of this, a time series approach is considered to examine the empirical evidence of Fisher's Effect in the country. By applying OLS and Unit Root test, the estimated value is used to determine the casual relationship between interest rates and inflation for the monthly sample period of August 1996 to December 2003. The empirical results suggest that there does not exist any co-movement of inflation with interest rates and the relationship between the variables is also not significant for Bangladesh. Further, the trends indicate that the inflation premium, equal to expected inflation that investors add to real-risk free rate of return, is ineffective in the Country.

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**Finance & Banking: An Anthology of Contemporary Research** (ed. by P. S. James and Roji George, Saintgits Institute of Management, Excel India Publishers), New Delhi, India, pp. 14-20, 2008, (ISBN 978-81-907196-2-9)

### **Stock Returns Volatility in an Emerging Market: Evidence from Dhaka Stock Exchange**

**Tanbir Ahmed Chowdhury\***, Md.Wahidul Habib\*\*

#### **Abstract**

This paper investigates the volatility process in Dhaka Stock Exchange. This study considers the monthly share price index of Dhaka Stock Exchange from 1994 to 2006. For analyzing stock price index, we have used Augmented Dickey Fuller (ADF) Unit Root Test, Correlogram, and Graphical Approach Techniques. According to the indication of the graphical approach, the mean of the variable is changing overtime. In the case of correlogram at level, all the coefficients in the former i.e. initial stage are positive, whereas the latter shows some negative coefficients. It indicates at level, correlogram shows non-stationary trend which means there unit root exists. At first difference, correlogram shows stationary trend. In the case of ADF test, both with and without trend it reveals non-stationary trend i.e. unit root exists. In the case of first difference, both with and without trend it shows stationary trend.

**Keywords:** ADF test, Stock Exchange, Time Series

**JEL Classification:** C22, D53 and N25

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***Small and Medium Enterprise Development in Bangladesh*** (ed. by Muhammad Z. Mamun & Sheikh Morshed Jahan, Published by Amdib, Dhaka, 1<sup>st</sup> Edition), pp. 147-174, 2008, (ISBN 984-300-001895-5)

**The Impact of Emergency Price Control Measures on Small Importers of Essential Commodities and Subsequent Long Term Affect on National Economy**

**Sardana Islam Khan\*, Taskina Ali\***

**Abstract**

Increasing price trend of essential commodities has always been the main source of criticism of the ruling government in Bangladesh. All emergency price control measures so far taken are supported by substantial government expenditure that may lead to subsequent pressures on tax payers' money while immensely damaging the small and medium scale importer's existence. The objective of this study is to emphasize on the impact of emergency price control measures on small and medium importers in Bangladesh. The study highlights the measures taken by governments of other countries and their unique context. The study highlights the possibility that immediate measures are not only unnecessary but harmful for our economy. The study also focuses on the fact that the market of our essential goods is largely dependent on import and the small importers are massively victimized by the extreme urge to reduce the retail price. In order to find out the actual consequences, the authors have conducted an in-depth interview on ten small and struggling importers in Bangladesh. By combining the findings of the interview and the history of price control measures in other countries, the authors have suggested that government should shift its focus to more effective and long term price control measures that can actually protect the interest of the small importers along with buyers.

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**Working Paper: International Trade Series**, Department of Economics, Jadavpur University, Ministry of Commerce (GOI)-UNCTAD-DFID (UK), August 2008  
[http://www.jueconomics.in/home/unc\\_papers.php](http://www.jueconomics.in/home/unc_papers.php)

## **Export, Imports, Remittance and Growth in Bangladesh: An Empirical Analysis**

Haydory Akbar Ahmed\*, Md. Gazi Salah Uddin\*\*

### **Abstract**

This paper investigates the causal nexus between export, import, remittance and GDP growth for Bangladesh using annual data from 1976 to 2005. This paper uses time series econometrics tools to investigate the relationship adding import and remittance in the model. Study shows limited support in favor of export-led growth hypothesis for Bangladesh. Export and remittance cause GDP growth in the short run and does not have any long run influence. GDP, on the other hand, causes export growth in the long run. Import does not have any impact on GDP or export growth.

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**Communication Skill of the Business Executives of Local Private Business Concerns in Bangladesh**

**Nargis Akhter\*, Sardana Islam Khan\*, Md. Kamrul Hassan\***

**Abstract**

The study attempts to focus on the facts relating to the communication skill of the different levels of business executives of local private business concerns in Bangladesh and their level of awareness regarding the importance of communication skill for them. The study reveals that majority of the executives' opinions are positive regarding the importance of communication course for executives, many of them have completed this course and majority of them are dissatisfied with it. The study also reveals that many of the executives have received training on communication skill and majority of them are dissatisfied with its quality. Although majority of the executives think that there should be compulsory training program on communication skill in business organizations but compulsory training program does not exist in any of the business organization. Executives' opinions regarding the different issues relating to this study are independent of their levels. Academicians should design and execute the communication course from the practical point of view and employers should offer compulsory training program on communication skill to their business executives.

**Keywords:** Communication Skill, Training on Communication Skill, Communication Course, Business Executives, Local Private Business Concerns in Bangladesh.

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**A Study on the Corporate Labor Market in Dhaka: Categorizing the Barriers Face by Women Executives**

**M. Sayeed Alam\***, **Kamrul Hassan\***, **Iftekhar Amin Chowdhury\*\***

**Abstract**

Women have been in the labor market in almost all over the world for more than 20 years. While presence of women in senior management positions in the corporate world is limited, Bangladesh is not an exception from the above situation. In Bangladesh women represent about half of the population. Participation of women in higher studies (Business and Technology) has significantly increased in the recent years, but when we look at the corporate world it is perceived that corporate labor market is structurally gendered. The objective of this paper is to identify whether there are any barriers for career advancement of women executives in Dhaka. The study is based on in-depth interview of thirty women executives at different levels of the corporate world. All women executives in this study hold managerial positions. Barriers to their advancement may be tangible or intangible, and depends on the perception of the participants in this survey. This report tries to identify both forms of barriers, with special focus on glass ceiling phenomenon. The survey was conducted only in Dhaka city because most of the corporate houses are located in Dhaka but this is also the limitation of this study. Instead of generalizing the findings from this study further study of an extended area with a large number of sample is suggested.

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## **Women Managers and Glass Ceiling in Dhaka: An Empirical Investigation**

**M. Sayeed Alam\*, Md. Farhan Faruqui\***

### **Abstract**

Women represent roughly half of the total population in Bangladesh. Studies on participation, in organizational decision making in the context of developing countries are limited, especially from a gender perspective. Based on a survey of women managers in Dhaka, Bangladesh, this study explores the extent to which glass ceiling is present or not. The problem of the glass ceiling that women in management face and the artificial barriers that prevent them from advancing upwards to higher levels of the managerial ladder in most countries of the world have been analyzed and discussed extensively in a large number of articles and books but this glass ceiling issue is almost new to Bangladesh. Inequality research was done on more comprehensive basis in Bangladesh. Literature review and survey questionnaire have been used for this research. The questionnaire is administered to a sample of 110 of entry, mid level managers. Results indicate that the glass ceiling is at least partially true in organization culture. Practicing policies of the organization and gender friendly working culture may be a solution to end glass ceiling problem. But further empirical research is suggested to know the in depth picture about glass ceiling in Bangladesh. The research is limited to Dhaka city and limited to private organizations only.

**Keywords:** Glass ceiling, Women manager, Dhaka city

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3<sup>rd</sup> International Conference on Postgraduate Education (ICPE-3), Gurney Resort Hotel & Residences, Penang, December 16&17, 2008.

### **Identify the Barriers to Quality Research at Business Schools of Bangladesh: Some Empirical Findings**

**M. Sayeed Alam\*, Mahmud Zubayer\*, Mahbubur Rahman\***

#### **Abstract**

Research is the predecessor of all forms of development. As a developing country Bangladesh needs quality research in almost all the sectors. In the higher education sector of Bangladesh business learning is now the most popular and accepted segment of learning. Both in the private and public universities, business education is the most growing sector in terms of students enrollment, job opening and employers' acceptance. All most all the business schools curricula is based on North American syllabus and teaching model. Texts that are followed in the classroom are written by western, mostly American, authors. The cases and examples of business subjects are drawn from the North American perspective. All most all the universities have their own research journals. Research findings of the business scholars are published in these journals. But unfortunately it is true that, despite these researches and students' preference for the business education, the numbers of books based on Bangladeshi context and numbers of business cases prepared on Bangladesh situation are very limited. The objective of this paper is to identify the barriers to quality research in business schools of Dhaka. This research is based on stratified sampling .In-depth interviews are taken from thirty business school faculties – both from private and public universities. The scope for fund availability for research, accessibility to up-to-date information, teaching focus of the universities, distribution of teaching and research time are the important barriers to be considered. Other then finding the barriers to quality research, the advantages of quality research with respect to Bangladeshi context are also identified. The main limitation of this paper is that only Dhaka based business schools have been considered.

**Keywords:** Business school, Research, Bangladesh

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*1<sup>st</sup> International Conference on Social Sciences and Humanities*, University Sains  
Malaysia, Penang, June 18-29, 2008

### **Women Entrepreneurs in Dhaka: Some Barriers to Success**

M.Sayeed Alam\*, S. I. Nusrat A. Chaudhury\*

#### **Abstract**

Women's movement towards rights finally sees light. Taking part in formal economic activities is the first step towards women's liberty. Initiatives taken by Government, non-government and women's right organizations helps women become educated and take part in direct money earning activities. Researches indicate a significant proportion of the labour force are women. Initiatives like micro credit is helping women become independent. Taking part in the market economy is clearing the dark cloud that covered them for years. Economic freedom gave women the opportunity to take control of their life and make their own decision. As women constitute half of the population, by taking part in market economy they not only liberalizing themselves but also strengthening the economy.

This study presents a preliminary report of an exploratory qualitative investigation of the role of women entrepreneurs in Dhaka. The main focus is on the women in business. How women take initiatives to enter in to the business and what are the characteristics of the enterprise that is run by the women. The demographic characteristics of the women entrepreneurs. This preliminary paper also discuss the barriers women encountered while entering in to the business.

**Key words:** Women entrepreneurs, barriers.

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### **Gender and Small Business: Entrepreneurship Experiences from Women Entrepreneurs of Dhaka**

**Farhan Faruqui\*, M. Sayeed Alam\*, Kohinoor Biswas\***

#### **Abstract**

The issue of small businesses and gender is drawing increasing attention in developing countries. While in developed world organized research on gender issues has reached a matured status, here in Bangladesh, this issue is still at its exploratory stage. Industry and business characteristics of women-owned businesses, typologies, motivation and educational background of the women entrepreneurs are not yet analyzed like the developed nations. This research is mainly focused on Dhaka city's women entrepreneurs. The objective of this paper is to identify the nature of women-owned business, motivational factors behind their entrepreneurial venture and the typology of women in business. Stratified sampling is used to consider entrepreneurs from all the business segments. The strata are: dying and boutique, food, communications, jewelry, and design fittings and fixtures. A convenience sample of 5 is selected from each of the stratum. The total sample size is 25.

It is found that most of the women are involved in retail business. Compared to men-owned businesses the size of the business is small in the same retail business category. Motivation to start a business is the same basic reason as applicable to male (Financial independence, etc). According to typologies Dhaka's women entrepreneurs are found to be Innovators (do business to earn economic freedom with personal success). This study is based on a small sample size. Proportional stratified random sampling of all the categories of women retail businesses with specific sub-categorization is suggested for enhancing better understanding of the issue.

**Keywords:** Dhaka, Women entrepreneur, Industry and business characteristic

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*The Eight Global Conference on Flexible Systems Management*, Stevens Institute of Technology (published in the proceedings of GLOGIFT), Hoboken, New Jersey, June 14-16 USA, pp. 817-827, 2008

### **A Study on Service Quality of the Bangladesh Police**

Nazrul Islam\*, M. Akbar Ali\*\*

#### **Abstract**

Providing quality service is the prime objective of the law enforcing agency of a country. It is also important for Bangladesh where a huge number of social problems are present. This paper aims at identifying the service quality factors of the Bangladesh police. It includes the views on service quality of the service receivers of 33 thanas of Dhaka City. To identify service quality factors, standardized SERVQUAL instrument developed by Parasuraman and Ziethmal was used for this survey. Three hundred thirty one service receivers concerned with criminal and civil problems were interviewed with a structured questionnaire. The sample respondents were selected randomly at the 33 thanas of Dhaka City. Multivariate analytical technique like Factor Analysis was used to assess the expected and perceived service quality factors. Multiple Regression Analysis was used to identify the relationship between the overall service quality and the service quality factors in this regard. Results show that the service receivers expect that the police should keep the interest of the clients at their heart. If they promise to do something, they should do it on time. The respondents also expect that the police should use up-to-date equipments and they should have convenient operating hours. The clients perceived that the police should have interest of the clients at their heart, they should use up-to-date equipments in investigating the cases, and their operating hours should be convenient to the clients.

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**International Conference on Global Commerce, Energy, Minerals, and the Environment** (organized by Global Commerce Forum, Arvada), Tropicana Hotel Las Vegas, USA, October 20-22, 2008.

### **Service Quality in Retail Banking of Private Commercial Banks in Bangladesh**

Md. Tabarak Hossain Bhuiyan\*, Nazrul Islam\*\*, Jashim Uddin Ahmed\*\*\*

#### **Abstract**

Retail banking is the most important segment of the services provided by the private commercial banks in Bangladesh. This paper aims at identifying the service quality of retail banking in Bangladesh. SERVQUAL model suggested by Parasuraman and Zeithmal was used to measure the retail banking service quality of the banks. This is an exploratory research in nature. A total of 100 respondents were interviewed from the five leading private commercial banks of Bangladesh. The banks are BRAC Bank, Dutch-Bangla Bank, Dhaka Bank, Eastern Bank Limited, and AB Bank Limited. The equal number of respondents was randomly selected from the sampled banks. Simple average scores were used to report the gaps between the expected and perceived services provided by the banks. Results show that the reliability and responsiveness are the most important dimensions of service quality that are to be properly addressed by the private commercial banks in Bangladesh in terms of retail banking. Other service quality dimensions such as assurance, empathy and tangibles are hardly accepted by the private bank customers. This indicates that the private commercial banks of Bangladesh should focus more on the service quality dimensions to improve the service quality in retail banking.

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### Testing Random Walk Hypothesis for Dhaka Stock Exchange: An Empirical Examination

Md Gazi Salah Uddin\*, A. K. M Nabiul Khoda\*\*, Y.A.M. Rafiqul Haq\*\*\*

#### Abstract

This paper investigates whether stock-price indexes of Dhaka stock markets can be characterized as random walk (unit root) processes. This study seeks evidence supporting the existence of market efficiency in the Dhaka Stock Exchange Ltd (DSE). In this paper; we have analyzed the behavior of daily return of Dhaka Stock Market indices. The sample includes the daily price indices of all securities listed on the DSE general, DSE top 20 indices, and Day wise indices listed in the Dhaka stock market. Again as a proxy of the of the movement of individual stock prices, daily closing prices of 23 companies operating in the Pharmaceutical sector has been analyzed. This industry is chosen as this sector is rapidly growing in Bangladesh stock markets. The results from the unit root test, the ADF test on DSE general price indices and DSE top 20 indices day wise indices and on individual stock prices of the proxy companies provide evidence that the Dhaka stock exchange (DSE) is not efficient even in weak form and DSE does not follow the random walk model.

**Keywords:** Efficient Market Hypothesis, Random walk model, Dhaka Stock Exchange  
**JEL Classification:** G14, C22

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# LIBERAL ARTS AND SOCIAL SCIENCES

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(ISBN1531-6793)

## **Kee's World: Reflections of Evolving Identity**

**Muhammed Shahriar Haque\***

### **Abstract**

Comic strips in newspapers are entertaining in themselves, with their stock of cartoon characters, caricatures and overstatements. What makes *Kee's World* different from other comic strips is that it deals with situations from life, often in a much-exaggerated manner as to evoke instant laughter. C. W. Kee's instances of wit and humour are enlightening in the sense that they not only provide us with food for thought but also make us realize our own follies. In this respect, *Kee's World* opens a window through which we can experience various aspects of the Malaysian way of life. In surfacing the various aspects of social life, by drawing upon bold humorous situations, it seems that Malaysians are learning to laugh at themselves. From an introspective stance, the evolving culture of being able to depict hyperbolic instances of social life, sit back and laugh at them, is significant in etching out an identity, which shows tolerance and forbearance. This paper looks at comic strips from *Kee's World* and humbly attempts to show the portrayal of various aspects of social life through exaggerated situations, wit and humour. In doing so, the paper argues that, an evolving identity of endurance and fortitude is the order of the day.

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### Quest for Home in Amitav Ghosh's *The Glass Palace*

Farzana Akhter\*

#### Abstract

Amitav Ghosh's novel *The Glass Palace* (2000) is a narrative that revolves around the experiences of a variety of multigenerational, diasporic Indian and Burmese characters entangled in the turmoil of colonialism during the first half of the last century. The plot of the novel unfolds against the backdrop of a hundred years of pre-colonial, colonial, and post-colonial Burmese history as families are formed and individual characters experience loss and joy. Besides depicting the colonial power the book concerns itself with the themes of exile and diaspora. At the focal point of the novel are the Royal Family – King Thebaw, Queen Supayalat and the princesses, and the commoners – Dolly, Rajkumar, Saya John, and Uma. What unites all these characters is the question of colonial displacement. As all these people at one point or the other are cut off their roots, their land, and their past their quest for home always drive them on. Almost all the characters are seen to move from one place to another and have a deep yearning to settle down, to have a home, and to be rooted. The people in the novel are dislocated not only once but on several occasions and through various events open the reader's eyes to acts of forced displacement and its consequences. In this paper I attempt to show how all the characters haunted by a sense of displacement seek a place which they can call home and where they can be rooted permanently. In doing so, I will take into consideration Said, Hall, and Ramraj to show how exile triggers in the King and the Queen the desire to hold on to their own culture more rigidly resisting to succumb to the dominant culture. At the same time, I will focus on the influences of dominant foreign culture that elicit the process of acculturation and assimilation on the younger generation of the novel.

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February 2008

## **A Critique of Critical Discourse Analysis**

**Muhammed Shahriar Haque\***

### **Abstract**

The emergence of critical discourse analysis (CDA), as a reaction against a linguistically-based non-critical discourse analysis, has broadened the scope of discourse analysis. As a new ideological orthodoxy with a goal to make explicit the ideological bias in texts, CDA has generated controversies and invites critical attention with both its advocates and critics asserting their own respective positions. Critical discourse analysis has been criticised for being the most overtly political form of discourse analysis, offering not only critique of the existing social order, but espousing an agenda of change. Having taken up this ideological position, it is absolutely essential that the methodology of CDA is unflawed and defensible. While its purpose of uncovering hidden agendas and motives that serve self-interest has been applauded, the tendency of CDA analysts to evaluate a text according to their own political commitments, which may privilege particular meanings, has been strongly criticised. These critiques, which concern mainly the epistemological question of how the term "critical" is to be defined and the weaknesses in CDA methodology, are expressed from the western ideological perspective. My aim in this paper is to emphasize some of these comments in order to see how the critics perceive CDA, and how the practitioners (of CDA) defend themselves. A discussion of this nature would allow future practitioners to take account of the debates in CDA and enable them to make compromises in order to improve the general methodology of this branch of linguistics.

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## **Institutional Elitism: Critical Discourse Analysis of Private Educational Institutions**

**Muhammed Shahriar Haque\***

### **Abstract**

The fact that graduates from western or foreign countries, or at least those with qualifications from these countries, are highly prized is probably a marketization ploy in order to enhance the international atmosphere and reputation of the host institution. In a country like Bangladesh, very few get the opportunity to study beyond the shores of their home country, and most of the fortunate few are usually from the upper middle class. By somewhat surreptitiously opening the doors of employment to the very privileged few, the advertisers are not only being elitist and discriminatory but also contribute to the (re)production of the ideology that anything foreign is better than local. To separate this reality from the rhetoric in Bangladesh's private education discourse, this paper analyzes a sample of web-based recruitment advertisements of the country's private institutions and attempts to illustrate how institutional elitism is practiced in the country

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## **Critical Discourse Analysis and the Rational Faculty**

**Muhammed Shahriar Haque\***

### **Abstract**

In this age, the constant desire to be the best, to achieve the highest, to attain the most power, seems to be making us compromise our moral standards. The endeavour to strive and go to the next level may not always be practiced in a healthy manner. The present era poses its own problems, issues and challenges; complexities are part and parcel of social existence. In such an environment taking things at face value could lead one to be beguiled, influenced or manipulated. Critical discourse analysis (CDA) offers a window of opportunities to make apparent the not so apparent issues of a society. Its objective is to empower people by making them conscious of the hidden structures that exist in the social makeup of a community. Once an individual or members of a community and / or a society becomes aware of the issues that may have escaped them, they will be in a position to choose what to believe and what not to believe, what is authentic and what is doubtful or questionable. This paper aims to give a brief introduction to CDA and suggests how it can make the rational faculty more inquisitive outside and inside the academia

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**Daffodil International University**, Journal of Business and Economics, Vol. 3, No.1, pp. 157-171, January 2008, (ISSN 1818-6238)

## **Teaching Speaking Skill at Tertiary Level in Bangladesh: An Empirical Investigation**

**Akhter Jahan\***

### **Abstract**

This paper aims to explore the problems of teaching speaking in English at tertiary level in Bangladesh and tends to find out the solutions regarding this important issue. Since English is a significant vehicle of communication in this era of globalization, the complications in learning and teaching this skill must be solved. Therefore, through a questionnaire survey including teachers and students, those predicaments have been investigated by some statistical tools and have found that the problems lie mainly within the teaching methods and techniques. Also significant statistical association has been tested between students' satisfaction of language competence in speaking English before instruction and the level of their improvement in this skill after instruction.

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*Literature in Times of Violence* (ed. by Gulshan Rai Kataria, Somdatta Mandal), pp. 195, (published by Prestige Books), New Delhi, India, 2009 (Published in 2008)

### Decolonizing Space: Toni Morrison's *Song of Solomon*, *Tar Baby* and *Love*

Afia Arafat\*

#### Abstract

The paper is primarily concerned with exposing the colonizing structure that exists within the United States, particularly against African Americans. Focusing on Morrison's *Song of Solomon*, *Tar Baby* and *Love*, it examines the existence and nature of colonialism within the American national borders and identifies the ways in which African Americans resist this colonialism. Using the critical primers of postcolonial and space studies, the first argument that the thesis makes, through a look at space in America compared to that of more traditional colonial societies as well as a discussion of the history of oppression of African Americans, is that America is indeed a colonial society. It discusses the nature of resistance to this colonizing structure as represented in Morrison's novels and the characters' diasporic discovery of and return to their African and early African American past. It then proceeds to examine the presence of the American colonizing structure within the country through Morrison's revisionist writing of Shakespeare's *The Tempest* - *Tar Baby*. Finally, it looks at the way in which city space and African American culture interact to form a new kind of free global space and a meaning in *Love*. Reading Morrison's works in a postcolonial context, the thesis seeks to facilitate an ongoing dialogue that is concerned not only with the realization that there is a colonizing structure in America and the exploration of the various methods of resistance to such a structure, but also, in identifying the African American struggle as postcolonial, unify it with other cultures that have encountered and do continue to encounter colonial and hegemonic forces.

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**Books of Reading: Issues on Quality of Work Life (QWL)** (ed. by Khulida Kirana *et al.* Universiti Utara Malaysia Publication), pp. 235-258, Malaysia, 2008

### **Exclusion in Recruitment: Confronting Discrimination in Printed Vacancy Advertisements**

**Muhammed Shahriar Haque\***

#### **Abstract**

Recruitment and retention is a concern for many companies when it comes to sustainable human and social development. Recruitment of human resource involves many stages, among which advertising is a small but a significant step. It is at this phase that by placing an advertisement (ad), for instance in the print media, an internal discourse of a company, organization or institution becomes a piece of public discourse. As a public discourse, a recruitment ad is subjected to various laws and regulations on equal employment opportunities; furthermore, it needs to abide by the advertising code of ethics as well as media regulations. However, in the Malaysian context, the norms and policies of recruitment advertisements are hardly emphasized upon. This situation seemingly favours employers / companies, and positions them to be able to influence the discourse of vacancy ads at the expense of potential applicants. Critical analysis of the contents (discourse) of recruitment ads, reveal discriminatory and / or exclusionary practices that seem to marginalize particular candidates, who despite having relevant qualifications and experience are unable to apply for certain positions. Apparently, the issue of the 'practice of exclusion' in job ads has been somewhat overlooked or taken for granted, and studying this phenomenon from a CDA (critical discourse analysis) perspective enables us to addresses such a concern. This paper aims to identify not only the exclusionary practices in recruitment ads, but also intends to suggest plausible recommendations to confront and overcome discrimination in vacancy ads.

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*Constructing Identities in the Malaysian Media* (ed. by Nair, R., Haque, M.S., Khan, M.H),  
Kuala Lumpur: University Malaya Press, Malaysia, 2008, (ISBN: 978-983-100-466-1)

### **Discursive Construction of an Identity in Conflict: CDA Perspective**

**Muhammed Shahriar Haque\***

#### **Abstract**

Bangladeshis have often been associated with a nation that suffers from extreme poverty, embroiled in political turmoil, afflicted by floods, cyclones and by tragic accidents; these are the images that the mass media often portrays of Bangladesh internationally. Besides these associations, the media in Malaysia also focuses on the migrant workers and their involvement in some isolated criminal cases and antisocial activities. These activities portray a rather bleak and unwholesome picture of Bangladeshis in Malaysia and go towards creating an identity which is in conflict with the real identity of most Bangladesh nationals residing in this multicultural nation; hence, people in general develop a negative image of Bangladeshis. This chapter humbly attempts to show from a critical discourse analysis (CDA) perspective how the one sided media portrayal may contribute to the construction of an identity which not only contradicts but is also in conflict with the real identity of most Bangladeshi nationals—be they students, academics, professionals, businesspersons or workers—residing in Malaysia. It is hoped that awareness of the issue from a CDA stance will help to dispel the stereotypical associations that more often than not may be triggered by the portrayal of certain reports in the media.

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*NELTA 13<sup>th</sup> International Conference*, Katmandu, Nepal, February 16-18, 2008

**Promoting Collaboration in Mixed Ability EFL Classrooms at Tertiary Level in Bangladesh**

**Akhter Jahan\***

**Abstract**

This paper discusses how teachers can effectively foster collaborative environment while they are teaching English to mixed ability tertiary students in Bangladesh. The vast disparity in students' communicative competence in English provides challenges not only to teachers but also to students particularly regarding the promotion of active learning across all language levels. Teachers have to accept such challenging contexts rather as inspirations and thus have to turn the prevailing pressurizing condition into a relaxing one where students' anxiety level will be limited and their self esteem will be nurtured. With this purpose, the study has been done through questionnaire survey both from students' and teachers' point of view and the survey results have been analyzed by several statistical tools. Hence, it has been located that the problems lie primarily within the teaching techniques and methods.

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# SCIENCES AND ENGINEERING



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### **Performance Evaluation of Rake Receiver of DS-CDMA under AWGN Environments**

M. Imdadul Islam\*, M. Zulhasnine\*, M.R. Amin\*\*

#### **Abstract**

High speed data, particularly, direct sequence code-division multiple access (DS-CDMA) experiences inter symbol interference (ISI) in wireless communications due to delay differences of multipath propagations. Rake receiver is an effective method of recovery of baseband signal for wideband CDMA (WCDMA) under multipath environments. This paper deals with bit error rate (BER) performance of a Rake receiver for multipath wireless CDMA contaminated by additive white Gaussian noise (AWGN), and impact of fingers on reception of fading channel signal.

**Keywords** – DS-CDMA, PN sequences, AWGN, BER, ISI and Multipath channel.

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## Dynamic Channel Allocation in Mobile Cellular Networks

Shahrina Mou \*, Md. Imdadul Islam\*\*, M.R. Amin\*

### Abstract

Channel assignment problem is one of the main issues in radio networks. Having limited number of possible channels and unlimited demands it has become a challenge for the network planners to allocate channels in optimize ways. In the early days of radio technology, conflict free fixed channel assignment was the main target. But in the present days, dynamic channel allocation is used. In this paper, an algorithm has been developed, which will be able to allocate channels dynamically. In a certain area, there can be different demands; in the morning the demand may be increased and in the evening the demand may be reduced. This algorithm, based on Greedy method, is able to assign the radio channels dynamically according to dynamic demands.

**Keywords** – Dynamic channel allocation, co-channel constraint, adjacent channel constraint composite channel constraint.

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### Gate Dielectric Scaling of Top Gate Carbon Nanoribbon on Insulator Transistors

Khairul Alam\*

#### Abstract

The effects of gate dielectric constant and thickness on the performance of top gate carbon nanoribbon on insulator transistors are studied using a  $\pi$ -orbital quantum simulation model. The focus is on both the zero Schottky barrier (SB) source-drain contacts and the metal-oxide-semiconductor field effect transistor (MOSFET)-like doped source-drain contacts. The gate dielectric constant has little effect on the on/off current ratio, channel transconductance  $g_m$ , and switching performance in SB contact devices. However, the on/off current ratio, the channel transconductance, and the switching performance significantly improve with high- $K$  gate dielectric in doped contact devices. The physics is related to the modulation of the tunnel barrier. In SB contact devices, the on-state current is limited by the SB, and therefore, the improvement in on/off current ratio and transconductance is insignificant. However, the tunnel barrier modulation in the subthreshold regime is similar in both types of contact and the inverse subthreshold slope has similar improvement with high- $K$  gate dielectrics. The unity current gain frequency ( $f_T = g_m/2\pi C_g$ ) degrades with high- $K$  gate dielectric in SB contact devices and improves in doped contact devices. This is because the gate capacitance does not change much with dielectric constant and  $g_m$  has a significant improvement in doped contact devices. The device performance improves with thinner gate oxide. The on/off current ratio and the inverse subthreshold slope scale as square root of oxide thickness.

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## Dielectric Scaling of a Top Gate Silicon Nanowire on Insulator Transistor

Sishir Bhowmick\*, Khairul Alam\*\*

### Abstract

The effects of gate dielectric constant and thickness on the performance of a top gate silicon nanowire on insulator transistor are studied using three-dimensional quantum simulation. The replacement of  $\text{SiO}_2$  by a high- $K$  dielectric improves the off-state current, the on/off-current ratio, the inverse subthreshold slope, and the channel transconductance and degrades the switching performance. The high- $K$  gate dielectric provides better control of the channel potential, especially in the off-state, and improves the off-state tunneling current by almost two orders of magnitude. With high- $K$  dielectric, the switching performance degrades primarily due to increase in gate capacitance. The gate has better control of channel potential with thinner oxide. The on/off-current ratio, inverse subthreshold slope, channel transconductance, and the switching performance improve with thinner gate oxide. Our device of 10 nm gate length, 1 nm oxide with dielectric constant of 10, has an on/off-current ratio of  $1.16 \times 10^8$ , an inverse subthreshold slope of 70.5 mV/decade, and the intrinsic unity current gain frequency of 2.7414 THz.

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### **Polarization Anisotropy of Spontaneous Emission Spectra in GaInAsP/InP Quantum-Wire Structures**

D. Plumwongrot\*, T. Maruyama\*, Anisul Haque\*\*, H. Yagi\*, K. Miura\*, Y. Nishimoto\*  
S. Arai\*

#### **Abstract**

The polarization properties of GaInAsP/InP single-quantum-well (SQW) quantum-wire (Q-Wire) structures fabricated by electron beam lithography, CH<sub>4</sub>/H<sub>2</sub> reactive ion etching, and organometallic vapor-phase epitaxial regrowth have been investigated. Spontaneous emission spectra of the electrical field perpendicular and parallel to the Q-Wire direction  $h01\bar{1}1i$  were measured and the polarization anisotropic properties in lattice-matched (LM) and strain-compensated (SC) SQW Q-Wire structures were compared. Even for a relatively wide wire around 35 nm, the polarization degrees in the SC-SQW Q-Wires were clearly observed to be three-times-stronger than in the LM-SQW Q-Wires. Furthermore, the wire-width dependences of the polarization degree in the LM- and SC-SQW Q-Wire structures were measured and compared with theoretical calculations. It was found that the theoretical prediction accurately fitted in the case of the LM-SQW Q-Wires, whereas the measured results showed approximately two-times-stronger polarization anisotropy than the prediction of the SC-SQW QWires, which might be attributed to the energy band deformation and the effective wire-width becoming narrower than the wire-width measured from a scanning electron microscope (SEM) image.

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### **Robust Multichannel LMS-type Algorithms with Fast Decaying Transient for Blind identification of Acoustic Channels**

M. A. Haque\*, M. K. Hasan\*\*

#### **Abstract**

The multichannel least mean square (MCLMS) is an attractive and effective algorithm for blind channel identification in the noise-free case. Some recent studies show that the performance of the MCLMS algorithm significantly deteriorates in a noisy environment, that is, the blind MCLMS solution does not remain collinear with the channel vector. Therefore the authors propose non-conventional technique that helps the MCLMS algorithm converge to a novel steady-state solution that is a weighted combination of all the eigenvectors, with the weight profile inversely proportional to the eigenvalues. The improved performance of the proposed solution is verified both analytically and numerically. The algorithm is then optimized by introducing an adaptive step size that ensures fast decay of the transient response, giving stability as well as rapid convergence to the final solution. The authors then apply the proposed technique to different variants of the MCLMS algorithm, including frequency-domain implementations, to achieve a noise-robust performance. Computer simulations are presented that show improved performance of the proposed algorithms for blind identification of both acoustic and random channels with noise.

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### Noise Robust Multichannel Frequency-Domain LMS-type Algorithms for Blind Channel Identification

M. A. Haque\*, M. K. Hasan\*\*

#### Abstract

A number of multichannel least mean square (LMS)-type algorithms have been proposed in the literature to identify single-input multi-output finite impulse response channels. All of these algorithms share the common characteristic of good initial convergence followed by a rapid misconvergence in the presence of noise. This misconvergence characteristic is due to the nonuniform spectral attenuation of the estimated channel coefficients as reported in some research results. In this letter, we formulate a novel cost function that inherently opposes such spectral attenuation resulting from the noisy update vector. We show analytically that the gradient of the proposed penalty term enforces uniform distribution of the estimated channel spectral energy over the entire frequency band and thus contribute to ameliorating the misconvergence of these multichannel algorithms in the presence of noise. The robustness of the proposed algorithm is verified using numerical examples for different channels in a wide range of signal-to-noise ratios.

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## **Implementation of Space Time Block Code Using Base Station Repeater Diversity**

**Mustafa Hussain\***, **R.R. Joyee\*\***, **S. Jahan\***, **M.R. Amin\***

### **Abstract**

This paper considers the combination of space-time codes and repeater diversity to the cellular uplink and downlink. The antenna array used by the space-time code is comprised of the antennas of two or three geographically separated base station repeater antennas. We have analyzed and simulated space-time block codes for the mentioned. Simulation results indicate a significant improvement in energy efficiency at remote locations when the proposed system is used.

**Keywords** – Repeater diversity, Space Time Block Code (STBC), Antenna Diversity, Multiple-Input-Multiple-Output (MIMO).

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**A Numerical Analysis of Plasma-particle Heat exchange during in-flight Treatment of Granulated Powders by Argon-oxygen Induction Thermal Plasmas**

**M. Mofazzal Hossain\***, Yaochun Yao\*\*, Takayuki Watanabe\*\*

**Abstract**

A plasma-particle interaction flow model has been developed to investigate the effects of plasma and particle parameters on the energy transfer to particles, and thermal treatment of soda–lime–silica glass powders. In this paper attention will be given to the effects of individual particle diameter, size distribution, and average diameter, which govern the plasma-particle energy transfer to a large extent. To investigate the size distributions, computations have been carried out for two size distributions: flat and Maxwellian. Computations have also been performed for Maxwellian size distribution with three different average diameter (51, 58 and 84  $\mu\text{m}$ ) powders. It is found that the energy transfer to particles is higher with flat diameter distribution than that of with Maxwellian distribution; however individual particle temperature becomes lower with flat distribution. On the other hand, smaller average diameter of powders leads much heat transfer to powders, but individual particle temperature becomes lower. Both the effects come from the intense cooling of plasma due to the large heat transfer to large number of particles with flat distribution as well as small average diameter powders.

**Keywords:** Plasma temperature; Particle temperature; Energy transfer; Soda–lime–silica glass

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### **Effects of Feed rate and Particle size on the in-flight melting Behavior of Granulated powders in induction Thermal Plasmas**

Yaochun Yao\*, M. Mofazzal Hossain\*\*, Takayuki Watanabe\*, Tomoyuki Tsujimura\*\*\*  
Fuji Funabiki\*\*\*\*, Tetsuji Yano\*\*\*\*

#### **Abstract**

The innovative in-flight glass melting technology with induction thermal plasmas has been performed to investigate the influence of feed rate and particle size on the melting behavior of granulated powders for glass production. Results show that the properties of quenched glass powders are strongly dependent on the feed rate and particle size, especially for the alkali-free glass powders. Higher feed rate and larger particle size lead to lower vitrification degree and decomposition rate of raw material. The average diameter of quenched powders increases with an increase in feed rate and particle size of raw material. The high vitrification degree and decomposition rate obtained in short time shorten the melting and fining time of glass considerably.

**Keywords:** Induction thermal plasma; In-flight melting; Heat transfer; Feed rate; Particle size

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### **Application of In-Flight Melting Technology by RF Induction Thermal Plasmas to Glass Production**

Yao Yaochun\*, M. Mofazzal Hossain\*\*, T. Watanabe\*\*\*, F. Funabiki\*\*\*\*, T. Yano\*\*\*\*

#### **Abstract**

An innovative in-flight glass melting technology with induced thermal plasmas was developed for the purpose of energy conservation and environmental protection. Two-dimensional modeling was used to simulate the thermofluid fields in the plasma torch. The in-flight melting behavior of glass raw material was investigated by various analysis methods. Results showed that the plasma temperature was up to 10000 K with a maximum velocity over 30 m/s, which made it possible to melt the granulated glass raw material within milliseconds. The carbonates in the raw material decomposed completely and the compounds in the raw material attained 100% vitrification during the in-flight time from the nozzle exit to substrate. The particle melting process is similar to the unreacted-core shrinking model.

**Keywords:** induced thermal plasmas, in-flight melting, plasma heat transfer, glass production

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### **A Multi-phase AC arc Discharge and its Application in in-flight Thermal Treatment of raw Glass Powders**

Y. Yao\*, M. Mofazzal Hossain\*\*, T. Watanabe\*, T. Matsuura\*\*\*, F. Funabiki\*\*\*\*  
T. Yano\*\*\*\*

#### **Abstract**

The in-flight melting technology with multi-phase alternating current (AC) arc was developed for the purpose of saving energy and shortening production cycle for glass industry. The 6-phase arc and 12-phase arc were used to investigate the in-flight melting behavior of soda-lime and alkali-free glass powders. Results showed that the vitrification degree of raw materials and the shrinkage of particle diameter increased with the increase of input power. The higher melting temperature and viscosity were responsible for the lower vitrification degree of alkali-free glass powders. Compared with 6-phase arc, 12-phase arc improved the vitrification degree of raw material for the longer residence time and higher plasma temperature under the same transformer current. The high vitrification degree achieved in short time indicated that the new in-flight melting technology with multi-phase ac arc would be a promising method for energy conservation in glass industry.

**Keywords:** Thermal plasmas; Multi-phase ac arc; In-flight melting; Glass production

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## Optimum Location of a Switching Station of an Urban Network

M. Imdadul Islam\*, S. Jahan\*\*, M.R. Amin\*\*

### Abstract

Cost of the wire and expenditure of telephone exchange is major portion of the initial investment of a network. To optimize the cost of wire, the major concerns of a network planner is to determine the number of telephone exchanges and their locations under the jurisdiction of exchange areas. Similarly, in a mobile cellular network location of mobile switching center (MSC) is a vital factor to optimize the length of wired or wireless links between base station controller (BSC) and MSC. This paper applies the existing concept of optimum location of public switched telephone network (PSTN) to mobile cellular network introducing new cost parameter will be helpful for a network planner.

**Keywords** – Optimum cost, service area, demand density, link length and elemental square

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<http://www.elsevier.com/locate/sysarc>

## Synthesis of Quaternary Reversible/Quantum Comparators

Mozammel H. A. Khan\*

### Abstract

Multiple-valued quantum circuits are promising choices for future quantum computing technology, since they have several advantages over binary quantum circuits. Quaternary logic has the advantage that classical binary functions can be very easily represented as quaternary functions by grouping two bits together into quaternary values. Grover's quantum search algorithm requires a sub-circuit called oracle, which takes a set of inputs and gives an output stating whether a given search condition is satisfied or not. Equality, less-than, and greater-than comparisons are widely used as search conditions. In this paper, we show synthesis of quaternary equality, less-than, and greater than comparators on the top of ion-trap realizable 1-qudit gates and 2-qudit Muthukrishnan-Stroud gates.

**Keywords:** Multiple-valued logic, Quaternary comparators, Quaternary logic, Quantum logic, Reversible logic

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<http://www.elsevier.com/locate/sysarc>

### **A Recursive Method for Synthesizing Quantum/Reversible Quaternary Parallel Adder/Subtractor with Look-Ahead Carry**

**Mozammel H. A. Khan\***

#### **Abstract**

Multiple-valued quantum logic circuits are a promising choice for future quantum computing technology since they have several advantages over binary quantum logic circuits. Adder/subtractor is the major component of the ALU of a computer and is also used in quantum oracles. In this paper, we propose a recursive method of hand synthesis of reversible quaternary full-adder circuit using macro-level quaternary controlled gates built on the top of ion-trap realizable 1-qudit quantum gates and 2-qudit Muthukrishnan-Stroud quantum gates. Based on this quaternary full-adder circuit we propose a reversible circuit realizing quaternary parallel adder/subtractor with look-ahead carry. We also show the way of adapting the quaternary parallel adder/subtractor circuit to an encoded binary parallel adder/subtractor circuit by grouping two qubits together into quaternary qudit values.

**Keywords:** Arithmetic circuit, Encoded binary logic, Logic synthesis, Quaternary logic, Quaternary controlled gate, Quantum logic, Reversible logic

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## Design of Reversible/Quantum Ternary Comparator Circuits

Mozammel H. A. Khan\*

### Abstract

Multiple-valued quantum circuits are promising choices for future quantum computing technology, since the multiple-valued quantum system is more compact than the corresponding binary quantum system. Grover's quantum search algorithm requires a sub-circuit called oracle, which takes a set of inputs and gives an output stating whether a given search condition on the inputs is satisfied or not. Equality, less-than, and greater-than comparisons are widely used as search conditions. In this paper, we show design of quantum ternary equality, less-than, and greater-than comparators on the top of ion-trap realizable 1-trit gates and 2-trit Muthukrishnan-Stroud gates.

**Index Terms:** Multiple-valued logic, quantum logic, reversible logic, ternary comparators, ternary logic

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## Cost Reduction in Nearest Neighbour Based Synthesis of Quantum Boolean Circuits

Mozammel H. A. Khan\*

### Abstract

Quantum computer algorithms require an 'oracle' as an integral part. An oracle is a reversible quantum Boolean circuit, where the inputs are kept unchanged at the outputs and the functional outputs are realized along ancillary input constants (0 or 1). Recently, a nearest neighbour template based synthesis method of quantum Boolean circuits has been proposed to overcome the adjacency requirement of the input qubits of physical quantum gates. The method used SWAP gates to bring the input qubits of quantum CNOT or C<sup>2</sup>NOT gates adjacent. In this paper, we propose cost reduction techniques such as ancillary constant determination to reduce the number of NOT gates and variable ordering and product grouping to reduce the number of SWAP gates required in nearest neighbour template based synthesis. The proposed approach significantly reduces the quantum realization cost of the synthesized quantum Boolean circuit than that of the original nearest neighbour template based synthesis.

**Index Terms:** Ancillary constant determination, nearest neighbour template, product grouping, quantum Boolean circuit, fixed polarity Reed-Muller expression, reversible logic, variable ordering

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## **Solitary Waves in a Four Component Dusty Plasma with Nonthermal electron**

Kaushik Roy\*, Gurudas Mandal\*\*, Prasanta Chatterjee\*

### **Abstract**

Nonlinear dust acoustic waves are studied in a four component dusty plasma. Nonthermal distributions for electrons are considered. The KdV equation is derived by Reductive perturbation technique. It is seen that a parameter related to nonthermal distribution of electron has a significant effect on the amplitude and width of the solitary wave. The other parameters have also non-insignificant effect on the existence of solitary wave.

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## Framework for Synthesis of Universal Networking Language

Md. Ershadul H. Choudhury\*, Md. Nawab Yousuf Ali\*\*

### Abstract

This paper presents the specifications of Universal Networking Language (UNL), a project undertaken under the auspices of the United Nations University (UNU) in Tokyo and for a framework for integration of Bangla language to UNL. The mission of the UNU project is to allow people across nations to access information in Internet in their own language\_ a step to help bridge the digital divide. The core of the project is UNL, a language independent specification for serving as a common medium for documents in different languages. Researchers involved in this project from different countries have been developing UNL systems for their respective native languages. The process basically involves i) building a native language to UNL dictionary and ii) deriving language specific syntactic rules called analysis rules for parsing/ translating native language corpora to UNL and vice versa. In this paper we present parallel works for developing a framework for synthesizing Bangla to UNL that involves building a Bangla to UNL dictionary and parsing sentences to UNL. To the best of our knowledge this is a pioneering work in Bangla.

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### Performance Comparison of Zero-Schottky-Barrier Single and Double Walled Carbon Nanotube Transistors

Md. Abdul Wahab\*, Khairul Alam\*\*

#### Abstract

Atomistic quantum simulation is performed to compare the performance of zero-Schottky-barrier single walled (SW) and double walled (DW) carbon nanotube transistors having almost equal magnitude of band gap. The DW nanotube is generated from two semiconducting SW tubes and the SW tube is the outer tube of the DW nanotube. The DW nanotube transistor has better off current, better inverse subthreshold slope, and better on/off current ratio. The SW nanotube transistor has better on current and switching performance. The better switching performance of SW nanotube transistor is the consequence of higher transconductance and on current that results from current saturation in DW nanotube transistor after source-channel flat band condition. The inverse subthreshold slope of DW nanotube transistor is 63.11 mV/dec and that of SW nanotube transistor is 65.26 mV/dec. The on-state transconductance is 21.0963  $\mu\text{S}$  and 1.5023  $\mu\text{S}$ , the intrinsic switching delay is 33.6415 fs and 55.0184 fs, respectively for SW and DW nanotube transistors.

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**The Effects of Doping, Gate Length, and Gate Dielectric on Inverse  
Subthreshold Slope and on/off Current Ratio of a Top Gate Silicon Nanowire  
Transistor**

Sishir Bhowmick\*, Khairul Alam\*\*, Q. D. M. Khosru\*

**Abstract**

The effects of gate length  $L_g$ , gate dielectric constant  $\epsilon_{ox}$ , gate oxide thickness  $t_{ox}$ , and source/drain doping concentration on inverse subthreshold slope and on/off current ratio of a top gate silicon nanowire on insulator device are studied using three dimensional quantum simulation. The variation of inverse subthreshold slope and on/off current ratio are very sensitive to gate length, gate dielectric constant, and oxide thickness and relatively less sensitive to doping concentration. Significant improvement in subthreshold slope and on/off current ratio can be achieved using high-K gate dielectric with thinner oxide and relatively longer gate. The key feature of this improvement is the better gate control of channel potential with longer  $L_g$ , higher  $\epsilon_{ox}$ , and thinner  $t_{ox}$ . Due to better control of channel potential, the tunneling current through the conduction band is significantly suppressed in the subthreshold regime that improves the subthreshold slope and on/off current ratio.

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### Effects of Uniaxial Strain on the Bandstructures of Silicon Nanowires

Redwan Noor Sajjad\*, Khairul Alam\*\*, Q. D. M. Khosru\*

#### Abstract

The effects of uniaxial strain on the band structures of  $\langle 100 \rangle$  silicon nanowires of width 2.75 - 3.84 nm are studied using  $sp^3d^5s^*$  orbital basis atomistic tight binding approach. The conduction band edge at  $\Gamma$  point has almost no variation with strain and the second valley located at  $0.36 \times (\pi/a)$  of the wire Brillouin zone moves down in energy with both compressive and tensile strains. The top valence band moves up in energy with both tensile and compressive strain, and therefore, the band gap reduces with both types of strain. We notice about 7% change in band gap for an application of 2% strain. The electron effective masses at  $\Delta_4$  and  $\Delta_2$  valleys show opposite dependence on strain, and the hole effective mass of top valence band has almost similar variation with both types of strain. We notice a significant change in hole effective mass with strain.

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### **Specific Features of a Converter of Web Documents from Bengali to Universal Networking Language**

**Md. Nawab Yousuf Ali\***, Jugal Krishna Das\*\*, S. M. Abdullah Al-Mamun\*\*\*  
Md. Ershadul H. Choudhury\*\*\*\*

#### **Abstract**

In this paper, we present a workable structure along with characteristic features of a subsystem that may become an integral part of a Language Server bridging Bengali and the Universal Networking Language (UNL). We try to assimilate the results of the research efforts of the UNL community and also of various machine translation projects. Vast information resources in different languages are available in the Internet, but they cannot be shared (because of vastity due to the language barrier). And the UNL community is set to devise an effective and efficient system to diminish that barrier with an ultimate aim to allow automatic conversion of web based resources in one member language to that in another member language. A good number of researchers in computational linguistics all over the world have already joined hands with the UNL initiators, and research groups representing most widely used natural languages are working intensively for the purpose. This paper is to demonstrate our pioneering efforts in the field of Bengali (Bangla). Here we here outline a possible Bangla-UNL dictionary, feature an annotation editor for Bangla texts, infer significant morphological, syntactic and semantic rules for parsing Bangla web documents in connection with conversion to the UNL, and show possible ways of future contribution towards the goal.

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## **Morphological Analysis of Bangla Words for Universal Networking Language**

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Abu Mohammad Nurannabi\*\*\*\*

### **Abstract**

This paper focuses on morphological analysis of Bangla words to incorporate them into Bangla to Universal Networking Language (UNL) processors. Researchers have been working on morphological structure of Bangla for machine translation and a considerable volume of work is available. So far, no attempt has been made to integrate the works for a concrete computational output. In this paper we particularly emphasize on bringing previous works on morphological analysis in the framework of UNL, with the goal to produce a Bangla-UNL dictionary, as UNL structures can provide, for any morphological analysis, a unified base to fit into already developed universal conversion systems of UNL. We explain the morphological rules of Bangla words for UNL structures. These rules tend to expose the modifications of parts of speech with regards to tense, person, subject etc. of the words of a sentence. Here we outline the morphology of nouns, verbs and adjective phrases only.

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## Decision Combining in Relay Networks

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### Abstract

We consider a non-coherent detection of  $M$ -ary FSK modulated signals over a slow, Rayleigh fading channel in a wireless relay network. The network consists of a single source-destination pair and a number of relays ( $L$ ), which employ cooperative diversity. We study the probability of error performance of an amplify and forward relay technique. Performance of a counting rule and a square law combiner are studied. We derive closed form expressions for probabilities of error for equal relay channel average SNR. For unequal relay channel SNRs, we resort to random number simulations to estimate the error probabilities. We examine different combinations of  $M$  and  $L$  for a range of average SNR values. Although the square law combiner outperforms the counting rule for equal SNR case and small average SNRs, the loss in performance is not high. Simplicity of counting rule may be advantageous in some cases.

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5th International Conference on Electrical and Computer Engineering (ICECE),  
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### Optimization of k-Fold Multicast Wireless Network Using M/M/n/n+q Traffic Model

Asfara R. Towfiq\*, N. A. Siddiky\*, Md. Imdadul Islam\*\*, M. R. Amin\*

#### Abstract

An analytical model has been developed to determine the suitable value of the fold  $k$  of a  $k$ -fold multicast network with different traffic loads under Poisson traffic with finite queue. We have derived stationary probability distribution for the network states and then derived expressions for the throughput and the blocking probability of the network. It has been found in this study that the network throughput increases very fast as we increase the fold number. However, beyond a threshold value of  $k$  the throughput profile becomes flat. We have also observed that as the offered traffic is increased, the throughput also increases. It has also been found that as the system parameter  $k$  is increased, the blocking probability decreases. However, after an optimum value of  $k$ , the blocking probability remains constant for particular value of the offered traffic.

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### **Performance Analysis and the Study of the behavior of MPLS Protocols**

Md. Arifur Rahman\*, Ahmedul Haque Kabir\*, K. A. M. Lutfullah\*, Zahedul Hassan\*\*  
M. R. Amin\*

#### **Abstract**

MultiProtocol label switching (MPLS) is the new means to take care of the fastest growing communication network to enhance the speed, scalability and service provisioning capabilities. In order to optimize the use of transmission resources, MPLS carries differentiated services across the Internet through a virtual path capability between packet (label) switches. MPLS also has the capabilities to engineer traffic tunnels by avoiding congestion and utilizing all available bandwidth with an efficient manner. The core value of MPLS is followed by the comparison of MPLS network with the existing network and MPLS signaling protocols: Constrained based Label Distribution Protocol (CR-LDP), Resource Reservation Protocol (RSVP) and Traffic Extension RSVP(RSVP-TE) maintaining the Quality of Service(QoS) parameters and their performance analysis as well. In such context, a full comprehensive simulation environment is created for a conventional network and MPLS applied over that traditional network to evaluate the comparative performance of network traffic behavior and the functionalities of MPLS signaling protocols as well. Finally, the results are evaluated and analyzed, and their behaviors are shown by means of graphical manner.

**Keywords** – Label Switching, MPLS, LDP, CR-LDP, RSVP, RSVP-TE, QoS, Network Simulator (NS2).

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**Evaluation of Traffic Parameters of Multidimensional Traffic of a Combined Link Using a Tabular Method**

Md. Imdadul Islam\*, Md. Shahriar Karim\*\*, J. K. Das\* , M. R. Amin\*\*\*

**Abstract**

In many communication systems, two or more traffic links are merged together to form a common trunk line. Usually, a Markovian technique is used to determine the different traffic parameters of aforementioned combined trunk line. But the technique does not hold good and also the Markov chain takes a complex shape for a network where offered traffics are more than two different types. In this paper, we propose a tabular method instead of a Markovian technique for calculating various traffic parameters of a network with multimedia traffic, applicable in mobile cellular networks. It is found in this work that the proposed tabular method overcomes the complexities of the Markovian approach and yields similar results.

**Keywords:** Call blocking, combined trunk, Markov chain, M/M/n traffic model, multimedia

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December 20-22, Dhaka, Vol. 1, pp. 158 – 161, Bangladesh, 2008

**Direct Extraction of Interface Trap States from the Low Frequency Gate C-V  
Characteristics of MOS Devices with Ultrathin High-K Gate Dielectrics**

Md. M. Satter\*, Anisul Haque\*\*

**Abstract**

A simple but accurate  $D_{it}$  extraction technique has been proposed from low frequency C-V characteristics of MOS devices with ultrathin high-K gate dielectrics. The proposed method incorporates quantum mechanical effect with wave function penetration for theoretical calculation of MOS electrostatics. Fermi-Dirac distribution function and the effect of finite temperature have also been included in the proposed technique. The extraction technique has been applied to different simulated devices with different  $D_{it}$  profiles. Excellent agreement has been found between extracted and actual  $D_{it}$  profiles.

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**Effect of Gate Bias on Channel in Depletion all-around Operation of the SOI  
Four-Gate Transistor**

S. Jahangir\*, Q. D. M. Khosru\*, Anisul Haque\*\*

**Abstract**

In depletion-all around (DAA) operation of SOI four-gate transistor ( $G^4$ -FET), the conducting channel can be surrounded by depletion regions induced by independent vertical MOS gates and lateral JFET gates. This enables majority carriers to flow through the volume of the silicon film far from both silicon/oxide and p+ gate/n-channel interfaces. A numerical model using FEMLAB with MATLAB is developed to obtain the potential distribution solving 2-D Poisson equation using finite element method. This model is extendable to fully depleted (FD) structure. Using this model, effect of gate bias on the location and size of the conducting channel is studied. Gradual change of the size of the conducting channel from drain to source is also studied when drain is positively biased. Under appropriate gate bias voltages, the cross-section of the channel may be made sufficiently narrow to invoke quantum mechanical effects.

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December 20-22, Dhaka, Bangladesh, pp. 434 – 437, 2008

**Gate C-V Characteristics of Si MOSFETs with Uniaxial Strain along <110>  
Direction**

M. I. B. Shams\*, Q. D. M. Khosru\*, Anisul Haque\*\*

**Abstract**

Gate C-V characteristics of nMOSFETs fabricated on 100 silicon and subjected to a uniaxial strain applied along the <110> direction are studied. MOS electrostatics is calculated by solving self-consistent Schrödinger-Poisson equations including wave-function penetration into the gate dielectrics. It is observed that the gate capacitance increases in strong inversion with strain, but is relatively unaffected by strain in depletion region. This is due to the changes in the electron quantization mass and density of states effective mass with strain. We have also found that the effect of strain on the gate capacitance is not sensitive to changes in the substrate doping density.

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**5th International Conference on Electrical and Computer Engineering (ICECE),**  
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### **Inversion Layer Properties of <110> Uniaxially Strained Silicon n-Channel MOSFETs**

S. N. Rahman\*, H. M. Faraby\*\*, Md M. Rahman\*, Md. Q. Huda\*, Anisul Haque\*\*\*

#### **Abstract**

This paper discusses the influence of <110> uniaxial tensile stress on some of the inversion layer properties of (100) silicon n-channel MOSFETs. Quantum mechanical calculations are performed assuming Airy function approximation holds. Uniaxial tensile strain lowers the eigen-energies and increases the occupation of the ground state. Average inversion layer penetration is also increased. The change in the surface electric field due to strain is insignificant.

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### On MIMO Channel Shortening for Cyclic-Prefixed System

Toufiqul Islam\*, M. K. Hasan\*\*

#### Abstract

In this paper, we consider channel shortening for cyclic-prefixed block transmission system over multiple input multiple output (MIMO) channels. A time domain equalizer (TEQ) is necessary at the receiver front end to mitigate inter symbol interference (ISI). Melsa, Younce, and Rohrs proposed the most popular MSSNR channel shortening method for single input single output (SISO) channels based on minimizing the energy of the shortened impulse response (SIR) outside the target window while keeping the energy inside constant. Because of computational simplicity of the MSSNR method, we extended this method directly for MIMO channels unlike other MIMO TEQ design methods which perform shortening in multiple stages. We compare our scheme with other MIMO TEQ design techniques for equalization SNR, energy compaction ratio, signal to interference plus noise ratio and bit rate. The results show significant improvement over some reported techniques.

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## **A Multiband Approach for Voiced/unvoiced Discrimination of Speech Signals**

M. K. I. Mollah\*, K. Hirose\*, N. Minematsu\*\*, **M. K. Hasan\*\*\***

### **Abstract**

This paper presents a new technique for voiced/unvoiced (V/UV) discrimination based on sub-band zero-crossing rate (ZCR) and energy distributions of speech signal. Empirical mode decomposition (EMD) is employed here in multiband representation of speech signals. The autocorrelation function (ACF) of speech segment is decomposed using EMD into the data-adaptive bases termed as intrinsic mode functions (IMFs). The zero crossing rate (ZCR) for individual IMF is computed and the overall ZCR is obtained as the weighted sum of individual one. The marginal Hilbert spectra (MHS) are computed by applying Hilbert transformation in the EMD domain. The combination of these two features (sub-band ZCR and MHS) is used in classifying V/UV speech segments. The experimental results show that the performance of the proposed method is noticeable compared to other reported methods.

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December 20-22, Dhaka, Bangladesh, Vol. 1 pp. 428-433, 2008

**Least-Squares Optimal Variable Step-size LMS for Nonblind System Identification with Noise**

M. A. Wahab\*, M. Adel Uzzaman\*, M. S. Hai\*, M. A. Haque\*, **M. K. Hasan\*\***

**Abstract**

This paper proposes a least-square optimal variable-step-size (LSVSS) least-mean-square (LMS) adaptive algorithm for nonblind identification of single-input single-output (SISO) finite impulse response systems. It is shown that the well-known normalized LMS (NLMS) and the LSVSS-LMS algorithms are mathematically equivalent for the noise-free case. The derivation of LSVSS is then extended for noisy measurements. The convergence analysis of the LSVSS-LMS is also presented. The performance of the proposed method is compared with the conventional robust variable-step-size LMS algorithms. Experimental results demonstrate improved performance of the proposed algorithm for nonblind system identification in both stationary and nonstationary environments.

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### **Noise Optimized Minimum Delay Spread Equalizer Design for DMT Transceivers**

Toufiqul Islam\*, Satya Prasad Majumder\*, **M. K. Hasan\*\***

#### **Abstract**

Time-domain equalizer (TEQ) design for multicarrier transceivers has recently received much attention. In this paper, we consider generalization of one such design method which takes into account the noise observed in discrete multitone (DMT) systems. We propose an iterative TEQ design method which jointly minimizes delay spread of the channel and filtered noise at the output of the equalizer. Experimental results show that our method can successfully minimize delay spread and noise when compared to other reported techniques.

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*Proc. of the 2<sup>nd</sup> International Conference on Anti-Counterfeiting, Security and Identification (ASID)*, August 20-23, Guiyang, China, pp 235-240, IEEE Xplore, 2008

### **A Proposal for Enhancing The Security System of Short Message Service in GSM**

**Md. Asif Hossain\***, Sarwar Jahan\*, M. M. Hussain\*, M.R. Amin\*, S. H. Shah Newaz\*\*

#### **Abstract**

Short message service (SMS) will play a very vital role in the future business areas whose are popularly known as m- Commerce, mobile banking etc. For this future commerce, SMS could make a mobile device in a business tool as it has the availability and the effectiveness. The existing SMS is not free from the eavesdropping, but security is the main concern for any business company such as banks who will provide these mobile banking. Presently there is no such scheme which can give the complete SMS security. In this paper, we have proposed a security scheme for improving the SMS security. At first plaintext of SMS would be made as cipher text with the help of existing GSM encryption technology, then this cipher text would be digitally signed with the help of public key signature. These have to be made compatible to existing infrastructure of GSM security. The proposed scheme will give total authenticity, data integrity, confidentiality, authorization and non-repudiation which are the most essential issues in m-commerce or mobile banking and in secure messaging.

**Keywords-component:** SMS, mobile banking, ciphering, digital signature, public key algorithm, public key signature, data integrity, authenticity etc.

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### Modeling and Numerical Analysis of Thermal Treatment of Granulated Porous Particles by Induction Plasma

M. Mofazzal Hossain\*, Y. Yao\*\*, M. Rafiqul Alam\*\*\*, M. Maksud Alam\*  
T. Watanabe\*\*\*\*

#### Abstract

In this paper it is aimed to describe the modeling and numerical analysis of thermal treatment of granulated porous particles by induction plasma. To investigate the heat exchange dynamics between plasma and particles during the flight of granulated porous particles through the hot plasma, a plasma-particle interactive flow model has been developed. This model solves the conservation equations to predict the temperature and flow fields of plasma, under local thermal equilibrium (LTE) conditions, and then computes the injected particles trajectories temperature and size histories, and the particle source terms to incorporate the particle loading effects. It is found that the size and dose of injected particles greatly affect the particle trajectory and temperature, and hence the heat transfer to particles at higher powder feed-rate.

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### **Performance Evaluation of DODE of a Voice/Data Integrated Wireless Mobile Network**

H. M. Rahat\*, Runa Laila\*, Sabiha Rahman Juthy\*, Md. Imdadul Islam\*\*, M. R. Amin\*

#### **Abstract**

An analytical model has been developed to improve the performance of a wireless mobile communication network with voice and data integrated traffic system. To reduce the probability of no channel available, which is an important quantity for performance evaluation, delays to the last data end user is introduced to the system. It has been found that by applying a very small delay to the last data end user, the probability of no channel available can be drastically reduced compared to the usual erlang case.

**Index Terms**-last data end user, performance evaluation, probability of no channel available voice/data integration.

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### **An Application Specific Integrated Circuit for Optimization of Fixed Polarity Reed-Muller Expressions**

**Tahseen Kamal\*, Mozammil H. A. Khan\*\***

#### **Abstract**

EXOR-based logic circuits have become more popular than AND-OR circuits because they have some specific advantages over AND-OR realizations. Two-level AND-EXOR logic is one of the EXOR-based logics, which is also known as Reed-Muller logic. A Fixed Polarity Reed-Muller (FPRM) expression is one of the seven classes of AND-EXOR logic expressions. An FPRM expression is canonical and uses a fixed polarity for each variable. An  $n$ -variable function has  $2^n$  different polarity vectors; consequently, there are  $2^n$  different FPRM expressions. The expression with minimum number of products is the minimum FPRM expression. Therefore, the minimization problem of FPRM expressions is to find a polarity vector that produces an FPRM expression with minimum number of products. There are many software methods for FPRM minimization which are sequential in nature and require exponential execution time. In this work an ASIC has been developed to minimize 3-variable FPRM expressions which is parallel in nature and requires constant time. This ASIC takes the minterm coefficients of a Boolean function as input. It generates all the polarity vectors for a three variable function and determines the optimum polarity and corresponding FPRM coefficients.

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### **Genetic Algorithm Based Synthesis of Ternary Reversible/Quantum Circuit**

Rashida Khanom\*, Tahseen Kamal\*\*, Mozammel H. A. Khan\*

#### **Abstract**

Reversible / Quantum circuits are believed to be one of the future computer technologies. In this paper, a Genetic Algorithm (GA) based synthesis of ternary reversible / quantum circuits using Muthukrishnan-Stroud gates is presented. The circuit generated by GA may contain redundant gates. We have used post GA reduction to eliminate these redundant gates. We have experimented with ternary half-adder circuit. The proposed GA converges for many combinations of crossover and mutation.

**Index Terms:** Reversible logic, half-adder, quantum circuit, post GA reduction

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### **Minimization of Quaternary Galois Field Sum of Products Expression for Multi-Output Quaternary Logic Function using Quaternary Galois Field Decision Diagram**

**Mozammel H. A. Khan\***, Nafisa K. Siddika\*, Marek A. Perkowski\*\*

#### **Abstract**

A quaternary logic function expressed as quaternary Galois field sum of products (QGFSOP) expression can be realized as a cascade of quaternary 1-qudit, Feynman, and Toffoli gates. In this paper, we have presented a heuristic algorithm for simultaneous variable ordering and quaternary Galois field expansion selection for constructing optimal quaternary Galois field decision diagram (QGFDD). We have also shown the way of flattening the QGFDD for generating QGFSOP expression. We have written Java program to construct QGFDD for multi-output quaternary functions and provided experimental results.

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## **Reversible Realization of Quaternary Decoder, Multiplexer, and Demultiplexer Circuits**

**Mozammel H. A. Khan\***

### **Abstract**

Quaternary logic is very suitable for encoded realization of binary logic functions by grouping 2-bits together into quaternary digits. This sort of quaternary encoded reversible realization of binary logic function requires half times input/output lines than the original binary reversible realization. Quaternary decoder, multiplexer, and demultiplexer are very important building blocks of quaternary digital systems. In this paper, we show reversible realization of these circuits using quaternary reversible gates like quaternary shift gates (QSG), quaternary controlled shift gates (QCSG), and quaternary Toffoli gates (QTG). We also show the realization of multi-digit QCSG and QTG using QSG and QCSG, which are realizable using liquid ion-trap quantum technology and other reversible technologies.

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**A Comparison of the Quantum Mechanical Corrections in Surface Potential based MOSFET Compact Models**

M. A. Karim\*, Anisul Haque\*

**Abstract**

Compact models of MOSFETs are important for simulation of electronic circuits. Surface potential based compact models have become popular for sub 100 nm MOSFETs. However, these models are based on semi classical analysis and quantum mechanical effects, important in nano-MOS devices, are added to the surface potential terms separately. In this study we have investigated the accuracy of quantum mechanical corrections to surface potential based MOSFET compact models. Results show that the existing quantum mechanical corrections are not accurate, particularly with respect to the derivative of the surface potential.

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*Proc. of the 5th International Conference on Electrical and Computer Engineering (ICECE)* December 20-22, Dhaka, Bangladesh, pp. 745 – 749, 2008

### **Improved VLSI Circuit Performance using Localized Power Decoupling**

Laila S. Sraboni\*, Ophelia Mohaimen\*, Rezwana H. Mustazir\*, S. M. Salahuddin\*, Md Ishfaqur Raza\*

#### **Abstract**

Power droop in the silicon is a major cause for system performance degradation. Higher frequency of operation and reduced power levels are limiting the timing and voltage budget, which is designed in circuits to account for system noise, which includes voltage drooping due to inductive losses. Novel techniques are evolving to compensate for these losses at all levels, starting from motherboard, package, down in to silicon. Due to lack of available space and design constraints, decoupling at the die level is very limited. In this paper a proposal is made to provide for decoupling at the CMOS levels, right where the power is needed. Advanced technology for DRAM capacitors is proposed for use in this paper for the decoupling strategy. Simulation of sub 100 nm multi-metal layer circuit demonstrates the advantage of proposed localized decoupling.

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**Reconfigurable Monocycle Pulse Based UWB Transmitter in 0.18 $\mu$ m CMOS for Intra/Inter Chip Wireless Interconnect**

S. M. Salahuddin\*, Salahuddin Raju\*\*, P. K. Saha\*\*\*

**Abstract**

Ultra wide band (UWB) communication has got special attention as a promising radio technology for networks delivering extremely high data rate with relatively low power consumption at short distance. In this paper we are reporting a new Monocycle Pulse (MCP) generation technique which can be used in a single chip implementation of Impulse Radio based ultra wideband (UWB) transceiver architecture for high speed intra/interchip communication. The proposed MCP based UWB transmitter is implemented in 0.18 $\mu$ m CMOS process. The performance and simulation results of the circuit is presented in this paper. The MCP is found to be reconfigurable; therefore it is possible to control the data rate.

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### **Modified Physical Configuration to Compensate Parasitic Effects in High Speed Systems**

Saad Bin Abul Kashem\*, Salahuddin Raju\*\*, Md Ishfaqur Raza\*

#### **Abstract**

With systems operating at higher frequencies, parasitic effects are taking larger shares of the voltage and timing budget of a circuit. Also smaller devices have shrunken landscape for components, increasing coupling between critical physical features. These undesired loading on otherwise uniform transmission lines introduce impedance discontinuities which degrades signal quality and strains the performance metrics. This paper introduces a concept of compensating coupling effects by modifying transmission line physical characteristics. The modification in the line dimensions is calibrated to compensate the lumped equivalent of the coupling effect. High speed system spice simulation and S-parameter analysis has demonstrated the effectiveness of this methodology.

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## Index of EWU Authors

- Anisul Haque, 39, 63, 64, 65, 66, 78  
Afia Arafat, 30  
Akhter Jahan, 29, 33  
Basanta Kumar Barmon, 1  
Farzana Akhter, 25  
Gurudas Mandal, 52  
Khairul Alam, 37, 38, 54, 55, 56  
Kohinoor Biswas, 19  
M. Sayeed Alam, 15, 16, 17, 18, 19  
Mahmud Zubayer, 6, 17  
Mamunur Rashid, 6  
M. A. Karim, 78  
M. K. Hasan, 40, 41, 67, 68, 69, 70  
Mozammel H. A. Khan, 48, 49, 50, 51, 74, 75, 76, 77  
Monowar Hossain Mahmood, 9  
M. Mofazzal Hossain, 43, 44, 45, 46, 72  
M. Maksud Alam, 72  
M.R. Amin, 35, 36, 42, 47, 60, 61, 62, 71, 73  
Mustafa Hussain, 42, 71  
Md. Asif Hossain, 71  
Md. Farhan Faruqui, 16, 19  
Md Gazi Salah Uddin, 10, 13, 22  
Md. Humayun Kabir Chowdhury, 2, 5  
Md. Ishfaqur Raza, 79, 81  
Md. Kamrul Hassan, 14, 15  
Md. Nawab Yousuf Ali, 53, 57, 58  
Muhammed Shahriar Haque, 24, 26, 27, 28, 31, 32  
Nargis Akhter, 14  
Nazrul Islam, 3, 7, 20, 21  
Sardana Islam Khan, 4, 8, 12, 14  
Saadia Shabnam, 9  
S. I. Nusrat A. Chaudhury, 6, 18  
Sharmin R Ara, 59  
Sabiha Rahman Juthy, 73  
S. Jahan, 42, 47, 71  
S. M. Salahuddin, 79, 80  
Tanbir Ahmed Chowdhury, 11  
Taskina Ali, 12  
Tahseen Kamal, 74, 75



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