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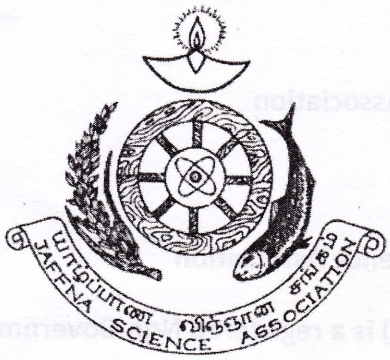

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Editor's Review

The Jaffna Science Association, an NGO, was established in 1991 by the founder President late Prof.A.Thurairajah with the primary objectives such as dissemination of scientific knowledge among the intellectuals in Jaffna region, encouraging national as well as regional research studies and presenting them in the Jaffna society and advancement of scientific knowledge among the secondary school students and at the undergraduate level. With these primary goals, the Association has conducted seventeen Annual Conferences under the guidance of seventeen executive committees throughout the completed two decades of services.

Every year, specific themes relevant to the region depending on the socio-cultural, socio-economic, and socio-political dimensions dominated the situations were identified and focused. The members of the JSA and their research collaborates are encouraged to carry-out researches relevant to the themes and submit their findings which are to be presented at the Annual Conferences. However, all other relevant research findings are also accommodated for dissemination of scientific knowledge. The abstracts and extended abstracts are accepted and subjected to national and international reviews. The Abstracts recognized by the evaluators are published in the annual proceedings of the Association.

The present eighteenth executive committee has arranged its eighteenth Annual Conference during 6-8 April 2011 and undertook the responsibility of publishing the abstracts of presentations to be held in the eighteenth Annual Conference during 6th – 8th April 2011. The abstracts submitted by the contributors have been compiled, organized and appropriately edited according to the recommendations from evaluators in this volume of release. This volume has a total of 27 papers from all the four sections of the JSA.

It is my great pleasure in releasing this volume of the proceedings of abstracts to be presented in the Eighteenth Annual Sessions of the Jaffna Science Association on 7th of April 2011.

Prof.C.Elankumaran
Chief Editor / JSA

Department of Economics,
University of Jaffna.

Contents – Research Presentations

Abstracts included in this volume are recognized for publication only when the related papers are presented and defended at the annual research sessions by one of the author who is a member of the JSA. The presentations are to be held on 07.04.2011 from 01.30 pm.

Eighteenth Executive Committee

April 2010 – March 2011

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A1

Bursting Effect of Potassium Concentration on Neural Network

Selvarajan. S and Srisatkunarajah. S.
Department of Mathematics and Statistics, University of Jaffna, Sri Lanka.

Neural network has been widely used to simulate brain activities. In fact, for simulating different types of brain functions, studies have been performed on the dynamics of neuron when used in a neural network. Recently a biophysical neuron model was used to simulate synchronized bursting in neural network by introducing external input current as background activity of the entire neural system. It was noted that maps of the neuron exhibit different types of trajectories similar to those were observed in some *in-vitro* and *in-vivo* experiments. Objective of this paper is to investigate the effect of the potassium concentration and synaptic weights changes on neuron dynamics in its network. An established relationship between potassium concentration and the membrane potential of the neuron is used to introduce the effect of potassium concentration. This is an innovative Approach. Neuron dynamics strongly depends on the synaptic weights irrespective of whether synaptic type is excitatory or inhibitory.

It was observed that bursting behavior due to the neuron excitability was affected by outside potassium concentration. It was also observed that the high potassium concentration and large value of synaptic weights makes high bursting activity in neurons similar to spontaneous bursting generally found in the central nerves system. Thus the population level behavior of the single neuron found to be very unstable to the outside potassium concentration changes and the value of synaptic weights between neurons. Thus the normal brain and abnormal brain signals are simulated by applying the external input current at low and high rate of potassium concentration. It is an important feature that would generate awareness among the scientists working on brain simulation.

Key words: Neural network, Brain simulation, Potassium concentration.

A2

Unified Sufficient Global Optimality Condition for Mathematical Programming Problems with Mixed Variables

Selvarajan. S and Srisatkunarajah. S
Department of Mathematics and Statistics, University of Jaffna, Sri Lanka.

Consider the following mathematical programming problem with continuous and discrete variables:

$$\begin{aligned} (MP) \quad & Minimize \quad f_0(x) \\ & subject\ to\ f_j(x) \le 0, \quad j = 1, 2, ..., m, \\ & x_i \in [u_i, v_i], \quad i \in I, \\ & x_i \in \{u_i, v_i\}, \quad i \in J, \\ & I \cap J = \phi, \quad I \cup J = \{1, 2, ..., n\}, \end{aligned}$$

where $u_i, v_i \in \mathbf{R}$, $u_i < v_i$ and f_j's are continuously differentiable on the feasible set D of (MP). Note that x_i's, $i \in I$ are continuous variables and x_i's, $i \in J$ are discrete variables. Model problems of the form (MP) appear in numerous application areas including electronic circuit design and combinatorial optimization. Recently a KKT sufficient optimality condition has been reported for box constrained problems, where $J = \phi$; no discrete variables. In this paper the following unified sufficient global optimality condition is established for a local minimizer $\bar{x}$ of (MP) to be a global minimizer, extending and improving the recent results.

Theorem: For (MP), let $\bar{x}$ be a local minimizer. If

$$\nabla^2 L(x, \bar{\lambda}) - diag\left(\frac{2\chi_1(f)(\nabla(L(\bar{x}, \bar{\lambda})))_1}{(v_1 - u_1)}, ..., \frac{2\chi_n(f)(\nabla(L(\bar{x}, \bar{\lambda})))_n}{(v_n - u_n)} \right) \text{ is a}$$

positive semi-definite matrix for all $x \in D$ and for a Lagrange multiplier $\bar{\lambda}$ associated with the local minimizer then $\bar{x}$ is a global minimizer of (MP), where $L(x, \lambda) = f_0(x) + \sum_{j=1}^{m} \lambda_j f_j(x)$, $\lambda \in \mathbf{R}_+^m$. denotes the usual Lagrangian function and

$$\chi_i(f) = \begin{cases} -1 & if \quad (\bar{x})_i = u_i, \\ (\nabla f(\bar{x}))_i & if \quad (\bar{x})_i \in (u_i, v_i), \\ 1 & if \quad (\bar{x})_i = v_i. \end{cases}$$

Key Words: Mathematical Programming, Global Optimality, Mixed Variables.

A3

Properties of Dose Depth Curves of Light Ions used in Ion Therapies

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In cancer treatment and radiation biology, the dose deposition by light ions has more impact than photons. This is due to the properties of dose depth curve of ions. A Monte Carlo simulation program (SRIM- Stopping Range of Ions in Matter-2008) which is available on public domain was used to determine the properties of dose depth curves. The results are of particular interest to workers involved in cancer therapy with light ion beams.

In this study, the energies of light ions such as H^+, He^+, C^+, and Ne^+ which give the total range nearly 0 to 25 cm, were selected for targeting the muscle tissue to obtain the properties of dose depth curves by using simulations. The maximum dose, the depth at maximum dose, the length of the tail and the dose at the surface of the body for light ions (H, He, C and Ne) targeted on skeletal muscle tissue were obtained. The variation of the distance at maximum dose with energy clearly illustrates how much energy of an ion needed to destroy a cancer cell at a particular depth inside the body. Except Helium ion, distance at which maximum dose occurs decreases with the energy per nucleon.

The initial dose and maximum dose shows almost same behaviour in their variations with energy of the ions; both increase with atomic mass of the ion. The length of the tail increases with the energy of the ion. In the case of heavy ions fragmentation of ions is not considered in SRIM model so that our results contradict with original results. The obtained variations of the properties of Bragg peak were analyzed to find out both advantages and disadvantages of light ion dose depositions in the ion therapy.

Key words: Monte Carlo simulations, Bragg peak.

A4

Fabrication and characterization of some metal oxides samples

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This study focus on fabrication and characterization of Nickel, Lead, Zinc and Silver Oxide thin films formed on glass substrates by using chemical bath deposition method. One of the advantageous of this method is that it allows depositing compound material at low temperatures. In these studies, the UV-Visible absorption and Hall Effect measurements were performed on all the thin film samples of thickness from 50 to 80 μm. The current voltage (I-V) measurements were also performed on these samples at different temperature and at different light intensities. Thicknesses of these samples were measured using a dial indicator.

$NaOH_{(aq)}$, $AgNO_{3(aq)}$ and $KMnO_4$ were used to fabricate Silver (I) Oxide; $Pb(NO_3)_{2(aq)}$, $NaOH_{(aq)}$ and $EDTA_{(aq)}$ were used to form Lead Oxide; and $Ni(NO_3)_{2(aq)}$ and $CO(NH_2)_{2(aq)}$ were used to fabricate Nickel Oxide. Zinc Oxide thin films were prepared from $ZnCH_3(COO)_2.2H_2O$ and KOH dissolved in methanol.

The Hall coefficients of Silver, Nickel, Lead and Zinc Oxides were found to be -4.48×10^{-5}, -8.81×10^{-2}, -64.75 and -4.93×10^{-1} $m^3A^{-1}s^{-1}$ respectively. The carrier concentrations of Silver, Nickel, Lead and Zinc Oxides samples were estimated to be 1.4×10^{23}, 7.09×10^{19}, 9.65×10^{16} and 1.27×10^{19} m^{-3} respectively. Optical band gap of Silver, Nickel, Lead and Zinc Oxides are 3.95, 4.03, 4.05 and 3.99 eV respectively. Our measurements reveal that the deposited Zinc, Lead and Nickel Oxides thin film samples exhibit semiconductor like properties while Silver Oxide sample shows metal like properties.

Key words: Thin film, Chemical bath deposition, NiO, PbO, ZnO, Ag_2O.

A5

Fabrication and Characterization of Zinc Oxide Nanostructure

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ZnO nanostructures were fabricated by electrodeposition on different substrates and their physical properties were compared with the nanostructures formed by using spin coating and spray pyrolysis. The electrodepositions were carried out in solution containing KCl and $ZnCl_2$. The temperature was maintained at 80° C under constant stirring and O_2 bubbling during the electrodeposition. The structural properties of the nanowire materials were studied using high resolution scanning electron microscopy (SEM).

Zinc acetate dissolved in methanol was used to fabricate Zinc Oxide thin film on glass substrate by using spray pyrolysis and spin coating methods. Electrical properties were studied by performing current-voltage measurements in different intensities of light (Dark, /Light). Optical properties were studied by using UV-Vis absorption spectra. The nanowire and thin film of ZnO were formed on Si substrate in -3V and Au substrate in -1V respectively at temperature 80 °C. Diameter and length of ZnO nanowire were estimated to be 0.5μm and 2 μm respectively and the aspect ratio (i.e., length/diameter) of the nanowire was estimated to be nearly 4.25. Optical band gap of Zinc oxides observed in spray pyrolysis and spin coating are 3.47 eV, and 3.49eV respectively. Our measurements suggest that Zinc Oxide nanostructure samples have semiconductor properties.

Key words: ZnO nanostructures Electrodeposition, spray pyrolysis , and spin coating

A6

Search for a Tissue Equivalent Compensator for Radiotherapy Treatment

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[2]*Provincial Teaching Hospital, Jaffna, Sri Lanka*

In radiotherapy treatments, gamma radiation incident on an irregular or sloping surface produces skewing of the isodose curves. The surface irregularity gives rise to unacceptable non uniformity of dose within the target volume. The tissue equivalent compensators overcome this problem when it applies to surface regularity.

Distilled water closely approximates the radiation absorption and scattering properties of muscle and other soft tissues. In this paper Plaster of Paris (density, ρ=909.5kgm^{-3}), Plastic clay (ρ=2119kgm^{-3}), Resin (ρ=803kgm^{-3}), Lead (ρ=11340kgm^{-3}), Silicon Paste (ρ=1329.5kgm^{-3}) and Soil clay (ρ=1473kgm^{3}) were used as compensating material to find a suitable and available material for easily constructing 3D compensators. The thimble ionization chamber of farmer type and NE 2570/1 electrometer in charge mode (Coulomb) were used as field detector positioned in the water phantom at 80 cm from the source (1.25MeV) to measure the dose along the central axis. The electrometer readings were taken for the above materials at different field sizes of 5×5cm^2, 10×10 cm^2, and 15×15 cm^2.

The attenuation coefficient of the Plastic clay, Resin, Lead, Silicon Paste, Soil clay, plaster of Paris and water were found to be 0.132, 0.092, 0.654, 0.137, 0.163, 0.094 and 0.086 respectively at the field size of 5×5 cm^2, 0.131, 0.069, 0.651, 0.135, 0.130, 0.088 and 0.077 respectively at the field size of 10×10 cm^2 and 0.130, 0.039, 0.605, 0.122, 0.114, 0.084 and 0.064 respectively at the field size of 15×15 cm^2. The equivalent thickness of 1cm water for Plaster of Paris, Plastic clay, Soil clay, Silicon paste, Resin and Lead were estimated to be 0.94, 0.49, 0.59, 0.75, 1.13 and 0.09 cm respectively at the standard field size of 10×10 cm^2. Our measurements show that the attenuation curves for the distil water lies between the attenuation curves of Plaster of Paris and Resin and closer to the curve of Plaster of Paris than the curve of Resin. Therefore, the combination of Plaster of Paris and Resin should act as tissue equivalent material and it is predicted that if the density of Plaster of Paris could be slightly changed, the transmission curve will fit well with the curve of distil water. Plaster of Paris does not affect the human skin and an easily available material for constructing three dimensional compensators. Further investigations are under way to combine these two materials in suitable ratio to make them as a tissue equivalent material which intern will provide suitable attenuators for radiotherapy treatment.

Key words: Radiotherapy, Attenuation

A7

Preliminary observations on the occurrence and species diversity of batoid fishes from waters around Jaffna.

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Batoids fishes (Skates and Rays) are commercially important and highly diverse fish group in the world. There are no records on diversity of batoids in the waters around Jaffna peninsula and the present study was carried out to identify all the batoid fish species and to provide a checklist of batoid fish. Since the investigation was carried out only for 8 months in 2010, from Pasaiyoor, Kurunagar, Point Pedro- Munai, Koddady and Manatkadu landing centers. Samples were collected from commercial catches obtained by different types of nets. Based on the present study 9 species of batoid fishes representing 3 families were recorded.

Of the identified 3 families, Dasyatididae (Sting rays) is the dominant family including 5 species such as *Pastinachus sephen, Himantura uarnak, Dasyatis kuhlii, Himantura gerrardi* and *Himantura walga* followed by Myliobatididae (Eagle rays) including 2 species such as *Aetobatus narinari and Rhinoptera javanica* and Torpedinidae (Electric rays) including 2 species such as *Narcine brunnea and Narcine timlei.*

Out of the 3082 fish collected *Dasyatis kuhlii* showed highest percentage of occurrence and it was the only species observed in all study areas during the period of investigation. *Narcine brunnea and Narcine timlei* were observed only at Manatkadu landing center. The distinguishing morphological characters used for the identification and the occurrence of batoid fishes in waters around Jaffna peninsula are discussed in detail in the present paper.

Key words: Species diversity, batoid fishes, checklist, Jaffna peninsula

A8

Preliminary studies on length - weight relationship of *Scomberoides lysan* (Forsskal, 1775) (Pisces: Carangidae) from the Point Pedro coastal waters, Sri Lanka.

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The present investigation was carried out to estimate the length weight relationship parameters and growth pattern of *Scomberoides lysan* (Forsskal, 1775) from the Point Pedro waters. *S. lysan* is commonly known as double spotted queen fish found in the tropical areas of Indian and Pacific Ocean. Random samples were collected monthly from January to September 2010 from Point Pedro landing centre, Northern part of Sri Lanka.

A total of 290 specimens were analyzed. Covariance analysis for length–weight relationships of male and female *S. lysan* reveals that there was no significant variation between male and female ($P>0.05$) but there is a difference between unsexed and male or female. The estimates of the regression parameters and equations for male, females and unsexed data of *S. lysan* obtained by regression analysis are $TW= 0.0302 * SL^{2.722}$ ($N = 94$, $r = 0.951$), $TW = 0.0240 * SL^{2.8475}$ ($N = 102$, $r = 0.877$) and $TW= 0.0371 * SL^{2.6631}$ ($N = 94$ $r = 0.956$) respectively. The exponent value, $b=2.722$ for males and $b=2.8475$ for females, significantly different from 3 ($P<0.05$) reflect a negative allometric growth in both instances. Two-sample T- Test show that females were not significantly ($P>0.05$) heavier than males.

The results obtained from the present study help in establishing yield and also in converting one variable into the other as is often required during monitoring field measurements.

Key words: Length-weight relationship, *Scomberoides lysan*, Regression analysis covariance analysis, allometric growth

A9

Synthesis of enzyme encapsulated cobalt nanoparticles

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Enzyme catalysis offers highly selective syntheses of specific products. Research in this field is greatly propelled by the possibility of engineering an increase in the range of substrates and conditions to which an enzyme can be made applicable and better enzyme stability, by physical and chemical manipulations. Further the encapsulation of proteins has in selected cases shown greater activity than free proteins. Encapsulation also offers protection to the proteins from damage by microorganisms and during processing. In some cases it was found to improve their structural and thermal stability. These qualities add to the prospect of recyclability. The activity of the proteins may be modified in the process however. The synthesis of encapsulated proteins especially biocompatible nanoparticles is therefore of much interest. Nanoparticles are greatly valued in drug delivery because their size allows mobility within body tissues.

Recently Kumar *et al.* have reported that encapsulation of hemoglobin within layered zirconium phosphate confers increased thermal stability to the enzyme without loss of activity. Bao *et al.* have synthesized monodisperse nanoparticles of cobalt and palladium. Reported here is a facile synthesis of monodisperse protein-encapsulated hollow cobalt phosphate nanospheres, using a simple laboratory-built aspirator designed by Kumar et al., and their isolation and purification.

The particles obtained have a diameter of about 45 nm as determined from their Scanning Electron Microscope images and Dynamic Light Scattering studies. The activities of the incorporated proteins are retained to a good extent during synthesis and they have a shelf-life of more than two weeks at 5 ^{0}C. Very good yields are obtained. The aspirator, synthesis and the characteristics of the nanoparticles obtained are presented.

150

Keywords: hollow nanoparticles, cobalt phosphate, enzyme.

A10

Changes in total lipid content in the flesh of different size *Scomeberoides lysan* from waters around Jaffna Peninsula

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The present investigation was carried out to estimate the total lipid content of flesh in different size *Scomeberoides lysan* and to understand the lipid changes with size variation. Regular field visits were made to the Point Pedro, Pasaioor and Delft landing centers from January 2010 to June 2010;

The standard length of fishes was categorized in to 10 cm class intervals and twenty six fish samples from each length class were collected and brought to the laboratory. The standard length and weight measurements were taken for each sample and 100 g muscle tissue was dissected from the lateral region of the body, the portion behind the gill operculum and under the dorsal fin. It was subjected to total lipid analysis. Total lipid was extracted by the standard method using chloroform: methanol mixture (2:1 V/V). Percentage of total lipid was computed for each sample. Among the one hundred and fifty eight *S. lysan* analyzed mean total lipid content of flesh varied from 1.15 to 5.10 % for *S. lysan* representing 0 - 10 and 30.1 – 40 cm standard length class interval, respectively.

Statistical analysis for correlation between mean total lipid content of muscle and different size class interval exhibited a positive curvilinear correlation (r^2= 0.936). It explains that the lipid deposition in the muscle increased with the increasing standard length, reached its maximum at 30.1 – 40.0 cm standard length *S. lysan*

Key words: Total lipid, *Scomeberoides lysan*, checklist, Jaffna peninsula

B1

Optimization of the medium for better α-amylase production from Bacilius Licheniformis

Vaseekaran. S, Balakumar. S and Arasaratnam. V
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The present study is concerned with the improvement of *Bacillus licheniformis* α-amylase production by media optimization. The enzyme production [50.52(±0.84) UmL^{-1}] was highest in the fermentation medium which contained (gL^{-1}) soluble starch, 2.0; peptone, 2.0; $(NH_4)_2SO_4$, 2.0; NaCl, 1.0; KH_2PO_4, 2.5; K_2HPO_4, 1.0; $FeCl_3$, 0.01; $MgCl_2$, 0.01; and $CaCl_2$ 0.01 at pH 7.0. When α-amylase production was studied at different concentrations of K_2HPO_4 the highest activity (53.33±0.47) was produced with $2.5gL^{-1}K_2HPO_4$ at 48h. It was noticed that the α-amylase production (55.67±0.86UmL^{-1}) was maximum with $1.0gL^{-1}$of KH_2PO_4.

Among the different concentrations used α-amylase production (62.22±0.92UmL^{-1}) was highest with $4.0gL^{-1}$ peptone. At the concentration of $4.0gL^{-1}$starch highest α-amylase production (64.79±0.62UmL^{-1}) was obtained at 48h. Varying $(NH_4)_2SO_4$ concentration in the fermentation media showed the highest α-amylase activity (66.64±0.86 UmL^{-1}) at the concentration of 1.0 gL^{-1}. When the NaCl concentration in the medium was optimized it showed the highest α-amylase production (69.53±1.02UmL^{-1}) at the concentration of 1.0 gL^{-1}. Thus medium optimization has increased the α-amylase production from 47.01(±0.22) UmL^{-1} to 69.53±1.02 UmL^{-1}.

Key words: α-Amylase, Optimization, *Bacillus licheniformis*

B2

Effect of replacement of analar grade chemicals with locally available substitutes on α-amylase production from Bacillus Licheniformis

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α-Amylase production could be achieved by using locally isolated *Bacillus licheniformis* in a fermentation medium prepared with salts. This study was aimed to check the effect of substitution of salts on the production of α-amylase in the fermentation medium with locally available fertilizers, table salt and Cuttle fish shell powder. The fermentation medium contained (gL^{-1}) soluble starch, 3.0; green gram powder, 8.0; $(NH_4)_2HPO_4$, 1.0; NaCl, 1.0; KH_2PO_4, 1.0; K_2HPO_4, 2.5; $FeCl_3$, 0.01; $MgCl_2.6H_2O$, 0.01; and $CaCl_2.2H_2O$, 0.01 at pH 7.0 and the highest α-amylase activity produced was 106.1(±0.26) UmL^{-1} at 60h. When $CaCl_2.2H_2O$ was replaced with Cuttle fish shell powder, the α-amylase production (117.6±0.34 UmL^{-1}) was increased by 1.1 fold (at 60h). There was 1.05 fold (at 60h) increase in the α-amylase production (111.5±0.46 UmL^{-1}) when NaCl was substituted with table salt. It was noticed that α-amylase production (88.4±0.35 UmL^{-1}) was reduced by 1.2 fold (at 60h) when the $(NH_4)_2HPO_4$ was substituted with $(NH_4)_2SO_4$ fertilizer.

Substitution of KH_2PO_4 and K_2HPO_4 with triple super phosphate (T.S.P) reduced the α-amylase activity (81.1±0.31UmL^{-1}) by 1.3 fold (at 60h). When Cuttle fish shell powder and table salt which increased the α-amylase activity were substituted together instead of $CaCl_2.2H_2O$ and NaCl in the fermentation medium, 1.08 fold (at 60h) increase in the α-amylase activity (113.4±0.43UmL^{-1}) was observed. Substitution of KH_2PO_4, K_2HPO_4 and $(NH_4)_2HPO_4$ with different amount of triple super phosphate showed 1.13 fold increase in the α-amylase activity (120.2±0.27UmL^{-1}) at the concentration of 3.0gL^{-1}at 60h. This study showed that the medium containing (gL^{-1}) soluble starch, 3.0; green gram powder, 8.0; table salt, 1.0; T.S.P 3.0; $FeCl_3$, 0.01; $MgCl_2.6H_2O$, 0.01; and Cuttle fish shell powder, 8.0 (mgL^{-1}) could be used for better α-amylase production (120.2±0.27UmL^{-1}) which was 1.13 fold higher than the medium with analar grade salts.

Key words: α-Amylase, activity, T.S.P, *B. licheniformis*, Cuttle bone powder, table salt.

B3

Optimization of Inoculum for α-amylase production by locally isolated *Bacillus Licheniformis*

Vaseekaran. S, Balakumar. S and Arasaratnam. V
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Single stage inocula are commonly used in most laboratory scale studies for the production of α-amylase by *Bacillus licheniformis*. Inocula at an age of 12 or 24h are commonly used as single stage inocula. This study was aimed to check the combined effect of two different aged inocula on the production of α-amylase using locally isolated *Bacillus licheniformis*. In this study α-amylase production using single and inoculum with two different aged inocula and the effect of different volume ratios of inoculum with two different aged inocula on α-amylase production were studied. Fermentation medium used contained (gL^{-1}) soluble starch, 2.0; peptone, 2.0; $(NH_4)_2 SO_4$, 2.0; NaCl, 1.0; KH_2PO_4, 1.0; K_2HPO_4, 2.5; $FeCl_3$, 0.01; $MgCl_2$, 0.01; and $CaCl_2$, 0.01 at pH 7.0. The effect of storage period of the *Bacillus licheniformis* in agar slant before inoculation was studied and 24h old bacteria gave the highest α-amylase activity ($40.2\pm0.42 UmL^{-1}$) at 48h.

When the age of the inoculum in the activation medium was 12h, highest α-amylase activity was produced ($45.8\pm0.51 UmL^{-1}$) at 48h, whereas the inoculum of 18h produced the α-amylase activity of $36.7(\pm0.18)UmL^{-1}$. When the inocula with two different ages (12h old, 5mL) and (18h old, 5mL) were mixed in equal volumes and used, α-amylase activity produced was $54.9\pm (0.44)\ UmL^{-1}$ at 48h, which was 48% higher than the activity produced with 18h old inoculum and 19.5% higher than the activity produced with 12h old inoculum where the inocula were prepared from 24h old slant culture. When the effect of volume ratios of inocula prepared from two different aged inocula were studied on α-amylase production, the highest α-amylase activity ($53.3\pm(0.34)UmL^{-1}$) was obtained with the inocula of 12h and 18h old in the volume ratio of 1:1 (5mL: 5mL). By optimizing the inoculum α-amylase production was improved by 1.52 fold.

Key words: Inocula, α-amylase, *Bacillus licheniformis*, activity, fermentation, culture.

B4

Improvement of xylanase production by *Bacilus pumilus* under submerged fermentation

Subajini. J, Balakumar. S and Arasaratnam. V
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Xylanase production by the alkalophilic *Bacillus pumilus* was improved under submerged fermentation when commercial Birchwood xylan was used as the substrate. Initially the medium containing commercial Birchwood xylan $20gL^{-1}$ at pH 8.5 was used. When the commercial Birchwood xylan concentration was $5gL^{-1}$ highest xylanase activity [61.3 (±0.96) UmL^{-1}] was obtained at 24 h. The media substituted with raw materials of local carbon sources and considerable amount of xylanase was produced in the media containing corncob [24.9 (±0.99) UmL^{-1}], corn hull [18.2 (±0.92) UmL^{-1}] and rice straw [21.5 (±0.86) UmL^{-1}] and lowest amount of activity was obtained with rice bran [4.7 (±0.98) UmL^{-1}]. Xylan was extracted from local carbon source such as corncob, corn hull and rice straw and these were used as the carbon source in the media and Birchwood xylan was used as the control.

The highest xylanase activity was obtained in the medium with Birchwood xylan [(62.6 (±0.89) UmL^{-1})] than in the media which contained the xylan ($5gL^{-1}$) extracted from corncob [29.8(±0.97) UmL^{-1}] corn hull [20.2(±0.99) UmL^{-1}] and rice straw [17.6 (±0.98) UmL^{-1}]. Due to the amount of xylose present in the xylan, the highest activity was obtained with Birch wood xylan. With Fructose [70.6 (±1.01) UmL^{-1}] in the medium with Birchwood xylan induced the xylanase production ($2gL^{-1}$) than arabinose [45.6 (±0.68) UmL^{-1}], sucrose [40.6 (±0.92) UmL^{-1}], glucose [37.9 (±0.85) UmL^{-1}], and control [without sugars 60.61 (±0.78) UmL^{-1}]. The highest xylanase production was observed in the medium that contained Tween -80 [73.5 ±(1.79) UmL^{-1}] than in the media which contained SDS [6.6 ±(1.63) UmL^{-1}] and Triton -100 [33.6 ±(1.47) UmL^{-1}]. Based on this study the xylanase production from *B. pumilus* was better with commercial Birchwood xylan than that extracted from different local sources. Xylanase production was induced by fructose and this secretion was increased by Tween-80.

Key words: Corncob, corn hull, Rice straw, Tween- 80, xylanase and Xylan

B5

Thermal stability of xylanase produced by *Bacillus pumilus*

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The aim of this study is to improve the stability of an alkaline xylanase produced by a locally isolated alkalo-thermophilic *Bacillus pumilus*. At 55°C, the xylanase retained 38(±1.0) % of its initial activity at 30 min without additives and it retained 45.6 and 20.6% of its initial activity at pH 8.0 and 9.0 respectively. In presence of polyols such as 10mM Poly Ethylene Glycol (PEG)-8000, 1M glycerol and 2M sorbitol the enzyme retained 24.0(±0.34), 19.0(±0.84) and 53.8(±0.57) % of its initial activity respectively at 60min. Addition of 10mM NaCl helped the enzyme to retain 35.0(±0.74) % of its initial activity at 30 min and the enzyme lost all of its activity at 60 min. The enzyme retained 85.3(±0.18) and 88.4(±0.18) % of its initial activity at 120 and 60 min respectively in presence of 10mM$CaCl_2$. Half lives of the xylanase in presences of 10mM $CaCl_2$ and 2M sorbitol were 302 and 63 min respectively.

When both 10mM $CaCl_2$ and 2M sorbitol were used together, the enzyme retained more (95%) of its initial activity at 60 min than that in presence of 10mM $CaCl_2$ (88 %) and 2M sorbitol (53 %) indivdually. Half life of the xylanase at 55°C in presence of 10mM $CaCl_2$, 2M sorbitol and 10mM $CaCl_2$ & 2M sorbitol were 18, 47 and 552 min respectively. Addition of 10mM $CaCl_2$ & 2M sorbitol to the enzyme, helped the enzyme to retain 95, 88, 18 and 0 % of the initial activity of the xylanase at 55, 60, 65 and 70°C respectively at 120min, while at 70°C it lost all of its activity at 120 min. Xylanase from *B.pumilus* was stable at 60°C for 2h with both 10mM $CaCl_2$ & 2M sorbitol. Xylanase retained 93, 64% of the initial activity at 10 days when stored at -4 and 30°C respectively.

Key words: Polyols, Stability, Salts, stability, Xylanase

B6

Purification and characterization of xylanase from *Bacillus pumilus*

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A thermophilic and alkalophilic *Bacillus pumilus* isolated from corncob decaying soil produced xylanase was used for purification and characterization. From the culture supernatant (120.6Umg^{-1}) of *B. pumilus* the xylanase was purified by ammonium sulphate precipitation and Sephadex G 75 gel filtration. With different concentrations of $(NH_4)_2SO_4$, maximum amount of xylanase was precipitated at 50% of $(NH_4)_2SO_4$ saturation. This $(NH_4)_2SO_4$ precipitated sample was dialysed against distilled water for 24h and the sample (824.72 Umg^{-1}) was loaded to Sephadex G 75 column and eluted with 0.5M Tris buffer at the flow rate of 0.5mL/min. Eluted fractions which showed highest xylanase activity were pooled together (2250.13 Umg^{-1}), separated by Sodium Dodecyl Sulphate polyacrylamide (SDS) gel electrophoresis.

Purified xylanase showed 2250.13 Umg^{-1} specific activitiy and the purification fold was18.6. The specific activity of the initial crude xylanase was 120.62 Umg^{-1} with a recovery yield of 34 %. The enzyme appeared as a single band on SDS-PAGE gel with the molecular mass of approximately 25kDa. Accurate molecular mass was determined as 25.42kDa by electrospray mass spectrometry (ES-MS). Purified xylanase showed zero order kinetics for 4 min and gave highest xylanase activity [193.7 (±0.26) UmL^{-1}] at 60°C and pH 8.4. Purified enzyme showed high specific activity against xylan and showed no activity with carboxy methyl cellulose, starch and avicel. Therefore this purified xylanase had no amylase, cellulase activities. Due to this property this enzyme can be used for bio-bleaching of paper pulp.

Key words: Gel filtration, mass spectrometry, purification, xylanase, and xylan

B7

Number Plate Detection using Morphological operations and Verification using SIFT

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Number plate recognition system plays an important role in numerous applications, such as parking accounting systems, traffic law enforcement, road monitoring, and security systems.

The objective of this paper is to design an approach to detect and verify the number plates used in Sri Lanka. Initially, the captured image from the camera is converted into gray scale image. Then the grayscale image is segmented using Sobel vertical mask which provides vertically detected edges as a binary image. Some morphological operations are applied to the binary image to remove the noise and other unwanted objects. Characteristic features such as number plate width and height, character height and between spaces are considered for defining structural elements for morphological operations.

Then the labeling is done to the connected components in the binary image. The connected components are verified using some geometrical properties of number plates to extract the probable number plate from the car image. Finally, the SIFT (Scale Invariant Feature Transform) method is used to extract the local invariant features of the image labels and verification is performed by matching the extracted features with the stored features of the number plate images in the database. The performance of the proposed system has been tested on real images using the Sri Lankan number plates and the results are effective in detection as well as verification. These results report a high accuracy rate of 90% of detection and 88% of verification.

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Keywords: Number plate detection, SIFT, Morphological operations, connected component analysis, Sobel operator.

B8

Implementing the Epidemic Routing Protocol for the Scalable Wireless Ad-Hoc Network Simulations (SWANS)

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Packet routing is a critical task in MANETs due to dynamic topological changes and intermittent connectivity between participating nodes. Newer routing protocols are being proposed and developed by researchers around the world for the benefit of the MANET research community. Simulation based studies are often used by researchers for the performance validation of newly proposed routing protocols, applications and systems.

Epidemic routing protocol is a flooding based routing protocol proposed for the use in MANETs environments by researchers. The Epidemic routing protocol tries to exploit each contact opportunity between node pairs to propagate messages among nodes in order to maximize the chances of eventual delivery of messages towards the destination nodes. The Epidemic protocol has been suggested to be used to model data communication in the offspring of the MANETs such as delay tolerant networks and opportunistic networks.

In this research work we take the Epidemic routing protocol, implement it and then measure its message delivery ratio, memory usage and other related performance metrics under different experimental set up. For this study we have chosen the Jist/SWANS discrete event simulator which mimics the seven layer protocol architecture and have implemented the protocol into it. We optimize our protocol to use minimum resources of the system so that the simulation studies consume as little resources of the system as possible. Based on the determined performance metrics we measure how well the protocol functions with the increased node population and with different mobility patterns. We observe that increases in simulation times do not affect the average message transmission delay and the message delivery ratio in the considered scenarios. This implies that protocol performs in a stable manner. Further, we find that our implementation of this protocol is very well scalable both in terms of node population and memory usage. We hope our extension of the simulator by implementing this protocol would benefit the research community for their future experimental studies.

***Keywords**: Routing protocols, Epidemic routing protocol.*

B9

Recognition of printed Tamil Alphabet Characters

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In this Internet era there is a need to convert existing printed material into electronic format. Manually performing this task is time consuming and laborious. Hence a viable solution is to use automated systems. Existing printed character recognising systems use many different feature extraction techniques such as number of pixels in a character, area of a character, etc. But they are very complex and the noises in the input text affect the accuracy heavily. These techniques were developed for English alphabets and are widely used for English and similar alphabets. Since the Tamil alphabet comes from a different font family the performance of these methods are limited.

This paper proposes a novel method to recognize printed Tamil characters. This method utilises image processing techniques and Multilayer perceptron neural networks with error-back propagation learning. The whole process is done in three stages, namely, pre-processing phase, learning phase and recognizing phase. In the pre-processing phase a number of Tamil character images are converted into skeleton images through a series of digital image processing methods. Skeleton is a way of representing the shape of a character using curves with the width of a single pixel. Pixel colour values of the skeletonised images are used as the input to the neural network. In the second phase the neural network was trained with a number of different characters. In the third phase the trained network was used for recognition. The trained the neural network can work very efficiently with minimum computing resources.

The neural network was constructed with 2500 input neurons, 1500 hidden neurons and 28 output neurons. 10 vowels and 18 consonants from ten different Tamil font types of various sizes were selected to the train the network. The model was trained with an N- fold cross validation method where nine font types were used for training while keeping one font type for testing. The network was trained for 100 epochs with 0.01 as the learning rate and this was repeated for 10 times, each time with a different font type for testing. The system was found to be capable of recognising the characters with an accuracy of 84% for the training set and 80% for the test set. Errors were found to be only in differentiating the vowels.

2.00

Key words: Tamil character recognition, Neural network, skeleton of a character, Multilayer perceptrons

C1

Effects of Ricinus Communis Poisoning

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Ricinus communis is a medical plant. Extracts from the seeds are used as a purgative and extracts from the leaves used as external applicants for joint pain in Ayurvedic medicine. Ricinolecic acid is a component of these extracts which is very toxic but poorly absorbed through the gastro intestinal tract. This is a descriptive study of the effects in patients who accidently ingested seeds of ricinus comminus and admitted to Teaching hospital Jaffna

All the patients who were admitted to the Jaffna teaching hospital on 10th &11th of June 2oo8 with the history of injection of Ricinus comminus seeds were included in the study .Data were collected withthe B.H.Ts& direct interview from the patients& their parents. Collected data were analyzed manually. There were 26 patients who consumed accidently the seeds from the nearby tree. All of them were between 02 to 17 years. Nine of them {35%} had symptoms.. Patients who had part of a seed developed no symptom. Among those who consumed one seed two of them developed symptom. Rest of the people who developed symptoms had injested more than one seeds [27%]. A thirteen year boy who consumed ten seeds developed giddiness vomiting and severe abdominal pain. The common symptoms noticed were vomiting {1oo %}, Giddiness {36%}, Abdominal pain {56%}and none had diarrhea .The time lapse between ingestion of the seeds and development of the first symptom varied from half an hour to four hour. None of them had the symptom more than twenty four hours.

Although the literature mentions the development of diarrhea, convulsion &death in Ricinus poisoning especially in inhalation or in injection but *none of our* patients developed these effects. Most of the patients developed symptoms when they consumed more than one seed. They started to develop symptoms between half an hour to four hours after ingestion but symptoms did not persist more than twenty four hours. Development of symptom and it severity are related to the ingested number of seeds. People who had the history of more than one seed ingestion should be monitored for symptoms at least for four hours and who have symptoms should be treated for at least twenty four hours.

Key words : Ricinus communis, poisoning, medical plants, seeds, Ayurvedic medicine

C2

Efficacy of "Gyanaco" a polyherbal syrup, in the management of menorrhagia

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Menstrual problems account for much of the morbidity that occurs in women of reproductive age, being one of the four most common reasons for consulting a general practitioner. Menorrhagia is defined as excessive uterine bleeding occurring at regular intervals or prolonged uterine bleeding lasting more than seven days. The classic definition of menorrhagia (i.e., greater than 80ml of blood loss per cycle) is rarely used clinically. In recent times phytoestrogens derived from many natural plants have been used to treat various gynaecological disorders. Siddha drugs correct the imbalance there by providing relief from symptom. In this study researcher used herbal combination of "Gyanaco syrup". which has been advocated in the treatment of menstrual disorders. The purpose of the present study, therefore, was to evaluate the effectiveness of Gyanaco syrup in reliving the symptoms of menorrhagia. Fifty patients, 21 – 35 years who complained past history of excessive, irregular / prolonged bleeding per vaginum were included in this study.

A verbally informed consent was obtained from all patients. This formula is administered in the form of syrup to the patients by researcher for this study. *Trigonella foenum* seeds-100g*: Areca catechu* seeds-100g*: Quercus infectoria* gall-100g: *Catechu crystal* gall-100g*: Coccus nucifera* Inflorescence-100g: *Ficus glomerata* bark-100g*: Syzygium cumini* bark-100g. It is then powdered which is finally made into a syrup form (add 8 litres water and boiled into one litre).50 patients attended the dispensary were informed about the study drugs, its effects, patient's duration of stay in the trial and overall plan of the study. The history was noted by interviewing the patient. Thorough clinical examination and symptomatic evaluation was carried out and the details were noted down in the case record form. The patients were advised to take 30 ml of Gynaco syrup, twice daily for 2 weeks. All patients were followed up every three days till the end of treatment and symptomatic evaluation and clinical examination was done, along with recording the occurrence of any adverse events.

The results showed that the duration of menstruation and the amount of menstrual flow started normalizing at the end of the 7days of treatment with Gynaco syrup. At the end of 2 week, 43 women (86%) had a normal duration of menstruation of 3-4 days, three (6%) women had a duration of 5-8 days, and four (8%) had a duration of above 8 days. After the treatment, the amount of menstrual flow was normal in 39 women (78%). Seven ((14%) women had to use four to five pads, and four (8%) women had to use more than five pads per day. A total of 38 (76%) women experienced complete relief of menorrhagia. Gynaco syrup were well tolerated and accepted by all the women, no side effects were reported during the study. The present study showed reduction of duration of menstruation, quantity and quality of blood flow loss at the end of 2 weeks of treatment with Gynaco syrup.

Keywords: Gyanaco Syrup, Siddha drugs, Menorrhagia

D1

Impact of Marketer's Characteristics on Quality of Service with special reference in HSBC Bank.

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This study was undertaken with the objective of finding out the relationship between marketer's characteristics and quality of service and customers satisfaction in HSBC bank in Wellawtta. For this study, marketer's characteristics can be categorized into three kinds such as physiological, psychological and employee's skills. Quality of services is evaluated by reliability, functionality, responsiveness service design and assurances, and also reviewed with help of the GAP analyze this was established by Zeithaml, Parasuramn and Berry.

The present study is initiated on" the marketer's characteristics towards quality of service" with the samples of 3oo customers of HSBC bank in Colombo -06. The study found that the correlation value between marketer's characteristic and service quality is 0.981. It is significant at 0.01 levels. There are positive linear relationship between the marketers' characteristic and service quality. According to the Regression analysis, 96% marketers' characteristic impact on service quality. Finally marketer's characteristic influence to service quality. Finally we can come to the conclusion that Marketers' characteristics have an impact on service quality. The study further points out that keen attention should be paid on to polish marketer's characteristics. Because marketer's characteristics are inter related with service quality.

Key words: *Marketer's characteristics, service quality, HSBC*

D2

DIVERSITY- A Comparative Study of Sri Lankan Tamil and English Newspapers Editorials

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The Mass Media has been playing a crucial role in the molding of public opinion. There is a striking relationship between public opinion and editorial writing. Editorial writing is a journalistic article which critically and rationally informs, educates and entertains its target audience on social political and economic issues of the day. It shapes peoples minds especially those with no direct connection to reality. The research wants to prove the diversity function of media through the editorials. Media should offer relevant choices of content at one point in time and also variety over time of a kind which corresponds to the needs and interest to their audiences' .This study examined how Sri Lankan Tamil and English newspapers and use of house editorials relates to the performance of its diverse function. According to Ate (2006) editorials in modern newspapers and magazine perform the following functions; Criticize or attack, Illuminate the day's intelligence by throwing more light to complex issues of the day.

Editorials often try to look at the two sides of an issue, Bring to fore debatable issues and provide an intellectual compass for society to discuss and resolve burning issues, aids policy formulation and planning in society and sets agenda for the society. The researcher selected content analysis as the methodology. Editorials framing and its manifest content are examined. Three Tamil newspapers and three English newspapers are examined. They are Valampuri, Uthayan, Veerakesari, Daily Mirror, Daily News and The Island. All the newspapers examined based on diverse of topics, the way they have written, the use of language and their framing style. One month (January 2010) was the period of analysis. Most of the editorials gave importance to politics. But the way they expressed their views are different .Two English papers gave importance to editorial cartoon .The editorial policy of each newspaper were shown through their editorials. English newspapers gave more space for politics and world while Tamil newspapers gave priority to politics and socials issues. But the diverse function of both the papers is not enough. They all gave importance to political agenda to set up a public agenda.

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Key words- Editorials, Public opinion, Framing, diversity, Agenda setting

D3

Impact of Human Capital factors on the Performance of Small Scale Enterprises in Vavuniya

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Human capital is the most important and valuable resource within any country. There appears to be a strong linkage between the training, attitudes and goals of people and the level of economic growth within a country. Business value formation is influenced by the socio cultural and personal background factor such as age, ethnicity, religion, education and experience of the decision makers. This study examined the impact of human resource factors on the performance of small scale enterprises in the Vavuniya district. It is also identified the salient impacts of human resource traits on the development and expansion of small scale enterprises in the country.

The study was carried out in Vavuniya, Sri Lanka where structured questionnaire was administered on selected 68 participants from 11 different small scale enterprises. Data were analyzed using descriptive and inferential statistics. Also, regression analysis was carried out to evaluate the impact of human resource factors on business performance with the aid of Statistical Packages for Social Sciences (SPSS).

Findings of the study revealed that human capital factors are significantly related with business performance in terms of educational qualification and years of experience. Based on this study marital status, age and gender are not significantly related with business performance. The study suggests integrated approach to the development of individual entrepreneurial capacity and promotion of sustainable small scale enterprises.

Key words: Small scale enterprises, human resource factors, performance

D4

Biographical Differences and Occupational Stress of Teachers in Jaffna District

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Numerous studies have confirmed that teaching can be a stressful profession. Teachers work stress has been linked to several consequences such as absenteeism, turnover, productivity and other negative organizational outcomes. Now a day it can't be stated that teaching can be a stressful work without analyzing the stressfulness of other (non- teaching) profession. There is a lack of research involving them. Several studies investigated the source and consequences of work stress. Few studies analyze the influence of the biographical difference on stress in Jaffna schools. The objective of the present study was to investigate the influence of biographical variables on occupational stress of teachers.

The problem of this study was defined as whether there are significant differences in stress among different biographical sub-groups (age, sex, parenthood, number of children, designation, grade and experience) of teachers. The sample consisted of 199 teachers from schools in Jaffna district. Data were collected using questionnaire survey. A demographic questionnaire was administered to get information regarding participants' age, sex, parenthood, number of children, designation, grade and experience. Occupational stress level was measured using the Perceived Stress Scale (Cohen, Kamarck and Mermelstein 1983). Comparison of means and multiple regressions were employed to test the hypotheses.

The findings showed that there are significant differences in occupational stress of teachers based on age, sex, experience and parenthood. Among the respondents, the greatest level of stress perceived respondents who are bellow 25 years old (Average Stress-ASR =34.0), female (ASR =29.95), who have only one child (ASR=25.85), those have the children (ASR=24.95) and who are with the experience of 6-10 years (ASR=24.80). The results are discussed in terms of implications for schools and future research.

Key Words: Occupational stress, Biographical differences

D5

APPLICATION OF MODEL OF 3Cs IN BANKING INDUSTRY IN SRI LANKA- SPECIAL REFERENCE TO COMMERCIAL BANKS

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Sri Lanka's banking sector is sound amidst a global rout thanks to early regulatory action taken to safe guard the banking system. The objective of this study is to identify how the model of 3Cs applied in banking industry in Sri Lankan market. The main focus of this study is to understand how far the theory applied in current context in banking industry in Sri Lanka. Furthermore we have considered the importance of 3Cs model to the banking industry. With the theoretical explanations and documentary evidence the following research problem has been advanced in this study. How the model of 3Cs will impact on organization's performance in banking sector?.

Customers, Cooperation and the competitors have been taken as key variables for this study. Focus group discussions and interview were used as a data collecting technique. Banking sector has been selected due to intense competition and the contribution for Sri Lankan economy. It was found out that people concerned on each variable alone, but not as model as whole .there is no interrelationship in these variables (i.e., the cooperation, the customers, and the competitors) and also need for better implementation of all 3Cs at once has been stresses.

This study contributes to the practice of strategic marketing by justifying how the useful model applied in banking sector and how it can be increase to use the model more efficiency and effectively. Thus findings of this research will helpful to prepare planning and decision making when prepare training manuals. Further these findings, especially suggested 3Cs model would increase the organization performance

Key Words: Competitors, Corporation, Customer and Bank

D6

Working Capital Management and Profitability: A Case Study of Sri Lanka Telecom Public Limited Company

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A firm is required to maintain a balance between liquidity and profitability while conducting its day to day operations. Keeping in view the pragmatic importance of working capital management as a gray area of corporate finance function, an attempt has been made to examine working capital management practices and the problems faced by the firms in working capital management process particularly in Telecom public Limited Company. The main objective of this study is to identify the effectiveness of the working capital management of the firm.

The study data is available in the annual reports for the period from 2002 to 2008. The collected data have been tabulated, analyzed and interpreted with the help of different financial ratios. Pearson correlation analysis is used to find out the relationship between working capital management and profitability. The correlation between the net profit ratio and inventory conversion period, and creditors conversion period is positive, the important measures of working capital management days of working capital shows negative correlation(-.831) and significant at 0.05 level.

The correlation between the return on equity and inventory conversion period , Creditors conversion period is positive, the important measures of working capital management, days of working capital shows negative correlation(-.9040) and significant at 0.01 level. The study concludes that working capital management of this company is in a satisfactory position because it reports positive days of working capital (Days of working capital in 2002 70.17days and 2008= 3.73 days). Correlation between days of working capital and profitability is negative. It means that as the days of working capital increases profit decreases.

Key Words: Working Capital Management, Liquidity, Profitability and Days of Working Capital

Abstract Withdrawn in Volume 17, No.1
Annual Research Sessions (21-23 April 2010)

The following abstract is withdrawn from the publication of the above said issue No.1 of Volume 17 as the author of the paper or his nominee failed to present and defend the paper at the annual research sessions held on 22nd April 2010. The paper submitted was reviewed and accepted for publication in the above issue of volume 17 under this condition.

Proceedings of Abstracts, Vol.17, No.1, Section D, Page 37

Title : *The use of Mother Tongue and Local Culture in the Teaching of Proficiency English to undergraduates: An Ethnographically Study.*

The author is debarred from submitting papers to the annual research sessions at the two subsequent annual research sessions according to the regulations of the JSA.

Chief Editor for Executive Committee

Jaffna Science Association

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03	1993/94	Prof.C.Sivagnanasundram	Prof.V.K.Ganesalingam	Dr.R.S.Navaratnam	Dr.S.Krishnarajah
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The Annual General Meetings were not held for the years 1996 and 2007 due to unsettled conditions in Jaffna region and hence new Executive Committees were not elected.

Jaffna Science Association

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