AIR FORCE INSTITUTE OF TECHNOLOGY
KADUNA

FACULTY OF SCIENCE

1st Faculty of Science International Conference

United Nations Educational, Scientific and Cultural Organization

IYBSSD2022 International Year Basic Sciences for Sustainable Development

1ST FACULTY OF SCIENCE
INTERNATIONAL CONFERENCE INLINE WITH THE
INTERNATIONAL YEAR OF BASIC SCIENCES FOR SUSTAINABLE DEVELOPMENT
(IYBSSD 2022) IN COLLABORATION WITH UNESCO

THEME: POSITIONING
BASIC SCIENCES AND TECHNOLOGY
IN ENHANCING DIGITAL ECONOMY AND NATIONAL SECURITY

21ST -23RD November, 2022

BOOK OF ABSTRACTS

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FOREWORD

Dear Authors and Esteemed Readers,

It is with a deep sense of satisfaction that I write this Foreword to the **Proceedings of the First Faculty of Science International Conference (1ST FSIC) in-line with the International Year of Basic Sciences for Sustainable Development (IYBSSD, 2022) in Collaboration with United Nations Educational, Scientific and Cultural Organization (UNESCO)** held at Air Force Institute of Technology (AFIT) Kaduna, Nigeria on November 21–23, 2022.

The goal of our conference is to bring together scientists, industrialist and young researchers from all over the world and their innovative research in various fields of Science and Technology in a discussion environment. The conference mainly stimulates the interaction between professionals, research students and developing young scientist. Their contributions helped to make the Conference outstanding and memorable as was expected.

These Proceedings documented completely refereed the papers presented at the conference. All abstracts and full-papers were subjected to a blind peer-review process. All the papers as captured in the proceedings have been peer-reviewed by the reviewers selected from the scientific committees, external reviewers and editorial board members of AFIT Journal of Science and Engineering Research depending on the research subject matter. After the rigorous peer-review process, the papers were selected on the basis of originality, significance, and clarity for the purpose of the conference. Accordingly, the conference & exhibition was exceptionally rich, highlighting high-impact presentations.

I would sincerely like to thank the members of the local organizing and scientific committees. They have worked very hard in organizing, reviewing methods and making valuable comments and suggestions for the authors there-by improving their research-work. At the 1ST FSIC in-line with IYBSSD 2022 in collaboration with UNESCO, the scientific committees accepted 93 physical/virtual oral and 26 poster presentations. Notwithstanding the effects of coronavirus, 150 participants are attending the conference. The conference features 3 keynote speech, 2 lead papers, followed by 110 contributed presentations in four parallel sessions including the exhibition stands.

In addition, this book of Conference Proceedings will certainly serve the scientists with an excellent reference book. I am confident that this material containing highly reviewed research will stimulate and motivate further study and research in Science and Technology.

So, I once again thank all authors and participants for their outstanding contributions.



Professor Muhammad Dauda
Conference Chair

1ST FACULTY OF SCIENCE INTERNATIONAL CONFERENCE
21ST -23RD November, 2022
PROGRAM OF EVENTS

SUNDAY 20 NOVEMBER 2022 – DAY 1 Arrival
MONDAY 21 NOVEMBER 2022 – DAY 2: Opening Ceremony and Plenary Session
Venue: Ibrahim Alfa Hall, AFIT, Nigeria Air Force Base, Mando, Kaduna

S/N	Time (Hrs)	Event	Action
1.	0730 – 0900	Registration of Participants	LOC
2.	0900 – 0930	Arrival of Guests and Participants	MC (AFIT PRO)
3.	0930 – 0940	Arrival of Directors, Deans, Heads of Departments and Centers	MC (AFIT PRO)/Fanfare
4.	0940 – 1000	Arrival of Kaduna State Governor, Royal Father, AFIT Commandant, Provost, Keynote Speakers, Lead Paper Presenters and AFIT Registrar	MC (AFIT PRO)/Fanfare
5.	1000 – 1005	National Anthem	NAF Band
	1005 – 1010	Safety Brief	PRO
6.	1010 – 1015	Welcome Address by AFIT Commandant	AVM MA Yakubu (Commandant, AFIT)
7.	1015 – 1020	Opening Remark	Prof. Muhammad Dauda (Provost, AFIT)
8.	1020 – 1035	Official Opening Speech by His Excellency, Governor of Kaduna State	Mal Nasiru El-Rufai
9.	1035 – 1037	Reading of citation of Keynote Speaker 1	Dr (Mrs) Eucharia Ozioko
10.	1037 – 1107	Keynote Speech 1: **The Role of Sciences and Technology in Enhancing Digital Economy**	Prof. Isa Ali Ibrahim Pantami
11.	1107 – 1127	Presentation of Plaques (GoH; RFoD; KYSs; LP1)	AVM MA Yakubu (Commandant, AFIT)
12.	1127 - 1157	Group Photographs • AFIT Management and Dignitaries • Central Organizing Committee and Dignitaries Visit to Poster & Exhibition Stands	AFIT Commandant/Provost Leads
13.	1157 – 1200	Reading of citation of Lead Paper 1	Dr. Adegboyega Taofeek Tope
14.	1200 – 1230	Lead Paper 1: **The Role of Basic Sciences and Technology in National Development**	Dr. Ahmad Halilu Shaba
15.	1230 – 1233	Reading of citation of Keynote Speaker 2	Dr. Bello Yusuf Ayoola

16.	1233 – 1303	Keynote Speaker 2: **The Role of Sciences and Technology in Enhancing Digital Economy: Industrialist Perspective**	Alhaji Aliko Dangote
17.		Tea Break	Catering Unit
18.	1303 – 1306	Reading of citation of Keynote Speaker 3	Dr (Mrs) Deborah A. Daramola
19.	1306 – 1336	Keynote Speaker 3: **The Role of Sciences and Technology on National Security: Engineering Perspective**	Engr. Prof. Mohammed Sani Haruna
20.	1336 – 1339	Reading of citation of Lead Paper 2:	Dr. Jacob Joseph
21.	1339 – 1409	Lead Paper 2: **The Future of Space Science and**	Prof. Fulvio Franchi
		Technology in Global Economy and Security	
22.	1409 – 1419	Vote of thanks	Dr. Hammed A. Lawal (Dean FSC/LOC Chairman)
23.	1419 – 1429	Announcements	MC (AFIT PRO)
24.	1429 – 1434	National Anthem	NAF Band
25.	1434 – 1500	Lunch	Catering Unit

TECHNICAL SESSION I: 1500hrs – 18hrs
Venue: Ibrahim Alfa Hall

1.	1500hrs	Paper Presentations	Participants
2.	1800hrs	Closing	Technical Lead

TUESDAY 22 NOVEMBER 2022 – DAY 3
TECHNICAL SESSIONS II (4 Breakout Sessions): 0800hrs – 1800hrs
Venue: Faculty of Science (TETFUND Building)

1.	800hrs	Paper Presentations	Participants
2.	1300hrs	Lunch	Catering Unit
3.	1400hrs	Paper Presentations	Participants
4.	1800hrs	Closing	Technical Lead

WEDNESDAY 23 NOVEMBER 2022 – DAY 4
TECHNICAL SESSIONS III (4 Breakout Sessions): 0800hrs – 1800hrs
Venue: Faculty of Science (TETFUND Building)
Venue for Closing Ceremony: Ibrahim Alfa Hall

1.	800hrs	Paper Presentations	Participants
2.	1200hrs	Lunch	Catering Unit

3.	1230hrs	Deans Award Presentation	Dean, FSC
4.	1300hrs	Conference Closing Remark	Provost
5.	1310hrs	Final Vote of Thanks	LOC Chairman
6.	1320hrs	Paper Presentations	Participants

CONFERENCE ADVISORY COUNCIL

S/N	NAMES	POSITION
1.	AVM C Ozougwu	Deputy Commandant
2.	Prof. Muhammad Dauda	Provost
3.	Air Cdre EO Oluokun	Registrar
4.	Air Cdre MS Lawal	Director of Academic Planning
5.	Prof. Malik Abdulwahab	Editor-in-Chief, AFJSER
6.	Prof. Adetutu Oluwakemi Aliyu	Chemistry Department
7.	Prof. Patrick O. Akusu	Physics Department

CENTRAL ORGANIZING COMMITTEE (COC)

S/N	NAMES	PORTFOLIO
1.	Dr. Hammed Adeniyi Lawal	Chairman, COC
2.	Dr. Deborah Abiola Daramola	Secretary, COC
3.	Dr. Abubakar Abdullahi Wachin	Chairman Logistics Sub-committee/Member
4.	Dr. Mansurat Oluwatoyin Shoge	Chairperson Planning/Fund Raising Sub-committee/Member
5.	Dr. Emmanuel Adoujo Ekpa	Chairman ICT/Abstract/Proceedings Sub-committee/Member
6.	Dr. Ozioko Eucharia Ngozi	Chairperson Protocol/Public Relations Sub-committee/Member
7.	Dr. Nwokolo Lilian Nwabunwanne	Member
8.	Dr. Tajudeen O. Amuda	Member
9.	Dr. Yusuf A. Bello	Member
10.	Mr. Chukwuemeka Lawrence Ani	Technical Lead (PA to the COC Chairman)/Member
11.	Mr. Anas Ali Tamasi	Desk Officer for Abstract/Proceedings Sub-committee/Member
12.	Mr. Kabiru Dauda	Logistics Desk Officer/Member

APPRECIATION

The Commandant, on behalf of Staff and Students of Air Force Institute of Technology (AFIT), Kaduna expresses his profound gratitude to His Excellency, The Executive Governor Kaduna State, Mallam Nasir El-Rufai, His Royal Highness, HRH Amb. Ahmed Nuhu Bamalli, Keynote Speakers, Leader Paper Presenters, and to all those who have come to felicitate with us on this maiden event commemorating the International Year of Basic Sciences for Sustainable Development (IYBSSD 2022) in collaboration with UNESCO. We also express our appreciation to our Sponsors; Kaura Motors Nig. Ltd., Airtel and Prof. Hawau Evelyn Yusuf for their tremendous support towards the realization of our event. We wish you all God's abundant blessings, protection, and journey mercies as you return to your respective destinations.

Dr. HAMMED ADENIYI LAWAL
Dean Faculty of Science/LOC Chairman
AIR FORCE INSTITUTE OF TECHNOLOGY

LISTS OF ABSTRACTS

S/No.	CODE	TITLE
BIOLOGY, CHEMISTRY AND HEALTH		
1	**BCH_001**	Determination of the Ignition Properties of Ammonium Dihydrogen Phosphate, Melamine and Urea on Fire Retardant Paint *Temiloluwa Ojuolape Amusan, Femi Emmanuel Awe, Jonathan Maduka Nwaedozie*
2	**BCH_002**	Prevalence and Pattern of Smoking Among Youths in Ilorin East Local Government Area, Kwara State, Nigeria *Barakat Olajumoke Kolawole, Mutolib Olabayo Olatubosun, Yusuf Funsho ISSA, Hamzat Ayodeji Sorunke*
3	**BCH_003**	Prevalence of parasitic Protozoa and Helminthes of Veterinary and Zoonotic importance among Cattle, Sheep and Goats slaughtered in Sabon – Tasha Abattoir, Chikun LGA, Kaduna State. *Eke, S. S., Onojafe, J. O., Owoh – Etete, U. & Umeasiegbu, C. U.*
4	**BCH_004**	Allelopathic Effect of Calotropis Procera (L) Leaves Extract on Seed Germination and Early Growth of Arachis Hypogeae (L) and Pennisetum Glaucum (L) *Zakari Abdurahman Ya'u, Emmanuel Aduojo Ekpa, Amina Shehu Bature,Nancy Erika Michael and Oluwatosin Comfort Oluwatoyin*
5	**BCH_005**	Vector Potentials of House Flies (Musca Domestica L.) in Mariga Local Government Area, Niger State *A. H. Bobi, H. M. Bandiya, D. Y. Kanya, and N.K. Isyaku*
6	**BCH_006**	Qualitative and Quantitative Analysis of the Bioactive Constituents of Euphorbia polycenomoid Aerial parts Crude Extract *Kwazo, H. A., Garba, U., Gayari, M. S., Aletan, U. I., and Sulaiman A. U*
7	**BCH_007**	Assessement of Heavy Metals in White Board Marker Using AAS Analysis for Health Security *Ibrahim Garba and Mannir Bello*
8	**BCH_008**	Photocatalytic Degradation of Phenol from Water Using Nickel Under UV *Joy Yohana Ishaya, Maurice Jemkur, Waidu Deborah Manko, Olaleye Timilehin Francis*
9	**BCH_009**	Physico-Mechanical Properties of Soybean bagasse reinforced waste Poly (vinyl) chloride Composites *Joseph Jacob, Uwaisu Yusuf, Kabiru Dauda, Khalifa Muhammad Musa and Anas Ali Tamasi*
10	**BCH_010**	Health Care Waste Management-An Emerging Challenge in Nigeria *Mohammed Tanimu Badamasi, Mohammed Haruna Rabiu & Musa Abdulhamid*

11	**BCH_011**	The Lethal Dose 50 (LD50) And Weight Effect Of Ageratum Conyzoides Methanol Leaf Extract On Alloxan-Induced Diabetic Rats *Paul Chijioke OZIOKO; Ukamaka OWOH-ETETET; Josephat Ejike OZOR and Idris ABDULLAHI*
12	**BCH_012**	Characterization of Column Fraction of Ethyl Acetate Root Extract of Ampelocissus grantii (Baker) Blanch (Vitaceae) *Salman Yahaya Maiyama, Halilu Dahiru, Misbahu Ladan Mohammed, Halilu Emmanuel Mshelia, Chinenye Jane Ugwah-Oguejiofor, Babagana Ali and Mustapha Salihu*
13	**BCH_013**	Molecular Modelling and Designs of Some Explosive Compounds *Usman Abdulfatai and Adetotro Ahmed*
14	**BCH_014**	Acute Toxicity Study of The Chloroform Leaf Extract of Neocarya macropylla (Sabine) Prance (Chrysobalanacea) *Bature H.B, Isah AM, Adamu S.S,Umar M.J.*
15	**BCH_015**	Health Risks Assessment of Chlorinated Pesticides in Fruits and Processed Fruit Juices Obtained from Niger State, Nigeria *Okereafor, S. and Garba, S.*
16	**BCH_016**	Isolation, Identification and Characterization of Some Phytochemicals Present in Cadaba Farinosa Stem Bark Extract *Salaudeen A.A., Dangoggo S.M., L. G. Hassan and H.E., Mshelia*
17	**BCH_017**	Evaluation of Ascorbic Acid Content and Antioxidant Activity of Methanol Extract of Some Selected Fruits Harvested in Kano *Prof. Suleiman Yusuf Mudi and Abdulsalam Abdullahi Dabo*
18	**BCH_018**	Molecular Docking, Drug Design, Pharmacokinetic Studies Of Some Hepatitis C NS-5B Inhibitors *Abubakar Sadiq Bello, Adamu Uzairu, Abdullahi Bello Umar and Muhammad Tukur Ibrahim*
19	**BCH_019**	Assessment of Endangered Wild Snail Species Present at the Federal College of Agriculture, Akure *Ajulo, T. B., Aruwajoye, D. A., Adeeko, A., Ogodo,B.R., Alaafin, S.O.*
20	**BCH_020**	Effect Of Application Methods Pig Manure On Growth And Yield Performance Of Pepper (Capsicum annum) *Aruwajoye D.A., Oruche C. C., Olamide T. A. and Ajulo T.B.*
21	**BCH_021**	Effect of Application Methods of Rabbit Manure on Growth and Yield Performance of Pepper (Capsicum annum) *Aruwajoye D.A., Oruche C. C., Olamide T. A. and Ajulo T.B*
22	**BCH_022**	Chiral Synthesis of Crispine-a by Asymmetric Hydrogen Transfer using Ru-Catalyst *Muhammad Sagir Abubakar and Abdulsalam Abdullahi Dabo*
23	**BCH_023**	Enhancing Nigeria's Security Capacity Through Biotechnology *Ekpa, E. A, Micheal N. E, Amina S.B, Oluwatosin C.O, and Bashir B.M*

24	**BCH_024**	Phytoconstituents of Ziziphus Mauritiana as Potential Inhibitors of HPV-16 for Cervical Cancer Treatment: An In silico Approach *Firdausi Aliyu, Nkechi Eucharia Egbe , Saidu Garba and Aliyu Adamu*
25	**BCH_025**	Phytochemical Screening of Leaves Extract of Maerua Angolensis, Entada Abyssinica/Africana and Sesamun Indicum and Test for their Reducing Compound *Halilu Aminu Anka Sani Ibrahim Aliyu Sani T/M and Muhammad Yunusa Boyi*
26	**BCH_026**	Annual Effective Dose Estimation from Radon Concentration in Commercial Bottled Water Consumed In Nigeria *Ismail A., Kolo M.T.and Olarinoye I.O*
27	**BCH_027**	Influence of Urinary Schistosomiasis on Nutritional Status in Al-Majiri (Disciples) in Kawo District of Kaduna Metropolis, Kaduna State-Nigeria *Mohammed M., Umar A. Y., Vanstawa P. A., Yahaya A. U., Muhammad D. M. and Amina R. H.*
28	**BCH_028**	Agitation Leaching Recovery of Zinc, Copper and Lead from Zarara Hill Polymetallic Sulphide Ore Deposit Using H2SO4, HCl and HNO3 *Mustapha Mukhtar, Faizuan Abdullah, K. I. Omoniyi, E. D. Paul and Z. N. Garba*
29	**BCH_029**	Effects of Oral Administration of Aqueous Leaf Extracts of Senna siamea and Eucalyptus citriodora on Some Hematological Parameters in Albino Wistar Rats *Umar SM, Sani MB, Yuguda YM, Maigari MU, Sadau Y.*
30	**BCH_030**	Allelopathic Effect of Calotropis Procera (L) Leaves Extract on Seed Germination and Early Growth of Arachis Hypogeae (L) and Pennisetum Glaucum (L) *Zakari Abdurahman Ya'u, Emmanuel Aduojo Ekpa, Amina Shehu Bature,Nancy Erika Michael and Oluwatosin Comfort Oluwatoyin*
31	**BCH_031**	Molecular Design of a COVID-19 Inhibitor *Adetoro Ahmed and Usman Abdulfatai*
32	**BCH_032**	Methodical Study of Chromium (VI) Ions Adsorption from Aqueous Solution Using Low Cost Agro-Waste Material: Isotherm, Kinetic And Thermodynamic Studies *Anene I. Augustine and Olubunmi K. Akiode*
33	**BCH_033**	Comparative Assessment of Residual Antibiotics in Chicken Parts From North Central And South Western Nigeria *John, Bolanle Durotoluwa, Tomori, Wasiu Bolaji and Faleti, Ayodele Ifeoluwa*
34	**BCH_034**	A Study on Evaluation of Correlation between Presbyopia and Presbycusis in Human *Ndom Bala Ndom*

35	**BCH_035**	A Review on Industrial Applications of Zinc Oxide Nanoparticles *Garba Danjumma Sani and Aliyu Saidu*
36	**BCH_036**	Determination of the Carcinogenic Potentials of Chemical Explosives used as Military Munitions *Madinat Hassan, Taofeek Tope Adegboyega, Sunday Zeal Bala, Jemila Saleh and Muhibbat Bolanle Komolafe*
37	**BCH_037**	Bambara groundnut as ready to use therapeutic food (RUTF) for children under 5 years of age in North-West Nigeria *Adegboyega, Taofeek Tope, Mansurat O. Shoge, Shehu Amina Bature1, Saleh Jamila; Sarki Aliyu; Sani Mohammad Abdsallam; Victoria Moltong Yilwa Abdoulkader Yonli Boukari; and Fagbemi Stephen Akintomide*
38	**BCH_038**	Physiochemical Analysis of Torrefied Sugarcane Bagasse as Feedstock in Biofuel Production *Nwabunwanne Lilian Nwokolo, Mohammed Sharif Lawal, Ndom Bala Ndom, Matthew Chekwube Enebe*
39	**BCH_039**	Heavy Metals Assessment in Some Vegetables and Soil in a Palm Oil Mill Site in Okada, Edo State, Nigeria *Georgina O. Erifeta, Eseosa Kingsley Uyi-Ohonba, Oluwagbenga John Ogunbiyi and Morufu Ojo Lawal*
40	**BCH_040**	Fertility Potentials of Five Medicinal Plants in the Treatment of Infertility Caused by Polycystic Ovarian Syndrome in Female Wistar Albino Rats *Ozioko Eucharia N., Ajibade G.A., Vantsawa P.A. and Appah J.*
41	**BCH_041**	Synthesis and Atomic Force Field Microscopy Characterization of Carbon Dot *Musa Yahaya Pudza and Wyasu Gideon*
42	**BCH_042**	Assessment of Hyperuricemia in some northern Nigerian States: A Descriptive Study *Khalifa Musa Muhammad; Abubakar Rabiu Koko Anas Ali Tamasi; & Kabiru Dauda*
43	**BCH_043**	Self-Healing Mechanisms: The Modern Paradigm in Structural Materials *Abdulafeez O. Akorede, Adetutu O. Aliyu, Abdulmumin Adebisi, Muhammed M. Yusuf and Oluwafunto O. Ilemore*
44	**BCH_044**	Drug Design, Molecular Docking and Dynamics Studies on the Interaction of Voxelotor, L-Glutamine and Hydroxy Urea with Human Carbonmonoxy Hemoglobin S *Anne Jibrin, Adamu Uzairu, Gideon Adamu Shallangwa, Stephen Eyije Abechi, Abdullahi Bello Umar*
45	**BCH_045**	Assessment of Water Quality of an Urban River, Case Study of the Wupa River Abuja

		Blessing Odafe Omovoh, Francis Ofurum Arimoro, Adesola Victoria Anyanwale, Evans Chidi Egwim, Gift Ochonogor Omovoh, Efe Ogidiaka-Obende
46	**BCH_046**	Antimicrobial Effects And Chemical Composition Of Propolis Extracts From The North-Central, North-West And South-East Of Nigeria *Bello Rachel Oluwafunmilayo[1], Egbe Nkechi Eucharia[2], Dibal Deborah[3]*
47	**BCH_047**	Assessment of Heavy Metals in Some Tea Leaves Using Atomic Absorption Spectroscopy *Ahmed Rufai Usman and Ahmed Hassan*
48	**BCH_048**	Chemomicroscopical Examinationand Physicochemical Evaluation of Detarium microcarpum. (FABACEAE) *[1]Ashiru. I. Ijinga [2]S, Abdulkadir, [3]Mahmoud. A. Dogara, [4]Rabiatu. A. Idrees.*
COMPUTING AND INFORMATION TECHNOLOGY		
49	**CIT_001**	Two Scheme Data Transmission for Mitigating Energy Consumption and Latency in Radio-Enabled Internet of Things (IoTs) Network Using Particle Swarm Optimization *Onyebuchi John Nwankwo, Mohammed Abdulkadir Giwa, Abdulmalik Shehu Yaro, Zanna Mohammed Abdullahi, Suleiman Ali Bunawa*
50	**CIT_002**	A Recommender System for the Nigerian Fashion Industry Based on Big Data *Habib Itopa Mohammed, Nafisat Abdulkadir and Abdulbasit Ahmed*
51	**CIT_003**	Utilizing Data Mining in Knowing the Performance of Secondary School Students in Achieving a Sustainable Development *Dauda Sule, Kamaludeen Bature Shehu, Tajudden Muhammad Mashkur*
52	**CIT_004**	Understanding Human Hacking for Improved Cyber Security Awareness *Bright Chibuzo Ezekiel, Dauda Sule Muhammad Auwal Bello*
53	**CIT_005**	Digital Forensics for National Security: Focus on Military Application *Dauda Sule, Kamaludeen Bature Shehu, Tajudden Muhammad Mashkur*
54	**CIT_006**	The Financial Impact of Biometric Technology in Africa towards Electioneering and Sustainable Democracy *Theophilus Aniemeka Enem, Philips Ifeanyi Eze and Edmund Nnabueze Ajimah*
55	**CIT_007**	Design and Development of an Online Local Train Ticket Reservation System *Yahuza Sani Hudu, Abubakar Isah, Ibrahim Yahuza and Abner Ayuba Atugan*
56	**CIT_008**	Mobile Technology: A Panacea to Food Insecurity in Nigeria. *Mudathir Muhammad Salahudeen, Salawu, I.S. Muhammad Auwal Mukhtar, Saadu Salihu Abubakar*

57	**CIT_009**	Big Data: The New Big Thing in The Field of Education *Tohomdet K. Loreta, Johnson Kasimu, Mammu'an Titus Alams, Aisha Ramalan, Maryam S. Masari and Ankat Tohomdet*
58	**CIT_010**	Design and Implementation of Web-Based Certificate Verification of Nigerians' Graduates *Kenneth Ojotogba Achema, Charity Jumai Alhassan and Yahaya Jibrin Danjuma*
59	**CIT_011**	Automated Face Recognition and Verification System for Student Examination Attendance and Impersonation Management *Obunike A. Ubadike, Abbas Abdullahi, Philip Achimugu, Monday Jubrin Abdullahi and Godwin A. Otu,*
60	**CIT_012**	A Stress Based Prediction Model for University Student Using Support Vector Machine and Grid-Search-CV for Parameter Turning *Aisha Jibrin, J.K. Alhassan and S. A. Adepoju*
EDUCATION AND ENVIRONMENT		
61	**EEN_001**	The Roles of Commercial Motor Cycle on Poverty Reduction (A Case Study of Bauchi State) *Salisu Lukunti, KM. Koko, Aminu Haruna and Usamatu Usman*
62	**EEN_002**	The Use of Performance Measuring Tools (Balanced Scorecard) to Foster Accelerated Development *Bernard Koranteng Kabutey*
63	**EEN_003**	A Descriptive Analysis of the Connections Between Basic Science and Quality of Life *Innocent Opara and Hassan Aliyu*
64	**EEN_004**	Effect of Instructional Media on Acadamic Performance of Basic Science Students in Junior Secondary Schools in Birnin Kebbi Metropolis *Jamila Sani Doki and Shafi'u Abdullahi*
65	**EEN_005**	Flood Risk Management, Public Information and Warning using Social Media *Mustapha Aliyu*
66	**EEN_006**	The Role of Technology in Combating Banditry and Food Insecurity in North-West Nigeria from 2011 – 2022 *Samuel Abimbola Kolawole Osanubi, Jinkai Dennis Ahmadu, Nuradeen Hassan Baba, Zuaira Abdullahi Garba, Abdulganiu Mahmud and Donald Sabastian Goji*
67	**EEN_007**	Basic ICT and Educational Technology in 21st Century in Nigeria: Problems and Prospects *B. Yahaya and I. Garba*

68	**EEN_008**	Concept Mapping as a Pedagogic Tool in Teaching Undergraduate Biology in Nigeria *Oluwatosin C.O, Ekpa, E. A, Micheal N. E, Amina S.B, Bashir B.M and, Fakolade,B.A*
69	**EEN_009**	The Use of the Big Five Personality Traits in Developing Personalized Educational Modules *Bernard Koranteng Kabutey*
70	**EEN_010**	Prevalence of Obesity among Adolescents in Private and Public Secondary Schools in Calabar Metropolis, Cross River State, Nigeria *Ogar, Emmanuel Ekawu and Adie, Boniface*
71	**EEN_011**	Unsustainable Developmental Practices in Nigeria: A Discourse on Sustainable Development *Samuel Adamu Abubakar*
72	**EEN_012**	Education Technology: A new Business Direction *A. A. Tamasi and S. A. Tamasi*
73	**EEN_013**	Effects of Video Instructional Package (VIP) on Secondary School Students Retention in Biology in Makurdi Metropolis, Benue State *Nwaokolo, B., Adejoh, M. James, Okwara, O. Kalu, Anyagh, I. Paul*
ENGINEERING		
74	**ENG_001**	The Design and Simulation of an Automatic Microcontroller (PIC 18F45K22A) Based Temperature Control System *Zainab Abiola Quadri, Mohammed Abdulkadir Giwa, Opeyemi Olajumoke, Habib Tunji Adeyemo, Godwin Abbe, Adedayo Abdulafeez Ogunsesan and Onyebuchi John Nwankwo*
75	**ENG_002**	Optimization of the Servomotor Speed Control Using Fuzzy Logic Based Conventional Feedback Mode *Ehibe Prince, Ogbonnaya Irukwu J, Alozie Innocent S.*
76	**ENG_003**	The Design and Simulation of Microcontroller-Based Office Automated Robot for Light-Weight Item Delivery *Sanni Suleiman Adebayo, Mohammed Abdulkadir Giwa, Habib Tunji Adeyemo, Suleiman Ali Bunawa, Idris Abdulkadir Kabir*
77	**ENG_004**	Review Study on the Design and Development of Bird-like Unmanned Aerial Vehicle *Abner Ayuba Atugan, Abubakar Isah, Ibrahim Yahuza, Yahuza Sani Hudu*
78	**ENG_005**	The use of Unmanned Aerial Vehicle (UAV) for Early Detection of Oil Spills from Crude Oil Pipelines *C.O. Njoku, E.U. Uche, A.V. Gambo, Y. Bello, R. E Donatus*

79	**ENG_006**	Recent Trends on Sol-Gel Synthesis of MgHf4P6O24 Electroceramic Electrolyte in Fabricating Mg-Sensors *Mohammed Adamu and Girish M Kale*
80	**ENG_007**	Finite Element Analysis of Kenaf Fibre Reinforced HDPE Composites for Crash Helmet Application *Ndubuisi Mbada; Malik Abdulwahab; Adetayo Adebisi; Idongesit Okon; Rita A Uzhoho*
81	**ENG_008**	Digitalization in The Construction Industry: Problems and Prospects *Precious Munachiso Juliet Ugochukwu, Ferdinand Ozemoya Inobeme and Victoria Hassana Jiya*
82	**ENG_009**	Optimum Replacement Levels of Ordinary Portland Cement with Rice Husk Ash from Varieties of Rice for Low Cost Housing *Dauda Ali, U. A. Jalam, Sani Aliyu and I. A. Alkali*
83	**ENG_010**	Evaluation of the Effects of Heat on the Tensile and Bond Strength of Slag Cement Concrete *Sesugh Terlumun, Tiza Michael, Victoria Hassan Jiya, Okah Michael Chukwu, Farida Ujudud Shariff and Ibibom Edidiong Godwin*
84	**ENG_011**	Design and Fabrication of a Motorized Fruit Juice Extractor *A.A. Hassan, O.E. Olorunshola, D. Solomon*
85	**ENG_012**	Design and Fabrication of Direct Current Blender *A.A. Hassan, O.E. Olorunshola, D. Solomon*
86	**ENG_013**	Validation Of Apsim Model For Rainfed Rice Yield Simulation At Kano River Irrigation Project *M. K. Mukhtar and M. M. Maina*
MATHEMATICS AND STATISTICS		
87	**MST_001**	Application of Linear Programming (A Case Study of Nylon Producing Company) *Peter Anthony and K. M. Koko*
88	**MST_002**	Prevalence of Intestinal Parasitic Infections in HIV Positive and Negative Groups in some Selected Semi-Urban Areas in Nasarawa State, Nigeria *G. A. Adesue, C. L. Ani, L. O. Mashood and J. Y. Anche*
89	**MST_003**	Some Estimate for Spatially Unbounded Solutions of Burgers Equation With Non-Autonomous Forcing *Peter Anthony and K. M. Koko*
90	**MST_004**	Classification of Crypto Assets, Non-Fungible Tokens (NFTs) and Blockchain Technology in Macroeconomic Statistics: Panel Data Analysis *C. L. Ani, L. O. Mashood, J. Y. Anche and D. E. Aderupatan*

91	**MST_005**	Facemask Violation Detection System Using Convolutional Neural Network *Ajodo Samson, Oyewole Stanley Ade, Ejekwu Graveth Ozuoma*
92	**MST_006**	On Quotient Based Graphs for Finite Abelian Groups *Aliyu I. Kiri and Aliyu Suleiman*
93	**MST_007**	Effect of DPL on Natural Convection Couette Flow of An Oldroyd-B Fluid in a Vertical Micro-Channel with Asymmetric Thermal Boundary Conditions *Peter B. Malgwi, Gabriel Samaila, Deborah A. Daramola and Abdullahi A. Wachin*
94	**MST_008**	On Multirings *Jibril Aminu, Yohanna Tella, Ibrahim Ahmad Isah and Simon Daniel*
95	**MST_009**	Multilevel Logistic Analysis of Infant Mortality in Nigeria across the Geopolitical Zones *Joshua Yakubu Anche, Azihaiwe-Justin Austin Nedu and G. A. Adesue*
96	**MST_010**	Geo-additive Model of Count Data: The Impact of Fertility Level on Female Education Among Childbearing Age Women in Nigeria *Lawal O. Mashood, Chukwuemeka L. Ani1, Oluwafemi S. Balogun, Sikiru A. Abdulazeez*
97	**MST_011**	Modelling the impact of Vaccination and Treatment in Controlling the Spread of Hepatitis B Virus with Infective Migrants *Nwaokolo Martin Afam, Gweryina lubem and Madubueze Chinwendu Emilian*
98	**MST_012**	Free Convection Slip Flow with Thermal Radiation in a Convectively Heated Vertical Channel Filled with Porous Material *Yakubu Bello, Muhammad Murtala. Hamza and Godwin Ojemeri*
99	**MST_013**	Construction of Education Development Index (EDI) for Monitoring Academic Performance in the NUC program of the Air Force Institute of Technology (AFIT), Kaduna *Salawu, I.S., Lawal, Adeniyi and Mudathir Muhammad Salahudeen*
100	**MST_014**	Hausdorff Bitopological Space in Multiset Context *Anas Usman, Yohanna Tella and Ahmed I. Isah*
101	**MST_015**	Unsteady Taylor-Couette Flow Formation with Slip Boundary Conditions: A semi-analytical Approach *D.J. Yahaya, B. K. Jha, K. O. Achema, F. Adegboye and I. Adaji*
102	**MST_016**	Boundary layer flow over a continuously moving plate with convective surface boundary condition *Basant K. Jha , Gabriel Samaila, Peter Bukar Malgwi, Abdullahi Abubakar Wachin, Deborah Daramola*

103	**MST_017**	Effect of the Zonal Harmonics of the Secondary on L4,5 in the Photogravitational ER3BP *Ashagwu Blessing Samuel, Abdulrazaq Abdulraheem*
104	**MST_018**	Caputo Fabrizio Fractional Time Derivative Approach On Transient Mixed Convection Flow Of Heat Generating/Absorbing Fluid In A Vertical Porous Channel With Exponentially Decaying Pressure Gradient: Semi Analytical Approach *Peter Bukar Malgwi, Nana Hauwa Sayeed and Gabriel Samaila*
105	**MST_019**	Perturbing Effects of P-R Drag on Location of Triangular Lagrangian Points and Zero Velocity Surfaces of the Photogravitational Restricted Problem of Three Oblate Bodies *Tajudeen Oluwafemi Amuda and Oni Leke*
106	**MST_020**	Model of Queuing System on First Bank (A Case Study of Jos Main Branch, Plateau State, Nigeria) *Salisu Lukunti, Ado Bappayo, Usman Hassan and Aliyu Suleiman*
107	**MST_021**	Facemask Violation Detection System Using Convolutional Neural Network *Ajodo Samson, Oyewole Stanley Ade, Ejekwu Graveth Uzoma*
108	**MST_022**	Optimal Control Analysis of Onchocerciasis Transmission Model *Isaac O. Onwubuya, Nkem N. Godwin, Nor Tindi and Chinwendu E. Madubueze*
109	**MST_023**	Commutativity and Cancellability Closure of Multiset Operation on Class of Finite Semi-Multigroup *Gambo Jeremiah Gyam, Tella Yohanna and Umar A.M*
110	**MST_024**	Naira per US Dollar Exchange Rate Modeling using ARFIMA method *Maimuna Ahmad Aliyu1 and Musaddiq Sirajo2*
PHYSICS AND SPACE		
111	**PHS_001**	Photovoltaic Potentials of a Silver Implanted Diamond-like Carbon Thin Film *Abdulsalam I. Galadima, Abubakar K. Abubakar and Anthony Miller*
112	**PHS_002**	Groundwater Development, Protection and Storage Mechanisms the Key Factors for Water Security and Sustainability. *Joseph Omeiza Alao, Hammed Adeniyi Lawal, Diya'ulhaq Abdullahi, Salisu Musa, Muhammad Sani Ahmad, Theophilus Toro Danjumo, Mohammed Shettima Nur*
113	**PHS_003**	Assessing the Water Content and Electrical Conductivity of Soil Samples for Agricultural Precision Using a Digital Dialysate Meter *Diya'ulhaq Abdullahi, Alao Joseph Omeiza, Abubakar Muhammad Narimi, Salisu Musa and Nura Muhammad Nagoda*

114	**PHS_004**	Space Weather Impacts on Small Satellites; Investigation of the Features of February Geomagnetic Moderate Storm *Hammed A. Lawal and Mukhtar I. Muhammed*
115	**PHS_005**	Development and Efficiency of Box-Type Solar Cooker Experiments in Zamfara State College of Education Maru-Nigerian *Marwana Muhammad*
116	**PHS_006**	Qualitative and Quantitative Interpretation of Aeromangentic Data Over Parts of Middle Benue Trough, Nigeria *Onyishi George Emeka and Ugwu Gabriel Zeruwa*
117	**PHS_007**	Assessment of Natural Radioactivity Levels and Associated Hazard Indices in Surface Rocks around Ikogosi Warm Spring Area of Ekiti State, Southwest Nigeria using Gamma Ray Spectrometry *Samuel O. Sedara, Adeola M. Asere and Oludayo O. Adekanye*
118	**PHS_008**	Thermal Characterization of the Pb-Zn Bearing Zone in the Lower Benue Trough of Nigeria through the Curie Point Depth, Geothermal Gradient, and Heat Flow *Shuaibu, A., Alile, O.M., Aigbogun, C.O., Ighodalo, J.E., and Bello, Y.A*
119	**PHS_009**	Application of Sponteneous Potential Method to Delineate Subsurface Salinization Level in Fadama Areas of Kurfi Town, Sokoto State Nigeria *Y.I. Bawa, M.Saleh, M.M. Ridwan, and D. Abdullahi*
120	**PHS_010**	An Evaluation of Nuclear Energy's Potential Role in Nigeria's Electricity Production *Kabir Abubakar and Isah Ahmad*
121	**PHS_011**	Efficient multicolor emission from Eu3+/Dy3+ co-doped doro-telluro-borate (DTB) glasses for Lasers and W-LEDs application *Ibrahim Bulus, Gyuk Philibus Musa, Hammed A. Lawal and Abdullahi Anderson Kassimu*
122	**PHS_012**	Structural, Electronic and Optical Properties of Double Perovskite Halide Cs2In-xSbCl6 *Ismail Magaji, Alhassan Shuaibu and Mustapha Isah*
123	**PHS_013**	Design And Implementation Of Light Fidelity Based Home Automation System *Muhammad Mustapha Gwani, Ahmed Mohammed Gimba and John Mikohol Uzer*
124	**PHS_014**	Elastic Properties of Zinc Tellurite Glass System Doped with Samarium Nanoparticles *Rabiu Abubakar Tafida, Muhammed Yusuf Onimisi, Owolabi Joshua Adeyemi*
125	**PHS_015**	Optimization of ETM and Absorber Layers' thickness in an inorganic lead free RbGeI3 based perovskite solar cells by device simulation

		Mary T. Ekwu and Eli Danladi
126	**PHS_016**	Ab-Initio Prediction of Stable Boron Doping Lattice Site in 3C-SiC Crystal Structure *Abdullahi Alkali Dauda, Muhammad Yusuf Onimisi, Adeyemi Joshua Owolabi, Ibrahim Garba Buba and Muhammad Abdurrahman Na'inna*
127	**PHS_017**	Stabilization of Monovalent and Mixed Valent Cations in SnnOm Clusters and Predictive Applications – First Principles Calculations *Olubunmi K. Akiode, Palanichamy Murugan Mopelola A. Idowu and Abideen I. Adeogun*
128	**PHS_018**	Performance Evaluation of a New Temperature Base Models For Estimating Global Solar Radiation in Sokoto Metropolis *Muhammad Abdurrahman Na'inna, Abdullahi Alkali Dauda, Muhammad Yusuf Dawaki, Obanero Omuya Abdulwahab & Alike Romanus Emeka*
129	**PHS_019**	The Ahmadu Bello University's High Voltage Materials Laboratory *A.A. Abdelmalik, A.I. Galadima, A. Abdulraheem, A.A. Khaleed, Y.M. Abubakar.*
130	**PHS_020**	Determination of The Presence of Gamma Rays Using Gammapix In Some Locations In Abuja And Kaduna. *Alike Romanus Emeka*
131	**BCH_049**	Physicochemical and Heavy Metals Evaluation Of Indigofera conferta (Fabaceae) *Ibrahim A.. I. and 1Abdulkadir S*
132	**MST_025**	A Generalization of New Exponential-Gamma Distribution with Applications *I. Suleman, M.A.Umar, U.M.Hassan , M.M. Ndaware*

BIOLOGY, CHEMISTRY AND HEALTH

BCH_001: Determination of the Ignition Properties of Ammonium Dihydrogen Phosphate, Melamine and Urea on Fire Retardant Paint

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Abstract

In this study, fire retardant paint was produced using the following components: Ammonium dihydrogen phosphate, Melamine, Urea, Gum Arabic, Polyvinyl acetate, Titanium Dioxide, Calgon, Nitrosol, Genepour, Calcium Carbonate and Formalin. Horizontal burning test following the ASTMD635-75 standard procedure was employed to evaluate the ignition time, burning rate and % weight loss of the coated samples. The pH of the paint was determined with the aid of a pH meter. Density and % weight gain of the coated materials were also carried out. The results obtained showed the density of the paint to have values of 1.056, 1.046, 1.066 and 1.062 for level 1,2,3, and 4 respectively while the pH values were 5.05, 5.03, 5.24, and 4.90 for level 1, 2, 3 and 4 respectively. The Flammability measurement showed the burning rate of 2.227mm/s, 1.67mm/s, 1.11mm/s, 1.25mm/s for Level 1, 2, 3 and 4 respectively as against the control value of 4.07mm/s. The ignition time was found to be 3s, 3s, 4s, 4s while the uncoated sample ignited after 2s of exposure to flame. The flame spread test values were 6s, 7s, 8s, 8s for Level 1, 2, 3 and 4 respectively. From the results of the burning analysis Level 4 has the highest flame - retardant properties.

Key words: *Fire retardant, Density, Burning rate, ignition time, Ammonium Phosphate*

BCH_002: Prevalence and Pattern of Smoking Among Youths in Ilorin East Local Government Area, Kwara State, Nigeria

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Abstract

Cigarette smoking has been associated with an extensive list of health disorders as well as reduction of life. On the average cigarette smokers lose about 15 years of their life and an estimated 4 million cigarette smokers die worldwide annually. A descriptive cross sectional study was carried out among 300 youths in Ilorin East LGA between February and March 2020. Data was collected with the aid of a pretested, validated, structured, interviewer administered questionnaire. Data was analyzed with statistical package for social sciences (SPSS) version 21.0 software and the results were presented with tables and charts. Close to half of the respondents (42.3%) are within the age group of 21-25 years with a mean age of 23.6±4.7 years, and about two thirds (77.3%) are females. Close to half of the respondents (49.3%) are smokers, half of whom (49.3%)

smoke on weekly basis. Close to three quarters of the respondents (73.3%) and (70.0%) had a good knowledge and attitude related to cigarette smoking. Majority of the respondents (9.7%) agreed that their religion doesn't allow smoking and also (85.3%) agreed that peer influence do contribute to youth smoking. There is a significant association between socio-demographic characteristics and the pattern of smoking among the respondents ($p<0.05$). This study revealed a prevalence rate of 49.3% for smoking among youth majority of whom had a good knowledge and attitude related to cigarette smoking. Factors related to smoking include parental smoking, religious practice and peer influence.

Keywords: *Cigarette, Prevalence, Tobacco, Smoking, Youths.*

BCH_003: Prevalence of parasitic Protozoa and Helminthes of Veterinary and Zoonotic importance among Cattle, Sheep and Goats slaughtered in Sabon – Tasha Abattoir, Chikun LGA, Kaduna State.

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Abstract

The livestock industry plays a vital role in the economy of Nigeria. It serves as a major source of income and livelihood for majority of Nigerians who are rural settlers and contributes about 5.2% to the National Gross Domestic Product (GDP). This study was conducted to investigate and provide data on the prevalence and zoonotic impact of parasitic protozoan and helminthes of ruminants slaughtered in Sabon – Tasha Abattoir, Chikun LGA of Kaduna State – Nigeria. Faecal samples were collected and examined using direct wet mount and sedimentation methods, respectively. A total of 329 diarrhoeic faecal samples were collected from 117 Cattle, 102 Sheep, and 110 Goats, respectively. Of the total 329 faecal samples collected and examined, 217 (65.96%) were positive for Gastrointestinal parasites. Goats had higher prevalence of gastrointestinal parasites 93 (42.86%) as compared to Cattle 65 (29.95%) and Sheep 59 (27.19%). The difference in the three species of ruminants was not statistically significant ($p>0.05$). Based on gender, the males had the highest infection 126 (58.06%) than their female counterparts 91 (41.94%) of gastrointestinal protozoan and helminthes. This study revealed the presence of Eight (8) genera of gastrointestinal parasites: *Eimeria sp, Ascaria sp, Haemonchus sp, Strongyloides sp, Fasciola sp, Oesophagostomum sp, Trichuris sp and Moniezia sp*. This study has revealed an all round protozoan and helminthes infections ruminants, which may impact negatively on their productivity, therefore, effective control measures, should be put in place to combat the despicable effects of gastrointestinal parasites in ruminants.

Keywords: *Diarrhoea, Gastrointestinal parasites, Sabon – Tasha, Prevalence, Ruminant*

BCH_004: Allelopathic Effect of Calotropis Procera (L) Leaves Extract on Seed Germination and Early Growth of Arachis Hypogeae (L) and Pennisetum Glaucum (L)

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Abstract

The effect of aqueous leaves extract of *Clotropis procera* at 20%, 40% and 80% on seeds germination and early growth of Groundnut (*Arachis hypogeae*) and Millet (*Pennisetum glaucum*) was investigated. The results showed that the extract both at lower and higher concentration did not affect the seeds germination of the two plants species. Final germination percentage after ten days was increased by increasing the extract concentration especially on Millet where 100% and 95% germination was observed at 20% and 80% concentration of the extract respectively. Generally, the radicle and plumule growth was sensitive to different levels of the extract where the plumule length was decreased by increasing the extract concentration and some leaves began to die at higher concentration (80%) in Groundnut (*Arachis hypogeae*). However, plumule emergence and growth was stimulated in both lower (20%) and higher (80%) concentration in Millet (*Pennisetum glaucum*) seedlings more than control treatment. Therefore the seedlings of Groundnut were must affected by the aqueous extract of *Clotropis procera* than that of Millet.

Keywords: *Allelopathic, Calotropis Procera, Germination, Arachis hypogeae, Penniserum glaucum*

BCH_005: Vector Potentials of House Flies (*Musca Domestica L.)* in Mariga Local Government Area, Niger State

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Abstract

The houseflies *(Musca domestica)* lives closely with humans and domestic animals, they are found in areas of human activities such as hospitals, restaurants, food canteens, markets, tea sports and slaughterhouses. This study was designed to assess the different species of parasites associated with the external and alimentary canal of the houseflies collected in Mariga local government area of Niger State, Nigeria. Herve *et. al*., (2008) method was adopted for the flies capture. Isolation of the parasites from the body of the houseflies was adopted from Nmorsi *et. al*.,(2014), Adiku (2008) and Trigurayate (2009). The results obtained showed that, *Entomoeba histolytica* recorded highest prevalence 217.67 **(34.59%)** on the external parts of the flies compared parasites' *Hymenolepsis nana* was the least 24.33**(3.85%)** parasite isolated on the external parts. *Teania* species recorded the highest prevalence 122.67 **(31.99%)** in the alimentary canal of the flies, *Trichuiris trichiura* has the least prevalence among the parasites isolated in the alimentary canal.

Housefly control is suggested. Also, health education, proper environmental sanitation, and personal hygiene are necessary.

***Keywords**: Houseflies, Parasite, Pathogens*

BCH_006: Qualitative and Quantitative Analysis of the Bioactive Constituents of *Euphorbia polycenomoid* Aerial parts Crude Extract

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Abstract

The therapeutic efficacy of medicinal flora depends on its phytochemical constituents. The phytochemical screening of the methanolic extract of *Euphobia polycenomoid* showed the presence of alkaloids, anthraquinones, cardiac glycoside, flavonoids, steroids, tannins, and terpenoids. Different concentrations of these secondary metabolites were determined using quantitative analysis; flavonoids ($341 \pm 10.0 mg/100g$), anthraquinones($56.67 \pm 1.52 mg/100g$), tannins($21.6 \pm 4.00 mg/100g$), alkaloids($126 \pm 0.00 mg/100g$), and steroids($48.67 \pm 1.53 mg/100g$). The methanolic extract was found to show inhibitory activity against *Salmonella typhi, Shigella dysentarea, and Escherichia coli* in all the concentrations used (25mg/ml, 50mg/ml, 100mg/ml, and 200mg/ml) and no activity were recorded for the other tested enteric bacteria. The phytochemical constituents of the extract conferred antibacterial properties of the plant for its Ethno medicinal claims in the treatment of enteric bacteria.

Keywords:

BCH_007: Assessement of Heavy Metals in White Board Marker Using AAS Analysis for Health Security

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Abstract

Health is a basic criteria for the attainment of quality population. Therefore, national security is incomplete without a healthy population, which account for national productivity. In this study, the present and level of concentration of some selected heavy metals which include: Pb, Cu, Cr, Fe, Ni and Mn, were evaluated in five (5) different brands of white board. The analysis was carried out using standard method of Atomic Absorption Spectrometry (AAS). The following elements were detected over some ranges; Pb 0.12±0.01ppm to 1.27±0.02ppm, Cu 0.38±0.01ppm to 21.57±0.01ppm, Cr 0.33±0.01ppm to 1.78±0.01ppm, Fe 0.02±0.02ppm to 1.78±0.01ppm, Ni 0.28±0.01ppm to 1.73±0.01ppm and Mn 0.08±0.01ppm to 0.38±0.01ppm. The five samples brands of white board markers were label A1, A2, A3, A4 and A5 for Monami white board marker sigma, Keyite white board marker, Refillable 35B white board marker, Dobel 212 white board refillable marker and NWYCON white board marker respectively. The detected concentrations of

heavy metals in the samples were compared with the max-limit recommended concentration by EPA's for ink and make-up substances. From the outcome of the result, sample A1 is consider more safe for use due to its low concentration content of heavy metals compared to the other samples, Sample A3 present the highest concentration of Cr, Pb, Cu and Ni while sample A4 presents the highest concentration of Fe and Mn. With the view to free the users of white board ink from the toxicity of heavy metals, the study extracted some safety recommendations.

Keywords: *Heavy Metals, Atomic Absorption Spectrum (AAS)*

BCH_008: Photocatalytic Degradation of Phenol from Water Using Nickel Under UV

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Abstract

Water supply contamination is a growing issue. The majority of current treatment methods are efficient at cleaning water, but they just move contaminants from one medium to another or produce waste that needs additional cleaning and disposal. It is necessary to create efficient processes for the complete mineralization of resistant contaminants or for their degradation to less hazardous chemicals. One of the most pervasive harmful organic pollutants released in wastewater effluents is phenol and phenolic compounds, which are resistant to environmental degradation by chemical, biological, and photolytic processes. Chemical process industries include pulp and paper, pharmaceutical, agrochemical, petrochemical, and pesticide production discharges are the main producers of phenol and phenolic compounds. Due to their toxicity, capacity to interfere with the endocrine system, and activity as carcinogens, the buildup of these pollutants can have detrimental impacts on human health. As a result, the environment and ecosystem are seriously endangered by the incorrect management and disposal of these poisonous, cancer-causing substances. Conventional adsorption techniques, such as biological degradation, chemical oxidation, adsorption, and photocatalysis, are employed to cope with such contaminants. For the purpose of reducing water pollution, photocatalysis was created. The combination of photochemistry and catalysis is known as photocatalysis. Ni/Bone under UV illumination was used to study the photocatalytic degradation of phenol using nickel combined with bone with varied metal loadings of 0.025%, 5%, and 0.075%, respectively. It is very effective than the conventional treatments.

Keywords: *Photocatalytic, Phenol, Water, Pollutant, Nickel*

BCH_009: Physico-Mechanical Properties of Soybean bagasse reinforced waste Poly (vinyl) chloride Composites

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Abstract

This research focuses on the development and physico-mechanical characterization of Soybean bagasse (SBB) filled waste poly vinyl chloride (PVC) composites. The composites samples were produced through melt mixing and compression moulding techniques. Physical and mechanical properties such as density, water absorption, tensile strength, elastic modulus and flexural strength were investigated. Better mechanical properties were obtained at higher weight percentage of SBB fibres incorporated. Composite sample with optimum properties has tensile strength of 55 MPa, flexural strength of 45 MPa and Elastic modulus of 2.50 GPA, density of 1.05g/cm^3 compared to 1.28g/cm^3 of the unreinforced sample and minimal water absorption of 0.95% after 30 days immersion period at ambient temperature. These results indicate that reinforcement of waste PVC with SBB enhanced its physical and mechanical properties.

Keywords: *composites, physical properties, poly (vinyl) chloride, mechanical properties and soybean bagasse.*

BCH_010: Health Care Waste Management-An Emerging Challenge in Nigeria

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Abstract

Healthcare wastes have received less attention and the priority it deserves in the health care centres and the environment especially in Nigeria. the study estimates the dangers of improper disposal of health care waste; and also review the international agreements and principles on health care management. Furthermore, to reduce the movement of hazardous wastes. The study reported that the Health Care Wastes (HCW) pose immense danger due to the inadequate waste disposal management practices in rural and urban sectors. Health and Medical Care Waste (MCW) is often mixed with municipal waste including domestic wastes and is finally disposed- off in residential waste landfills or improper treatment facilities. Regulatory intervention by the government and health care agencies. However, it is very crucial to control and check the health care waste management especially for medical waste. This study is an attempt to present a general overview of the current management practices of health and medical wastes in Nigerian hospitals, with emphasis on the urban sector. The data are generated by the analyses of the primarily and secondary collected reports and information regarding the generation, composition, segregation, transportation and disposal of contaminated materials and medical wastes is discussed. The study

also focuses on the impact of poor management of HCW to handlers, public health and environment.

Keywords: *Healthcare waste, Medical waste, Waste-management and Risk.*

BCH_011: The Lethal Dose 50 (LD_{50}) And Weight Effect Of *Ageratum Conyzoides* Methanol Leaf Extract On Alloxan-Induced Diabetic Rats

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Abstract

Weight management should be part and parcel of diabetes mellitus (DM) treatment strategy, especially type 2 diabetes mellitus (T2DM), including selecting oral antidiabetics/hypoglycemic medications and insulin products that are weight beneficial. The crude extract of *Ageratum conyzoides* after maceration was subjected to solvent-solvent fractionation using chloroform, ethyl acetate and ethanol, in increasing order of polarity. The LD_{50} and the weight effects of the methanol leaf extracts on alloxan-induced diabetic rats after 28 days of treatment were investigated. Results showed that LD_{50} of the extract is above 5000 mg/Kg body weight. Also, the effect of extracts on the weight of rats showed that there were no significant differences between the control and the treatment groups in both the crude extract and the fractions as their respective p-values ($p=0.348$ and 0.91) were above the confidence level ($p<0.05$).Similarly, comparing the effect of the extracts on the percentage mean weight (PMW) showed that all the methanol leaf extract treated groups including metformin treated group, had no significant weight reduction (with their respective values far below 0.5) when compared to Groups 1 and 2 in which their PMW were increased to 11.55±4.50* and 9.08±0.94*, respectively. In conclusion, the study indicated that the methanol leaf extract of *A. conyzoides* had a great weight loss effect on the diabetic rat even more than the metformin standard drug. Thus, the methanol leaf extracts *A.conyzoides* could be effectively used in the management of diabetic overweight or obese patients in ethnomedicinal practice.

Keywords*: Ageratum conyzoides, weight effect, diabetes, induction, and LD_{50}.*

BCH_012: Characterization of Column Fraction of Ethyl Acetate Root Extract of *Ampelocissus grantii* (Baker) Blanch (Vitaceae)

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Abstract

Ampelocissus grantii is a medicinal plant widely used in traditional medicine for treatment of diseases including bacterial, parasitic, and fungal infection. This research was designed to characterize column fraction of ethyl acetate root extract of the plant. The root sample was ground into powder and extracted by maceration using ethyl acetate (1:5 w/v). Chromatographic studies (Thin Layer Chromatography and Column Chromatography) were carried out on the extract and characterization was done using Fourier Transformed Infrared (FTIR) Spectroscopy and Gas Chromatography-Mass Spectroscopy (GC-MS). The Column Chromatographic led to the isolation of a yellow oil which on IR spectra showed abroad absorption at 3500-3300 cm^{-1} corresponding to O-H and a sharp absorption at 1735-1750 cm^{-1} due to C=O stretching. Other bands include 1000-1300 cm^{-1} due to C-O stretching in ester and at 1350-1470 cm^{-1} due to CH_2 and CH_3 stretch. The GC-MS result showed that the oil contains compounds including Oleic acid, hexadecanoic acid, cholest-22-ene-21-ol,3,5-dehydro-6-methoxy-pivalate, ethyl oleate and 9-hexadecanoic acid. The compounds were previously isolated from medicinal plants and proved to be biologically active. Hence, they can be used as precursors for drug syntheses.

Keywords: *Ampelocissus grantii, Column chromatography, Characterization, Infrared spectroscopy, Gas Chromatography-Mass Spectroscopy*

BCH_013: Molecular Modelling and Designs of Some Explosive Compounds

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Abstract

Due to the increasing production of modern explosive-resistant amour vehicles, materials and equipment, the calls for improved energetic materials (EMs) with a more destructive detonation capability and high thermal stability for warfare have received tremendous attention from explosive specialists. Energetic materials (EMs) are chemical compounds which contain high thermal stability and huge structurally stored explosive energies. Using the QSPR method, Five (5) novel EM compounds were designed from the seventy-one (71) experimental explosive EM compounds. The detonation velocity (D), density and thermal stability capacity of all the EM compounds were unique and better than those reported in the works of literature and also better than the standard explosive compounds, TNT; due to their unique detonations properties, the

explosive compound such as N,N'-(3,6 dinitropyrazolo[4,3-c]pyrazole-1,4-diyl)bis(N-fluoronitramide) should be given special attention when synthesizing those compounds. When synthesized, military specialists can use any of the compounds as a primary or secondary explosive material.

Keywords: *QSPR, Energetic material, EM, Thermal stability, Explosive*

BCH_014: Acute Toxicity Study of The Chloroform Leaf Extract of *Neocarya macropylla* (Sabine) Prance (Chrysobalanacea)

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Abstract

Neocarya macrophylla is used extensively in the Northern parts of Nigeria in ethnomedicine to treat numerous diseases such as asthma, skin infections, wounds and inflammations. The acute toxicity study was carried out according to the techniques outlined by Lorke (1983).The procedure involved 2 phases: in the 1st phase 9 mice were grouped into 3 groups of 3 mice each, the 1st, 2nd and 3rd groups received 10,100 and 1000 mg/kg of the extract, respectively, intraperitoneally. Animals in all groups were observed for signs and symptoms of toxicity and mortality for 24h. After 24h of observation, 2 mice died in the 3rd group that received 1000mg/kg of the extract, based on this, 12 mice were divided into 4 groups of 3 mice each in the 1st,2nd and 3rd phases receiving 200mg/kg, 400mg/kg,800mg/kg and 1600mg/kg respectively. All mice in the 4th group that received 1600mg/kg died and 2 mice from group 3 that received 800mg/kg also died. Thus, the minimum lethal dose (LD_{50}) was calculated to be 565mg/kg, which is the acute toxicity.

Keywords: *Chloroform, extract, mice, Neocarya macropylla and toxicity*

BCH_015: Health Risks Assessment of Chlorinated Pesticides in Fruits and Processed Fruit Juices Obtained from Niger State, Nigeria

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Abstract

In this investigation, the presence of 10 chlorinated pesticide residues were assessed from 17 samples of fresh fruits (mangoes, oranges, and guavas) and fruit juices(mango juices, orange juices, guava juices, pineapple juices, and mixed juices) from a selected farm in Niger State, Nigeria. The samples were extracted using the modified Quick, Easy, Cheap, Effective, Rugged, and Safe (QuEChERS) technique while the identification and quantification were carried with gas chromatography mass spectrometry/mass spectrometry (GC-MS/MS). The result of this study

recorded the presence of 9 chlorinated pesticide residues which including BHC, δ- BHC, β- BHC Lindane, heptachlor, p'p-DDT, dieldrin, endrin ketone, and endosulfane in all of the samples. Endrin ketone recorded the highest concentration level in orange juice at 0.102 mg/kg. Heptachlor, revealed concentration levels of 0.011 to 0.015 mg/kg in 4 fruit juice samples which are slightly above the permissible limit of FAO/WHO. Dieldrin, p,p'-DDT, δ-BHC and β-BHC were detected in one sample each at concentration levels of 0.019, 0.016, 0.015 and 0.015 mg/kg respectively above the limits. For the Health Risk Assessment, the estimated daily intakes (EDI) of dieldrin, α-BHC, endosulfan , δ-BHC, p,p'-DDT, lindane, β-BHC and heptachlor were below the acceptable daily intake (ADI); as a result, Health risk index (HI) is less than 1. Only endrin ketone exceeded estimated daily intake (EDI) recommended by acceptable daily intake (ADIs)/reference doses (RfDs) in orange juice and HI is greater than 1. The accumulation of these pesticides is dangerous to human health. Therefore, continuous monitoring and evaluation of these toxicants in food is advised.

Keywords: *Chlorinated pesticides; fruits, fruit juices, Health Risk, GC-MS/MS*

BCH_016: Isolation, Identification and Characterization of Some Phytochemicals Present in Cadaba Farinosa Stem Bark Extract

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Abstract

As a result of deteriorating health conditions presently experienced world over and the rising cost of orthodox drugs and their side effects, necessitated the need for more incursion in terms of research into herbal medicinal plants which are known and documented to have lesser side effect. Cadaba stem bark was powdered and extracted by maceration using serial exhaustive extraction of solvent of increasing polarity. The extracts were further subjected to phytochemical screening using standard method. TLC and Column chromatography were carried out, FTIR, GC- MS was also done to characterize the phytochemicals present in the plant. Alkaloids, Carbohydrate, Saponins, Triterphenoids and other phytochemicals were identified. Phytochemical potential of the stem bark of *Cadaba farinosa* has been evaluated in this research. Result obtained at various concentration of the extracts, indicated that the methanol extract possesses the highest percentage phytochemical yield.

Keywords*: Phytochemicals, Cadaba farinosa, Microbial isolates, FTIR, Maceration.*

BCH_017: Evaluation of Ascorbic Acid Content and Antioxidant Activity of Methanol Extract of Some Selected Fruits Harvested in Kano

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Abstract

The study was aimed to determine the content of ascorbic acid in guava, lime and lemon and also to evaluate their antioxidant activity. Vitamin C (ascorbic acid) has been determined by UV spectrophotometric method in the selected fruit juices. The samples were measured spectrophotometrically at 521 nm. This method obeyed Beer's law as was tested by using a standard ascorbic acid. The Methanol extracts of the selected fruits were investigated for their antioxidant activity by DPPH method. Total phenolic content of the fruit samples (based on Folin Ciocalteu method) varied from 31.39 to 42.52 mg Gallic acid equivalent/g of extract and flavonoids content (based on colorimetric $AlCl_3$ method) varied from 1.32 to 1.46 mg quercetin equivalent/g of extract. This study shows that a local fruit such as guava has a high quantity of antioxidant such as phenols, flavonoids and ascorbic acid. Guava (*Psidium guajava*) also has high primary antioxidant potential when compared to other local fruits, lemon (*Citrus limon*) though weaker than lime (*Citrus aurantifolia*) in ascorbic acid and as a primary antioxidant however, is a powerful secondary antioxidant. Also, identification of functional groups present was performed using FTIR machine.

Keywords: *Ascorbic acid, Antioxidant, DPPH, FTIR, Phenolic*

BCH_018: Molecular Docking, Drug Design, Pharmacokinetic Studies Of Some Hepatitis C NS-5B Inhibitors

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Abstract

In this research, molecular docking stimulation was conducted on some Bisamide derivatives as anti-hepatitis C drug candidates via NS5B polymerase inhibition with the help of docking software Molegro Virtual Docker. Molecular docking was performed on twenty (20) Bisamide to elucidate the binding mode of some selected Anti-hepatitis C inhibitors against NS5B polymerase receptor (3FQK) and it was established that compound 19 have the best MolDock Score of -153.507 (kcal/mol), Rerank Score -107.259 (kcal/mol), and Plants Score -79.1867 (kcal/mol), which formed bonds and non-bond interactions. It was recognized that the ligand interacted with the receptor via Conventional hydrogen bond and hydrophobic bond of SER367, ARG386, ARG394 and GLN446 amino acid might be the reason why it has the highest binding affinity. This compound was used as a template in designing novel anti-hepatitis C compounds by attaching some favorable substituents. ADME properties of the selected molecules were predicted, and all Compounds did not violate the criteria stated by Lipinski's rule of five. Four potent analogues were

designed that illustrate an excellent MolDock score -182.345 (kcal/mol) better than the template, FDA approved drug (Ribavirin and Peg interferon) using the structure-based drug design method. However, the ADMET and drug-likeness properties predicted particular newly designed analogues to be pharmacologically and orally safe by not having not more than two violation of Lipinski's (Ro5) criteria. Based on their synthetic accessibility score, they can all be synthesized in the laboratory.

Keywords: *Hepatitis C, NS-5B Polymerase, ADMET properties, Molecular docking.*

BCH_019: Assessment of Endangered Wild Snail Species Present at the Federal College of Agriculture, Akure

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Abstract

The study of snail species diversity and abundance was conducted in the Federal College of Agriculture Akure, Ondo State, Nigeria. Four locations were randomly selected and mapped out using a GPS reader. The sampling methods used for the collection of snail samples were the direct search technique, litter sieving method, and deep net method. A total of 443 snails belonging to 3 families and 7 species were collected. The snails identified were *Achatina achatina, Achatina Fulica, Monochoides vicinus, Archachatina naginata, Limicolaria aurora, Limicolaria flammea, and Melanoides tuberculata*. The most abundant species were *Achatina fulica* with 339 individuals and a relative abundance of 76.59%, followed by *Achatina achatina* with 7.22%, *Archatina naginata with* 6.09%, and *Limicolaria flammea* with 6.7%, *Monochoides vicinus* 1.4%, *Limicolaria aurora* 1.13%, *Melanoides tuberculata* was the least with 4 individuals and a relative abundance of 1.0%. It was observed that *Melanoides tuberculata* a freshwater snail is rare in the study area, and apart from this species, no fresh water snail was found at the fishing dam area. The snail species in the four areas studied were greatly threatened by anthropogenic activities. This study has helped to identify the diversity of snails living within the Federal College of Agriculture, the Akure community, and their surroundings. Thus, this study revealed that FECA Community has low snail diversity having been at the center of the city. Snail picking by farmers and Students of FECA for meat is consequential and it's prejudicial to the population of snails.

Keywords: *Ecosystem, Species, Diversity, Distribution, Anthropogenic.*

BCH_020: Effect Of Application Methods Pig Manure On Growth And Yield Performance Of Pepper *(Capsicum annum)*

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Abstract

The experiment was conducted to determine the effect of application methods of pig manure on the growth and yield of pepper *(Capsicum annuum)*. The field experiment was conducted at Federal College of Agriculture, Akure, Ondo State. The duration of the experiment conducted was four months. The experiment was laid out in 11mx8m ($88m^2$) which was arranged in a Randomized Complete Block Design (RCBD) replicated three times. Pepper seeds was planted in the nursery and after 5 weeks the seedlings were transplanted to the field. The treatments include: Broadcast method, deep method, side method, furrow method of application and control. Growth and yield parameters measured were on plant height, number of leaves, stem girth, number of fruit, fruit weight. Data collected were subjected to analysis of variance (ANOVA) and the means we're separated using Duncan Multiple Range Test (DMRT) at 5% level of probability. Results showed that deep application method produced better growth and yield of pepper compared with broadcast, side, furrow methods of application and control. However, pig manure incorporated into the soil is recommended for pepper production for optimum yield and maximization of profit.

Keywords*: pig manure, pepper (Capsicum annuum), broadcast, deep, furrow method.*

BCH_021: Effect of Application Methods of Rabbit Manure on Growth and Yield Performance of Pepper *(Capsicum annum)*

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Abstract

The research was conducted to determine the effect of application methods of rabbit manure on the growth and yield of pepper *(Capsicum annuum)*. The field experiment was conducted at Federal College of Agriculture, Akure, Ondo State. The duration of the research conducted was four months. It was laid out in 11mx8m ($88m^2$) which and arranged in a Randomized Complete Block Design (RCBD) replicated three times. Pepper seeds was planted in the nursery and after five (5) weeks the seedlings were transplanted to the field. The treatments includes: Broadcast method, deep method, side method, furrow method of application and control. Growth and yield parameters measured were on plant height, number of leaves, stem girth, number of fruit, fruit weight. Data collected were subjected to analysis of variance (ANOVA) and the means were separated using Duncan Multiple Range Test (DMRT) at 5% level of probability. Results showed

that deep application method produced better growth and yield of pepper compared with broadcast, side, furrow methods of application and control. Therefore rabbit manure incorporated into the soil is recommended for pepper production for optimum yield and maximization of profit.

Keywords: *Broadcast method, deep method, rabbit manure, pepper (Capsicum annuum), side method.*

BCH_022: Chiral Synthesis of Crispine-a by Asymmetric Hydrogen Transfer using Ru-Catalyst

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Abstract

In the interest of synthesizing enantiomerically pure compounds without having to separate the racemic mixtures, the introduction of asymmetric catalysts and reagents became a very important and progressive discovery in synthetic organic chemistry. (-) – S – Crispine $[\alpha]_{23} = -84.1$ (c = 1, CH_3Cl) synthesis performed using a chiral Ru-catalyst synthesized with a chiral amine **was** successful to obtain an enantiomerically pure (-) – S – Crispine. The success of the reaction was checked using several methods, namely HPLC, 1H NMR, and polarimetry. The results obtained in comparison to literature shows that 1H NMR and HPLC are most reliable analytical techniques. All the three methods employed in determining the enantiomeric excess and optical purity of our samples namely; HPLC (87.59%), Optical rotation (83.8%) and 1H-NMR (88.5%) yielded nearly similar results with slight variation in the numerical values. The Ru-catalyzed asymmetric hydrogen transfer is highly selective and an efficient catalyst for selective asymmetric synthesis.

Keywords: *Racemic, Asymmetric, Enantiomer, Crispine, Ru-Catalyst.*

BCH_023: Enhancing Nigeria's Security Capacity Through Biotechnology

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Abstract

The race by developed Nations to enhance their security capacities in recent times calls for careful and deliberate actions by other third world countries. No less thanks to the ongoing war between Russia and Ukraine. It seems bigger Nations are suddenly becoming bullies due to their perceived superior military might. Since everything is fair and square in war, all kinds of weapons including bioweapons are now been deployed in order to subdue opponents. Apart from these developed Nations who are constantly developing their defence capacity, rogue states and terrorist organizations are also exploring novel methods of creating weapons of mass destruction. The intentional release of traditional or combinatorial bioweapons remains one of the most important challenges that will continue to shape national and global security in the nearest future. Therefore, in order to use biotechnology for medical intelligence, forensic operations, bio-threat awareness,

and mitigation, attention has to be redirected towards the development of molecular techniques in boosting our security system. This article is an attempt to highlight some of these benefits and challenges that field of biotechnology confronts in terms of biodefense. Issues related to the analysis of pathogen genomes and emerging methods including genomic barcoding, active curation, and knowledge management and their impact on intelligence, forensics, biosecurity, and policymaking will also be discussed. The essence of the essay is a wake-up call to our authorities on the need to develop their local capacity via the instruments of science and technology especially biotechnology in order to ensure the security of our country.

Keywords: *Security, Biotechnology, Molecular techniques, Bioweapons, Nigeria*

BCH_024: Phytoconstituents of *Ziziphus Mauritiana* as Potential Inhibitors of HPV-16 for Cervical Cancer Treatment: An *In silico* Approach

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Abstract

Cervical cancer induced by human papillomavirus is the second most common cancer and the fourth cause of mortality among women worldwide. With more than half a million diagnosis and over 300,000 deaths worldwide, there is need for an effective cure for the ongoing HPV infection. The current study was undertaken to identify natural inhibitors of HPV-16 E6 protein (4GIZ) from *Ziziphus mauritiana*. Thirty-three (33) phyto constituents were selected for molecular docking with the target protein. Molecular docking was performed using AutoDock Vina software. The ADME/T screening of the phytoconstituents was done by SwissADME.100ns MD simulation of the best protein-ligand complex was performed. Molecular docking results revealed that among all the selected phyto constituents, caffeic acid, squalene, gallic acid and ferulic acid showed the best binding energy (-6, -7.6, -6.2, and -6.7 KJ/mol) with HPV16 E6 oncogenic protein. Based on the ADME screening, only squalene and ferulic acid were selected as the best inhibitors.100ns MD simulations also revealed that squalene and ferulic acid were stable inside the binding pocket of 4GIZ. Squalene and ferulic acid can be used as a potential therapeutic drug to cure HPV infections.

Keywords: *Cervical cancer, HPV, Phyto constituents, Molecular docking, MD simulation*

BCH_025: Phytochemical Screening of Leaves Extract of Maerua Angolensis, Entada Abyssinica/Africana and Sesamun Indicum and Test for their Reducing Compound

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Abstract

The importance of medicinal plants is known to us and humans have used for them for different diseases from the beginning of human history. Medicinal plants play an important role in pharmacotherapy is used as starting materials for the synthesis of drugs. The phytochemical screening of Entada Africana/abysinnica, merua anglensis and sesamum indicum was carried out using standard methods. The phytochemical analysis of the three (3) leaves extract revealed that they both contain some important phytochemicals The phytochemical screening of Entada Africana/abysinnica revealed the presence of alkaloids, saponins, steroids, tannins, cardiac glycosides, and reducing compound. While, flavonoids and anthraquinones were absent. Merua anglensis contains alkaloids, saponins, steroids, tannins, cardiac glycosides, steroids and flavonoids. While reducing compounds and combined anthraquinones were absent. The phytochemical screening of sesamum indicum also, revealed such phytochemicals with exception of steroids, tannins, and cardiac glycosides.

Keywords*: Phytochemicals, Medicinal plants, Herbarium, Decoction, Pharmacotherapy*

BCH_026: Annual Effective Dose Estimation from Radon Concentration in Commercial Bottled Water Consumed In Nigeria

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Abstract

Ten brands of commonly consumed commercial bottled water in Nigeria were collected and assayed for their radon concentration using liquid scintillation counter (LSC). The highest radon (^{222}Rn) concentration of 0.073 Bq/l was recorded in C Way bottled water while Mr. V bottled water recorded the lowest ^{222}Rn concentration value of 0.016 Bq/l. These values were below the parametric reference level of 11.1 Bq/l set by United State of America Environmental Protection Agency and lower than the permissible limit of 100 Bq/l by World Health Organization (WHO) and European Union. Computed total annual effective dose due to ingestion and inhalation of waterborne radon recorded the highest mean value of 0.187 μSv/y in C Way Bottled Water and lowest value of 0.041 μSv/y in Mr. V bottled water. Mean total annual effective dose recorded for all the bottled water samples were found to be significantly lower than the safety limit of 0.1 mSv/y recommended by WHO. The likelihood of any radiation incidence among the public due to consumption of commercial bottled water is therefore negligible.

Keyword: *Liquid scintillation counter, Bottled water, Radon, Nigeria*

BCH_027: Influence of Urinary Schistosomiasis on Nutritional Status in Al-Majiri (Disciples) in Kawo District of Kaduna Metropolis, Kaduna State-Nigeria

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Abstract

A study on the influence of urinary schistosomiaisis on nutritional status in Al-majiri was carried out to document the status of the disease and their nutritional status in Kawo District of Kaduna metropolis. Urine samples were from taken 360 Al-Majiris and analysed using sedimentation method. Structured Knowledge, Attitude and Practice questionnaires was used determined age and water contact related activities were administered and anthropometric measurements to determine the nutritional status. A prevalence of 44.2% was recorded with mean intensity 45.32 eggs/10ml of urine. Highest prevalence was recorded in 10-14 age groups while the lowest was recorded in 20-24 age groups. The age and water contact related prevalence study revealed urinary schistosomiasis is greatly influence by age and water contact. 30.8% of the respondent perceived Urinary schistosomiasis as a form of yellow fever. Body Mass Index (BMI) revealed that 63.3% of those infected are severely malnourished, BMI indicates a strong relation ($P<0.05$) between urinary schistosomiasis and malnutrition. It is suggested that in order to prevent urinary schistosomiasis, provision of portable drinking water, and prevention of widespread wadding in pod water, adequate personal hygiene, improved nutrition and treatment of infected person to lessen the likelihood of water pollution should be encouraged.

***Keywords**: Al-Majiri, Urinary schistosomiasis, Schistosoma haematobium, Nutritional status*

BCH_028: Agitation Leaching Recovery of Zinc, Copper and Lead from Zarara Hill Polymetallic Sulphide Ore Deposit Using H_2SO_4, HCl and HNO_3

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Abstract

This paper present a laboratory report on the dissolution of zinc, copper and lead in H_2SO_4, HCl and HNO_3. This work is a prelude to a more systematic study on the dissolution kinetics and solvent extraction of these metals in H_2SO_4, HCl and HNO_3. Physicochemical characterization of this ore, such as moisture content, loss of mass on the ignition, pH and the elemental analysis by inductive coupled plasma- optical emission spectrometry (ICP-OES) was also carried out. The dissolution of zinc, copper and lead from Zarara hill polymetallic sulphide ore has been found to increase with the increase in acid concentration from 1 M to 6 M in HNO_3, HCl and H_2SO_4 and the dissolution further increases in HNO_3 and HCl with increasing the concentration above 6 M,

but dissolution decreases as H_2SO_4 concentration go higher. The metal recovery is in the trend HCl > HNO_3 > H_2SO_4 with zinc recovered the most.

***Keywords**: sulphide ore, dissolution, zinc, copper and lead*

BCH_029: Effects of Oral Administration of Aqueous Leaf Extracts of *Senna siamea* and *Eucalyptus citriodora* on Some Hematological Parameters in Albino Wistar Rats

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Abstract

Leaf extracts of *Senna siamea* and *Eucalyptus citriodora* have been used to treat a range of ailment in many communities like malaria and typhoid. Because the drug is unrefined, they may have some untoward effects on the animals. The objective of this present study was to determine the effects of oral administration of aqueous leaf extracts of *Senna siamea* and *Eucalyptus citriodora* on some hematological parameters in healthy albino rats. Twenty-five (25) albino rats of both sexes weighing between 60 - 110g were assigned into five different groups with five rats each. Daily doses of 100, 200, 300 and 400mg/kg body weight of the plant extract mixture (ratio1:1) were given orally to groups II, III, IV and V respectively for 21 days while group I served as control. The results for the analysis of Red blood cell (RBC), White blood cell (WBC), Parked cell volume (PCV), and hemoglobin were assayed using Sysmex KX-21NTM automated hematology analyzer while urea and creatinine were determined using the method of Fawcett and Scott. Oral administration of aqueous leaf extract of *Senna siamea* and *Eucalyptus citriodora* at different doses in the experimental groups did not show a significant difference ($p > 0.05$) in the concentration of serum urea, serum creatinine, and the hematological parameters (WBC, RBC, Hemoglobin and PCV) when compared to control group except WBC which showed a significant change ($p < 0.05$) at higher concentration of 400 mg/kg body weight of the extracts when compared to group I (control). This suggests that the extract at these concentrations (100, 200, 300, and 400 mg/kg) does not have any toxic effect on the renal and hematopoietic system except WBC which have a significant difference ($p < 0.05$) at higher dose (400mg/kg) on the hematopoietic system.

***Keywords:** Albino rats, Eucalyptus citriodora, Hematological Parameters, Senna siamea.*

BCH_030: Allelopathic Effect of Calotropis Procera (L) Leaves Extract on Seed Germination and Early Growth of Arachis Hypogeae (L) and Pennisetum Glaucum (L)

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Abstract

The effect of aqueous leaves extract of *Clotropis procera* at 20%, 40% and 80% on seeds germination and early growth of Groundnut (*Arachis hypogeae*) and Millet (*Pennisetum glaucum*) was investigated. The results showed that the extract both at lower and higher concentration did not affect the seeds germination of the two plants species. Final germination percentage after ten days was increased by increasing the extract concentration especially on Millet where 100% and 95% germination was observed at 20% and 80% concentration of the extract respectively. Generally, the radicle and plumule growth was sensitive to different levels of the extract where the plumule length was decreased by increasing the extract concentration and some leaves began to die at higher concentration (80%) in Groundnut (*Arachis hypogeae*). However, plumule emergence and growth was stimulated in both lower (20%) and higher (80%) concentration in Millet (*Pennisetum glaucum*) seedlings more than control treatment. Therefore the seedlings of Groundnut were must affected by the aqueous extract of *Clotropis procera* than that of Millet.

***Keywords**: Allelopathic, Calotropis Procera, Germination, Arachis hypogeae, Penniserum glaucum*

BCH_031: Molecular Design of a COVID-19 Inhibitor

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Abstract

In this present investigation, a structure-based docking design technique was explored in designing a novel derivative of chloroquine for the treatment and management of new COVID 19 disease. To achieve this, the molecular docking simulation method was used to investigate the level of chloroquine and hydroxychloroquine (Drugs presently under clinical trial) interactions on SARS-CoV2 enzyme (a causative agent of COVID 19 disease). Chloroquine and hydroxychloroquine which has been debated as drugs for the management of COVID 19 were subjected to molecular docking analysis, and the binding energies generated were found to be -6.1kcal/mol and -6.8 kcal/mol respectively. Moreover, novel 2-((4-((7-chloroquinolin-4 yl) amino) pentyl) ((methylamino) methyl) amino) ethan-1-ol as an anti-SARS-CoV2 protease was designed through the structural modification of hydroxychloroquine. The binding energy of this drug candidate was found to be -6.9 kcal/mol. This novel drug was found to formed hydrogen and conventional interactions with the binding site of SARS-CoV2 protease through amino acids such as Glutamic

acid (GLU166), Glycine (GLY143), Phenylalanine (PHE140), Asparagine (ASN142), Histidine (HIS163), His (HIS172, HIS41, HIS163), Leucine (LEU41, LEU27), Glycine (GLY143), Glutamine (GLN189), Methionine (MET49, MET165), Serine (SER 46), Cysteine (CYS145) and Threonine (THR25).With this binding energy, this new drug candidate could bind better to the human SARS-CoV2 protease' binding site. This research provides a clue for other scientists on various ways of designing and identifies the types of amino acids that may be responsible for biochemical action on SARS-CoV2 protease.

Keywords: *Molecular docking, COVID 19, SARS-CoV2, CADD*

BCH_032: Methodical Study of Chromium (VI) Ions Adsorption from Aqueous Solution Using Low Cost Agro-Waste Material: Isotherm, Kinetic And Thermodynamic Studies

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Abstract

In this study, an adsorbent prepared from *Saccharum officinarium* was used for the removal of Cr (VI) ions in a batch process. The adsorbent was modified with oxalic acid for improved performance. The surface morphology of the adsorbents was characterized by Scanning Electron Microscopy (SEM) and X-ray Diffraction (XRD). The effect of pH, contact time, initial metal ion concentration, and temperature on the biosorption process were studied. The experimental data were best fitted to the isotherms with $R^2 > 0.9$ for adsorption of Cr (VI) ions onto raw *S. officinarium* (RSO) and modified *S. officinarium* (MSO). The adsorption energy € obtained from D-R was found to be 3.460 and 6.325 $kJmol^{-1}$ for RSO and MSO respectively. Thermodynamic parameters values obtained showed that the sorption of chromium (VI) ions onto RSO and MSO is feasible, spontaneous, and endothermic in nature. The positive value of ΔS^o indicates an increase in the disorderliness of the process. Kinetic data achieved at different concentrations have been analyzed and the mechanism of the reaction was also studied by intra-particle and Bangham kinetic model. Each of the models was tested with $R^2 > 0.9$ where pseudo-second-order is the best-fitted model and Bangham mechanism only fitted with adsorption of Cr (VI) ion with RSO. The reusability potential of RSO and MSO contributes to their economic value and reliability as adsorbents for removing Cr (VI) ions from an aqueous solution.

Keywords*: Saccharum officinarum, Isotherm, Thermodynamic, Kinetics, Mechanism*

BCH_033: Comparative Assessment of Residual Antibiotics in Chicken Parts From North Central And South Western Nigeria

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Abstract

The indiscriminate application of veterinary antibiotics in animal husbandry (especially poultry farming) has been singled out as a treat to food security and human health. This study therefore intends to evaluate qualitatively and quantitatively the regional usage of antibiotics in Nigeria by examining various chicken parts from Kaduna (representing North central) and Akure (representing Southwestern). Randomly selected birds (broiler, cockerel and pullet) from pen of some poultry farms were sampled, slaughtered using a stainless-steel knife, defeathered and dissected to remove the targeted parts (muscle, heart, kidney, liver, and gizzard) including pullet eggs. The parts and eggs were homogenised, extracted appropriately, screened microbiologically and analysed for residue antibiotics using HPLC.

Keywords: *Antibiotic residue, HPLC, chicken, Microbial Analysis, Antibiotics*

BCH_034: A Study on Evaluation of Correlation between Presbyopia and Presbycusis in Human

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Abstract

Presbyopia is a condition that occurs with ageing and results in the inability to focus near objects. Presbycusis on the other hand describes a decrease in hearing ability which occurs with ageing. Although presbyopia and presbycusis (visual and hearing impairments) are common among the aged, its prevalence and consequences in the target age group is yet to be investigated in-depth. Therefore, this present study was carried out to investigate if there is a significant correlation between presbycusis and presbyopia in a population of age 40 to 75 years in the city of Jos, Plateau State. In order to partially investigate the status of the vascular system, blood pressure and fasting blood glucose level were measured. The sample in this study consisted of 70 subjects of both sexes with no history of any disease significantly relating to either visual or hearing acuity. Snellen chart was used at a distance of 6 meters to measure visual acuity, while regression equation developed by Chagok for ontologically normal people who had not been exposed to noise, determined as a function of age was used to evaluate presbycusis loss. The results of the measurement indicated that both presbyopia and presbycusis increases with ageing. However, the result did not clearly show that blood pressure and fasting blood glucose increase with age, probably due to other health conditions such as Diabetes and Genetic Component. Furthermore, the statistical analyses conducted using SPSS Version 21.0 Software showed a correlation of 0.800 as the highest and

0.499 as the least with both occurring at frequencies of 1000Hz and 2000Hz respectively. This has led to the conclusion that there is a significant relation between presbyopia and presbycusis, thus, if not controlled, could lead to total visual and hearing impairments which is associated with decrease in the functional capacity and depressive mood.

Keywords: *Presbyopia, Presbycusis, Correlation, Plateau State*

BCH_035: A Review on Industrial Applications of Zinc Oxide Nanoparticles

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Abstract

Nanotechnology research has gained much attention in recent years as it provides innovative solutions in the field of biomedicine, material science, optics and electronics. Nanostructured ZnO materials have received broad attention due to their excellent performance in electronics, optics and photonics, optoelectronics, sensors, transducers and biomedical sciences. It is a wide band-gap compound semiconductor that is suitable for short wavelength optoelectronic applications. ZnO nanoparticles are non-bio toxic materials with photo-catalysis and photo oxidising properties on biological species. ZnO is costless, environmentally friendly with significant physical and chemical stabilities. It is one of the most important metal oxide nanoparticles and one of the most widely used nanoparticles. ZnO NPs are popularly employed in various fields due to their peculiar physical and chemical properties. In this paper, the industrial applications of ZnO NPs are highlighted, focusing on the recent progress in research to realize its feasibility in these applications. However, further intensive research on better understanding of the relationship between size, shape, and structure of zinc oxide nanoparticles, and how one can tune its capability for various industrial applications is highly recommended.

Keywords: *Zinc oxide, Nanoparticles, Semiconductors, LED, Gas sensors*

BCH_036: Determination of the Carcinogenic Potentials of Chemical Explosives used as Military Munitions

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Abstract

Chemical explosives elicit cytotoxic, genotoxic and carcinogenic properties depending on the duration, quantity and exposure during warfare. This study investigates the carcinogenic potential of some selected chemical explosives used as military munitions by evaluating the quantity, duration and pathway of exposure of military personnel to the chemical explosives. The high explosives used as military munition include TNT, RDX and HMX chemicals. The quantity effect will be analyzed via toxicity profile by evaluating the acute toxicity of these chemical explosives

as well as testing the genotoxic activity via Ames *Salmonella* mutagenesis assay. The sub-chronic toxicity testing will be further assessed as well as the carcinogenicity of these chemicals via the rodent carcinogenesis biossay for a period of two years. It is expected that these explosives may produce either genotoxic or carcinogenic potentials which may be deleterious to the health of the affected military personnel. The outcome of the research stand to educate military personnel on how to regulate their exposure to these chemical explosives in other to mitigate the incidence of cancer causing chemicals and also suggest a medicinal plant as therapeutic approach to reduce or hinder the incidence of carcinogenesis .

Keywords: *Carcinogenic, Chemical Explosives, Military Munitions*

BCH_037: Bambara Groundnut as Ready to Use Therapeutic Food (RUTF) for Children Under 5 years of Age in North-West Nigeria

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Abstract

A large proportion of Nigeria's population is made up of malnourished children. This study seeks to assess the nutrient & mineral content of Bambara groundnut as an alternative crop in the production of ready to use therapeutic foods. Standard clinical procedures shall be used to determine the micro and macro nutrient deficiency in malnourished children; laboratory techniques shall be used to determine the nutritional and sensory characterization of product developed (NOR-GUR); assess the effect of the optimized ration on rate of weight gain until recovery and also estimate the variation in vitamin A and iron status and change in body composition. Agricultural interventions have great potential to improve nutrition, but this potential is yet to be fully unleashed. Production of an alternative locally made RUTF would ensure regular raw material supply, limit foreign exchange and serve as a local solution at reducing malnutrition.

Keywords: *Food Security; Malnutrition; Small-holder Farmers; Safe Foods.*

BCH_038: Physiochemical Analysis of Torrefied Sugarcane Bagasse as Feedstock in Biofuel Production

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Abstract

The production of biofuel from lignocellulose biomass has become a dynamic study topic in recent years. For sugarcane bagasse to be used as a feedstock for syngas production, its upgrade through pretreatment techniques is crucial. Torrefaction has been identified as an effective pretreatment technique intended to improve the fuel characteristics of raw biomass for thermal conversion. In this work, we examined how the physicochemical characteristics of sugarcane bagasse is modified after being torrefied at varying temperature (200 – 350ºC) in an electric muffle furnace with dimensions of 0.42 m in diameter, 0.49 m in length, and 0.66 m in height. After each pretreatment condition, the changes in the physical and chemical properties of the sugarcane bagasse samples as a function of temperature were analysed using X-ray Diffraction (XRD) and Thermogravimetric Analysis (TGA). The results presented herewith show the efficiency of the torrefaction process for improving bagasse properties.

Keywords: *Thermogravimetric Analysis, X-ray Diffraction, sugarcane bagasse, biofuel, feedstock*

BCH_039: Heavy Metals Assessment in Some Vegetables and Soil in a Palm Oil Mill Site in Okada, Edo State, Nigeria

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Abstract

This risk assessment study was conducted to investigate the possible heavy metals source, the level of heavy metals concentration in two commonly eaten vegetables, Waterleaf (*Talinum triangulare)*, African Spinach "green" (*Amaranthus hybridus)*, and soil obtained from an Oil Palm Mill Site in Okada, Edo State, Nigeria. The samples were analyzed using flame atomic absorption spectrophotometer (FAAS). The soil samples revealed the following heavy metals concentration: lead (Pb=0.01 mg/kg), copper (Cu=0.54 mg/kg), cadmium (Cd=0.05 mg/kg), chromium (Cr=0.01 mg/kg), zinc (Zn=2.1 mg/kg), nickel (Ni=0.10 mg/kg) and iron (Fe=11.5 mg/kg). *Talinum triangulare* contained Cu (0.12 mg/l), Cd (0.07 mg/l), Zn (0.7 mg/l), Ni (0.13 mg/l) and Fe (4.6 mg/l), while *Amaranthus hybridus* contained Cu (0.13 mg/l), Cd (0.04 mg/l), Cr (0.01 mg/l), Zn (0.4 mg/l), Ni (0.05 mg/l) and Fe (2.7 mg/l). Although, these concentrations were below the acceptable standard limits set by WHO/FAO, FEPA and EU. It was observed that the concentrations of the metals in the soil sample were in the decreasing order: Fe>Zn>Cu>Ni>Cd. *Talinum triangulare* also appears to bioaccumulate more of these metals than *Amaranthus hybridus*. The transfer factor is less than one for most of the metals except for Ni and Cd in *Talinum*

triangulare. This shows the possibility of the soil to be the main source of the metal bioaccumulation in the vegetables analyzed. Since the concentrations of these metals in the samples are within the permissible threshold, however, consumption of these vegetables grown on this milling site may not pose any probable health challenge on human.

***Keywords**: Talinum triangulare, Amaranthus hybridus, Vegetables, Soil, Heavy metals.*

BCH_040: Fertility Potentials of Five Medicinal Plants in the Treatment of Infertility Caused by Polycystic Ovarian Syndrome in Female Wistar Albino Rats

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Abstract

Polycystic ovarian syndrome (PCOS) causes infertility in females within childbearing age. Patient with PCOS go through the stress of taking serial medication for years including various medical procedures which are quite traumatic and painful. PCOS was induced in the experimental animals by administering 1mg/kg per body weight of letrozole for twenty-one days. After 21days oral administration of letrozole to the experimental animal, Blood samples were collected for Glucose and Lipid profile. Serum Progesterone, Estradiol, Testosterone, Luteinizing and Follicle stimulating hormones were measured with Enzyme Linked Immunosorbent Assay kit. After the confirmation of the establishment of PCOS, the following plant extracts were administered at 300mg/kg and 100mg/kg per body weight for 15days to different groups of animals in separate cages: *Trigonella foenum graecum*, *Sesamum indicum*, *Glycine max*, *Glycyrrhiza glabra* and *Lepidium meyenii*. The result shows *T. feonum graecum* and *G. glabra* effectively reduced insulin resistance by reducing the glucose level from 7.60mmol/L in the PCOS group to 5.50mmol/L in *T. feonum graecum* and 5.23mmol/L in *G. glabra*. Increased in lipid profile caused by PCOS was reduced effectively by *S. indicum* and *G. glabra*. More so, effective control of increased androgen level and hirsitism was shown by *T. feonum graenum* and *L. meyenii* by reducing the testosterone level from 34.4ng/ml in the PCOS group to 5.33ng/ml in *T. feonum graecum* and 7.10ng/ml in *L. meyenii*. Ability to increase follicle stimulating hormone was shown in *S. indicum*, *T. graecum*, *G. max*, and *G. glabra*, whereas the ability to ovulate, go through a successful gestation period, and deliver live babies was seen in *S. indicum* and *T. greacum*, this could be attributed to the high flavoniod (phytoestrogens) seen in the two plant extracts. The best of all the plants extracts is the extract of *T. graenum* because of the continuous fertility recorded and also, their none toxic effect on the vital body organs.

***Keywords**: Polycystic ovarian syndrome, Infertility, Testosterone, Follicle stimulating hormone, Luteinizing hormone.*

BCH_041: Synthesis and Atomic Force Field Microscopy Characterization of Carbon Dot

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Abstract
Quantum or carbon dots (CDs) has a wider spectrum of applications in medicine, chemical synthesis, environmental remediation, agriculture and other purposes. Consequently, this study was designed to synthesize and characterize quantum dots using tapioca as a precursor. Tapioca was dissolved in a solvent (deionized water + sodium hydroxide + acetone). The mixture was heat-treated at 175^{o}C for 1h 45min. The prepared CDs were dried and characterized using atomic force microscopy. The results obtained a very large surface area and mesoporous particle size scale, which suggested their suitability for various surface applications such as catalysis, drug delivery and others.
***Keywords**: Quantum dots, Synthesis, Solvothermal, Tapioca, Characterization*

BCH_042: Assessment of Hyperuricemia in some northern Nigerian States: A Descriptive Study

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Abstract
Hyperuricemia is associated with various diseases and the need for its enlightenment can never be overemphasized. This study aimed to assess prevalence of hyperuricemia in some states in Northern Nigeria. A cross-sectional study was conducted from 1 July to 1 November 2022. A total of 207 individuals participated in the study. The data was gathered from a questionnaire. The study revealed that age group of 31-45 are mostly infected; and 35% of the infected persons suffer from leg pain; 37.5% of persons infected relied on synthetic drugs for treatment; and 50% of the infected persons rarely exercised and their major exercise was walking.
***Keywords**: hyperuricemia; age-group; treatment and exercise.*

BCH_043: Self-Healing Mechanisms: The Modern Paradigm in Structural Materials

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Abstract
Polymeric materials are prone to damages in the form of cracks, voids, or crevices within its matrix system that simple eradication by traditional means is ineffective. Hence, the need for materials that can self-heal autonomously or non-

autonomously, as this property can increase material's service time, improve product safety, and reduce maintenance costs. The focus of this paper is to provide a literature based findings on the outcome of incorporating extrinsic self-healing systems in polymer for various domestic and industrial use. The findings in this paper bring us a step closer to perfecting self-healing polymer for various building and construction, packaging, military and aerospace applications.

Keywords: *Self-healing, Polymer, Extrinsic, Microcapsule*

BCH_044: Drug Design, Molecular Docking and Dynamics Studies on the Interaction of Voxelotor, L-Glutamine and Hydroxy Urea with Human Carbonmonoxy Hemoglobin S

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Abstract

Sickel cell disease is a defect in hemoglobin structure that leads to deficiency in oxygen transfer in the body. Voxelotor, L- Glutamine and Hydroxyurea are three out of the four compounds that were approved by the FDA to treat Sickel Cell Disease. In this study, we used molecular docking, molecular dynamics (MD) simulation and ADME studies to analyze the interactions of these drugs as potent inhibitors of blood sickling. Molecular Docking potential of the three drugs compounds into the active site of hemoglobin S was investigated. Voxelotor has the highest score, with a binding energy of -21.656751(ΔG = Kcal/mol). Out of the Eight new drug structures designed based on the backbone of Voxelotor, it was found out that Vox 8 has the best binding energy of -24.7339 (ΔG = Kcal/mol). For the prediction of blood-brain barrier penetration, the SwissADME site was able to predict the BBB profile for the designed drugs, Lipinski's rule, CYP450 inhibitor, bioavailability Score, are described and discussed, to understand the biological activity of the compounds. Molecular dynamics simulations results reveal that the complex of the ligand and the receptor protein is stable at 300K.

Keywords: *Sickel cell disease (SCD), Molecular docking, Molecular dynamic simulation, Hemoglobin*

BCH_045 Assessment of Water Quality of an Urban River, Case Study of the Wupa River Abuja

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Abstract

Industrialization and agricultural activities in an urban setting have been identified as major contributing factors to perturbation in freshwater ecosystems. The Wupa River within the Abuja metropolitan city flows through both planned and unplanned settlements influencing on the structural and functional ecology of Wupa River. The study was undertaken spanning from April 2019 to March 2021, covering both wet and dry seasons. Physicochemical variables as well as heavy metals in surface water were collected and analyzed using standard procedures. Results of the physico-chemical analysis showed that, water temperature and alkalinity ranged from 24.00 ^{o}C -28.90^{o}C and 72.36mg/l - 162.54mg/l with highest value of 27.34 ± 0.24 ^{o}C and 122.94±4.87 mg/l respectively. The two-way analysis of variance (ANOVA) performed showed that water temperature and alkalinity were highly significant among the months sampled (P<0.05; P= 3.033 E-05 and P<0.05; 0.0005088). The values for conductivity, DO, BOD, turbidity and TDS ranged from 132.30 µS/cm - 272.00 µS/cm, 5.14mg/l - 14.01mg/l, 8.40mg/l - 44.31mg/l, 4.80 - 72.10 mg/l and 92.8mg/l - 264.9 mg/l respectively. Among the environmental variable sampled, conductivity, DO, BOD, turbidity and TDS were all similar in both sampled months and stations (p<0.05). The nutrient variables: sulphate, nitrate and phosphate ranged from 3.10mg/l - 49.60 mg/l, 4.01mg/l - 907.25 mg/l and 0.03mg/l - 26.37 mg/l respectively. Sulphate and nitrate were not significantly different (P > 0.05, P=0.9327; P=6.30943) among sampled months, but along all the stations sampled, sulphate was highly significant (P<0.05, P=1.685E-25). Ecological assessment of urban river pollution in this study revealed the significance of physical and chemical variables, which are the basic determinants in evaluation and quantification of spatial and temporal environmental pollution gradients with probable environmental impacts.

Keywords: *Wupa river, Water quality, Environmental variables*

BCH_046: Antimicrobial Effects And Chemical Composition Of Propolis Extracts From The North-Central, North-West And South-East Of Nigeria

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ABSTRACT

Attention has been drawn to the use of propolis from honey bee in the treatment of various diseases due to its biological properties and chemical composition. This study focused on the evaluation of

the antimicrobial effects and chemical composition of propolis collected from the North-Western (Kaduna), North Central (Taraba) and South Eastern (Nsukka) geopolitical zones of Nigeria. The propolis samples were extracted using water and ethanol while analysis of the chemical composition of the extracts of the propolis was by HPLC. The antimicrobial activities of the three extract samples were determined by well diffusion method against four different microorganisms: *Salmonella* spp, *Escherichia coli*, Candida *albicans* and *Staphylococcus aureus*; the minimum inhibitory concentration (MIC) was determined by broth dilution. Results from the HPLC analysis showed that the Nigerian propolis is very rich in phenolic compounds with ethanolic extract from Nsukka having the highest phenolic content of 218mg Gallic Acid Equivalent (GAE). Of the phenolics analyzed, ethanolic extract of propolis from Nsukka gave the highest rutin concentration of 8.442 mg/g while the ethanolic extract from Taraba propolis gave the highest Quercetin concentration of 22.625 mg/g. Similarly, the aqueous extract of Propolis from Kaduna recorded the highest total flavonoid content of 79.9mg/g. Antimicrobial effects of the propolis extracts revealed that aqueous extract of Kaduna and Taraba propolis along with ethanolic extract of Taraba propolis were more effective against E *coli* with MIC value of 25mg/ml. Aqueous extract of Nsukka propolis with MIC of 6.25mg/ml was more effective against *S typhi*. While ethanolic extract of Kaduna propolis had more inhibitory effect against *C albicans*, aqueous extract of Kaduna propolis was more effective against *S. aureus* with both having MIC of 6.25mg/ml. Between the solvents types, aqueous extracts showed better inhibition than ethanol. This work has highlighted the antimicrobial potential of Nigerian propolis against common bacterial and fungal pathogen.

Keywords: Propolis, Honeybees, Antimicrobial, Chemical composition, HPLC.

BCH_047: Assessment of Heavy Metals in Some Tea Leaves Using Atomic Absorption Spectroscopy

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Abstract

Periodic monitoring of our foods and drinks for potential heavy metal contamination is necessary to ensure greater safety in our health. This study was carried out to determine the concentrations of some heavy metals (Cd, Zn, Mn and Fe) contents in some selected locally grown tea leaves obtained in Kankara, Dutsinma and Katsina local governments, Katsina State. The analysis was performed using Atomic absorption spectroscopy (AAS). The locally grown tea leaves were collected directly from local farmers for the AAS analysis. The AAS analysis of the sampled tea leaves show that the following metals (iron, manganese and zinc) were detected in some of the samples analyzed and cadmium was not detected in all the analyzed samples. The findings of this study were compared with prescribed recommended limits of these metals as set by WHO. Zinc with the highest amount of 0.1288mg/kg in the sample, was found to be much below the recommended harmful limit (50mg/kg). However, manganese and iron (0.112mg/kg and

0.906mg/kg) were found to exceed the maximum permissible limit (0.1mg/kg and 0.3mg/kg, respectively) in dry sample, according to recommendation by WHO.
***Keywords**: Heavy metals, Tear leaves, AAS, Cadmium, Manganese*

BCH_048: Chemomicroscopical Examinationand Physicochemical Evaluation of *Detarium microcarpum.* (FABACEAE)

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ABSTRACT
Detarium microcarpum. Is a plant that belongs to the family Fabaceae. The stem is erect, woody and 4-10cm in diameter. In Nigeria the fruits are edible but with non-edible seeds. Chemomicroscopical and physicochemical evaluation of *Detarium microcarpum* were carried, aimed at identifying, authenticating and standardizing the powdered materials of the leaf, stem and root. The parameters were ash values, extractive values, moisture content, and water soluble and insoluble ash. In the chemomicroscopical evaluation test for tannins, cellulose, starch and calcium oxalate crystals were also carried out using standard methods. The results obtained in the chemomicroscopical studied revealed the presence of cellulose, starch, tannins, calcium oxalate crystals, for the whole samples leaf, stem bark and Roots powdered samples. The results of physicochemical evaluation of the plant parts showed that the leaf, stem and root bark powdered materials had total ash of 4%, 1.5% and 1.5%; water soluble ash of 1. %, 1.3% and 1.4%; moisture content of 3.5%, 5.5% and 3%; extractive yield of 9.2%, 5.6 and 9.8% respectively. The results of the presence findings can be used for identification and authentication of the plant as well as establishing standard for quality, purity, level of adulteration and, efficacy in Ethnomedicine.

COMPUTING AND INFORMATION TECHNOLOGY

CIT_001: Two Scheme Data Transmission for Mitigating Energy Consumption and Latency in Radio-Enabled Internet of Things (IoTs) Network Using Particle Swarm Optimization

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Abstract
The proliferation of Internet of Things (IoTs) has provided broad area for research and deployment due to effective use of the capabilities of Wireless Sensor Networks (WSNs) in several military and civilian applications. However, in hostile or inaccessible areas without infrastructural

supports, transmission of IoT data is an overwhelming task due to the limited physical constraints associated with energy consumption during data transmission. In this study, we propose a two-scheme data transmission for mitigating energy consumption and latency in radio-enabled IoT network using Particle Swarm Optimization. The two schemes i.e. Early Sleeping (ES) and Early Data Transmission (EDT) decode and authenticate addresses bit-by-bit, allowing those non-destined devices to go to sleep at an earlier stage and permits a sender to transmit IoT data together with Wake-up Call (WuC) packets so that the main radio does not have to be in full operation for data reception. We carried out both schemes through a Wake-up Radio (WuR) testbed. In addition, we presened a framework based on queuing model and assessed the performance of the schemes using NS-2 simulator.

Keyword: *IoT, Latency, Particle Swarm Optimization, Wake-Up Radio, WSN*

CIT_002: A Recommender System for the Nigerian Fashion Industry Based on Big Data

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Abstract

Remarkable research has been carried out in the field of big data in recent years. This involves gaining insight from huge amount of data. Research has shown in recent times that big data is playing a massive role in the fashion world by analyzing the behaviors, emotions and preferences of peoples and also forecasting trends. In Nigeria, fashion is perceived to be diverse and dynamic. Few research has been conducted in contemporary African image dataset. This paper proposes a recommender system for the Nigeria fashion industry in making choice of outfits based on the occasions using the AFRIFASHION1600 dataset.

Keywords*: Fashion, Afrifashion1600, Nigeria, Big Data, Recommender System.*

CIT_003: Utilizing Data Mining in Knowing the Performance of Secondary School Students in Achieving a Sustainable Development

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Abstract

Due to the development of technology, it has greatly affected the amount of data growth in the areas that are related to Information technology development, with an extensive use of network or web-based applications. The large amount of data stored in files, database and other repositories, to develop a powerful means to carry out the analysis as well as interpreting data, for knowledge extraction that could be beneficial in decision making. For useful information to be extracted for an industrial need, a prediction and classification measures are being used by making the use of data mining techniques for an unknown patterns of data. For an environment that is changing globally, the work force of the educational system is highly required to meet up with challenges in

other to increase the performance of the educational institutes to present an accurate, effective and efficient educational process. The perfect prediction of student performance is an important goal to be achieved by the educational institute such as secondary school to meet up with the higher level in the educational system.

Keywords: *Data mining, Performance evaluation, Prediction*

CIT_004: Understanding Human Hacking for Improved Cyber Security Awareness

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Abstract

The rise in use of electronic and digital devices for communications and almost every aspect of human endeavour in the information age has brought about a lot of positive developments for business and leisure; however, this has also resulted in the exploitation of cyber space by malicious actors. Many multinational organizations and even governments hack been victims of cyber-attacks in recent times. Such attacks are not only restricted to governments and big companies, small businesses and individuals are not free from such attacks. There is also a prevalence of attacks that do not require extensive technical knowhow or tools – this works by exploiting the weakest link in the cyber security chain: the human factor. People can easily be exploited to compromise the best cyber security infrastructure. The best defence against these kinds of attacks, known as social engineering attacks, is awareness – knowing that such attacks exist and how they work can go a long way in ensuring protection from such.

Keywords: *Cyber security awareness, Human weaknesses, Social engineering*

CIT_005: Digital Forensics for National Security: Focus on Military Application

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Abstract

Advancements in information and communication technology has made life easier for individuals, organizations and governments. These same advancements are taken advantage of by malicious actors – ranging from common criminals to terrorist organizations to adversarial nations. The malicious actors can use the technology to greatly impact national security negatively. Digital forensics can be used to discover and unravel the malicious activities after-the-fact, the discoveries can be used to enhance military security. Furthermore, data gathered from intelligence activities can also be analyzed using digital forensics to ensure actionable intelligence. This can be used to protect and enhance a nation's security.

Keywords: *electronic evidence, hybrid warfare, intelligence, investigation*

CIT_006: The Financial Impact of Biometric Technology in Africa towards Electioneering and Sustainable Democracy

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Abstract

African Governments and Institutions have invested greatly in biometric research, developments, and implementations within the past few decades towards sustainable democracy and credible elections. The continent lacks homegrown biometric giants and still outsources the services to foreign companies. Much money had been spent on biometric-based elections, identity card programs, census, financial-based apps, etc. The results of these multi-million dollar investments through a formidable strategic impact assessment is a far cry from the desired rewards. Hence the need to justify the amount of money invested into this sector of the economy. This paper tries to understudy some of the costs incurred during these processes and analyze how beneficial it is to both the people and the Governments.

***Keywords**: Cost, Africa, Biometric, Technology, Justify*

CIT_007: Design and Development of an Online Local Train Ticket Reservation System

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Abstract

Transportation is an important component of economic development and one of the benchmarks used to quantify the level of progress made in a country. In Nigeria, rail transport offers an enormous advantage to its socio-economic activities because of its ability to carry huge loads and passengers. For decades, the Nigerian Railway Corporation (NRC) operates a 3,505-kilometer Cape Gauge network. However, in today's fast-growing world of technology and population, people still stand in the queue for tickets at the ticket counter for the Cape Gauge network. This way of queueing most times is unfriendly and unsatisfying. Hence, this paper aims to design and develop an online local train ticket reservation/booking system for Nigeria's Cape Gauge network. In the course of developing this web system, HTML, CSS and JS were used to design the system (front end) and PHP and MYSQL were used to store the database (back end). The design of the system is a complete multi-user, enabling users (passengers) to reserve train tickets online by having an account and choosing the starting point and arrival point. Similarly, passengers can download and print receipts for evidence of payment. The system consists of two accounts, a User account and an Admin account. the Admin can recharge the user account and view all the processed tickets of a user. It also provides the choice of a single-route trip or return trip along with the travel class (First class or Second class). The designed system is effective and precise and has enough memory for storing all passengers' records in the database.

Keywords: *Transportation, Railway, Queuing, Tickets, user, Cape gauge*

CIT_008: Mobile Technology: A Panacea to Food Insecurity in Nigeria.

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Abstract

Over time, agriculture is the most consistent activity, and it evolves every day. It contributes to a vast majority of the Gross Domestic Product (GDP) of Nigeria but as ironic as it may be, there is still hunger in major parts of the country due to low productivity in the agricultural sector. In the first half of 2022, agriculture contributed about 23% of the country's GDP while the industry and services sector had a share of the remaining 77%. This shows that with the high rate of agricultural activities taking place, Nigeria has not achieved food security and more productivity levels can be attained. Technology can assist Nigeria in overcoming global poverty and hunger quicker in both rural and urban areas. Today, there are many types of agricultural technologies available for farmers all over the world to increase productivity. Major technological advancements include indoor vertical farming, automation, robotics, livestock technology, modern greenhouse practices, precision agriculture, artificial intelligence, and blockchain. Mobile phones have one of the highest adoption rates of any technology developed within the last century. Digitalization will bring consumers and farmers closer together to access the shortest supply chain possible and reduce rural poverty and hunger. This paper will review the different technologies and propose a technological solution that will make farming more sustainable and profitable.

Keywords*: Agriculture, Technology, Artificial Intelligence, Digital Farming, and Adoption.*

CIT_009: Big Data: The New Big Thing in The Field of Education

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Abstract

Big data is currently one of the most prominent research areas. Big Data's popularity and usability makes it the most promising study subject in the last decade. Learning analytics with Big Data is a new topic, and most fields use the outputs and consequences of this analytics. Therefore, grasping and comprehending learning analytics and Big Data outcomes is critical. The growing amount of data and the requirement for various findings have produced new obstacles in practically every profession. Higher education institutions are among them since they must confront new problems to sustain their reputation and the progress of their students. Institutes have responded by implementing analytics-based approaches to increase instructional performance. Making analytics actionable in IT has become a must for higher education institutions. This article has highlighted several sectors of education that can benefit from such analytics, and higher education can see an

increase in both number and quality of students. The article aims to ensure that analytics outcomes are actionable and implemented.

Keywords: *Big Data, Education, Analytics, Information Technology*

CIT_010: Design and Implementation of Web-Based Certificate Verification of Nigerians' Graduates

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Abstract

In this work, we carry out the design and implementation of an enhanced web-based Certificate verification system of Nigerian graduates that will assist schools and co-operate organizations to confirm the originality of Nigerians graduates' certificate by displaying certificate details or information. This work is motivated by the level of certificate forgery, time wastage and the stress encountered while processing certificate manually during job recruitment or further studies for admission processes. The system adopted the object oriented and design methodology (OOADM). The following tools used for the front-end design are Hypertext Markup Language (HTML5), Cascading Style Sheet (CSS3), Bootstrap Frame work and Back-end design was achieved with Hypertext Preprocessor (PHP5), Apache and My-Structural Query Language (MySQL) that are integrated as XAMPP software. The result after design is a web-based certificate verification system that is able to verify and authenticate graduates' certificates and display certificate information after verification process, which could be used to reduce the high rate of certificate forgery not only within the educational system but in other co-operate organizations.

Keywords*: certificate, verification, software, xammp, web-based*

CIT_011: Automated Face Recognition and Verification System for Student Examination Attendance and Impersonation Management

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Abstract

The fundamental problem facing examination system in Nigeria is the impersonation of candidates otherwise known as malpractice. Frauds are normally detected in the examination system using identity cards and exams cards. To identify, recognise, and classify candidates, document image analysis techniques and biometric system were used in the existing examination system. The document image analysis is used in fraud detection generally whereas for authentication purposes, facial patterns, sound patterns, retina, and fingerprints are normally used in the identification and analysis of the human body characteristics in a biometric system. This paper develops an automated face detection and recognition in an examination system for candidate impersonation

detection and attendance management. Prototyping Software Development methodology was adopted in this paper; the development tools include C# .NET using Microsoft Visual Studio while SQL was chosen for the database system. The local binary patterns (LBP) were used in authentication to convert images into arrays for image analysis processing. The output of the Automated facial recognition and detection system shows that the system is more efficient, secured and with better performance in comparison with manual authentication.

Keywords: *Document image analysis, segmentation, fraud detection, pre-processing, examination verification.*

CIT_012: A Stress Based Prediction Model for University Student Using Support Vector Machine and Grid-Search-CV for Parameter Turning

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Abstract

The current academic system consists of various mental struggles ranging from family, peers, lecturers and the academic system generally. However, high level of stress on university students negatively affects their academic performance. In this paper, we describe how to efficiently select the best parameters to develop the proposed model. The Grid-Search-CV technique is adopted to fine-tune the SVM classifier with different parametric combination, the best parameter configuration is selected for training our model. Hence, the proposed student stress prediction model has shown a high degree of prediction accuracy (99%).

Keywords: *Mental Health stress, SVM, Grid-Search-CV, Fine-tuning, Student*

EDUCATION AND ENVIRONMENT

EEN_001: The Roles of Commercial Motor Cycle on Poverty Reduction (A Case Study of Bauchi State)

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Abstract

This study, "The Roles of Commercial Motor Cycle on Poverty Reduction", investigated effects of socio – economic survival of Okada riders in Bauchi State of Nigeria. The study was carried out using the questionnaire method to elicit vital information from Two Hundred and Ninety-Four respondents who were randomly- selected from five Okada parks within Bauchi metropolis. The general well- being of Okada riders have been analyzed using statistical tools (Chi – square, Correlation and regression) and were used to analyze the data. The data have been analyzed using

'Statistical Software for Social Sciences (SPSS)'. The findings showed that Okada riding, though a lucrative enterprise has its direct and indirect bearing on the cultural values of the society. That is to say, it plays a vital role in the society by eliminating (or reducing the level of poverty in the community). Majority of the riders engaged in the business because of the pressing need to survive and sustain their families. The study recommends that citizenship education should be incorporated into vocational training programs, empowerment e.t.c as well as establishment of monitoring unit to perform surveillance function.

Keywords: Motor Cycle, Chi – square, Correlation, regression, analysis.

EEN_002: The Use of Performance Measuring Tools (Balanced Scorecard) to Foster Accelerated Development

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Abstract

Performance Measuring tools (PMTs) are used to keep track of progress for any particular set goal. For many years, developmental projects have been set in motion especially in African states yet much is not seen with regard to results. It could be that the results are there, yet it is not interpreted very well by the people or the results are not tracked properly through empirical measurement. The two issues raised with regard to communicating progress and making alterations with regard to how far a particular developmental project has gone can be solved by the use and assistance of PMTs. The importance of measurement cannot be overemphasized. There is a need for research to be conducted on how the Balanced Scorecard can be fully incorporated into the administration of the school development. This paper identifies the Balanced Scorecard as the ideal performance measuring tool which could be maximized, scaled, and used in order to meet the stated needs. PMTs could be used as a means of communicating the vision of the management of the institution to all stakeholders and tracking the progress of the vision of the leadership in order to make the necessary strategic adjustments and to fast-track the process.

Keywords: *Balanced Scorecard, Performance measure, Monitoring, Tracking*

EEN_003: A Descriptive Analysis of the Connections Between Basic Science and Quality of Life

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Abstract

The basic sciences whether chemistry, biology, pathology, anatomy, physics, mathematics, earth science and others constitute powerful tools for transformation and improvement of life The fact that basic sciences have contributed to resolution of complicated issues of society make them fundamental in providing understanding and advancing knowledge of natural phenomena and

processes. Basic science has also provided us resources in development contexts to explore and sustain the environment. The World Health Organization defined quality of life as 'individuals' perception of their position in life in the context of the culture and value systems in which they live, and in relation to their goals, expectations, standards and concern. Basic science goals have implications for overall happiness, physical, economic and mental wellbeing that border on quality of life. Life has improved as a result of advancement in discoveries and innovations for example, in areas of security, medicine, healthcare, environmental sustainability, engineering, education, economy, social services, transportation, technology, knowledge and health pandemic management. The effectiveness of basic science is demonstrated by the recent development of the Covid 19 vaccine. The study attempted to challenge the consternation and suppositions of basic science sceptics who do not consider basic science as a transformative tool. This paper is premised on explaining the frontiers of connection between basic science and quality of life and extrapolating this connection to measurable societal outcomes. This paper uses documentary and historical analysis to describe the dynamics and connection in broader terms

Keywords: *Quality of life, Basic science, WHO, Covid 19, frontiers*

EEN_004: Effect of Instructional Media on Acadamic Performance of Basic Science Students in Junior Secondary Schools in Birnin Kebbi Metropolis

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Abstract

The study intends to investigate the effect of instructional media on academic performance of basic science students in JSS II students in Birnin Kebbi metropolis, Birnin Kebbi local government area of Kebbi state. The study involves a survey design, the population of the study comprises of all JSS II students in Birni Kebbi metropolis which consist of one thousand five hundred and sixty (1560). A sample of five (5) schools were selected which consist of six hundred and fifty (650) out of this, one hundred and twenty five (125) respondents were used for the research work. The details received were examined by simple percentage method to confirm the work; four (4) questions were prepared for this study. Descriptive statistics was used to determine the effect of teachers' efficiency and the instrument used in the collection of data was questionnaire and the data collected were analyzed using simple percentage method to verify the research questions formulated for this study. The results of our findings revealed that teaching students with instructional media by teachers in basic science improved student's capability and ability to meet up with the current standard. This study recommends that government should make available instructional media aids in all public schools as this will certainly help in improving teaching quality, delivery and learning of basic science.

Keywords: *Instructional media, Academic performance, Percentages, Students, Birnin Kebbi*

EEN_005: Flood Risk Management, Public Information and Warning using Social Media

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Abstract

This paper reviewed the flood risk and public information and warning using social media which involve public and/or private attempt to increase the availability of timely information on flood risk control policy. Flooding usually occurs in Kano metropolitan and the environs because of lack of community awareness and participation, blockage of water drainages, lack of law enforcement to force people living in flood prone areas to vacate as well as limited knowledge of the risk areas and how to control it. The focus group discussion (FGD) was employed as a tool for data collection. The sampling frame is all district heads within the metropolitan area, local government emergency management agency (LEMA) representative and other stake holders in each local government area. The random sampling techniques were adopted in selecting the respondents. It is found that the majority of the respondent believed that climate change is one of the causes of flooding. Other causes include, improper urban planning, dumping of refuse in drainages, lack of community participation and ignorance etc. Some of the responses made by the respondent about their level of preparedness are after flooding took place. Some of the recommendations made by this paper include, public enlightenment using social media on flood risk and flood preparedness in flood prone areas, more accurate flood forecasting through the use of weather satellite, high – tech equipment, evacuation planning, among others.

Keywords: *Kano metropolitan, Flooding responses, Social media*

EEN_006: The Role of Technology in Combating Banditry and Food Insecurity in North-West Nigeria from 2011 - 2022

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Abstract

Banditry is one of the major contemporary security challenges the Nigerian state is confronted with. Nigeria's North-West region is worst hit in the last decade leading to loss of lives and breakdown of socio-economic activities especially, food production that supports livelihood in the region. The constant scourge of banditry not only poses threat to human security but food security in the whole country. This paper is a critical analysis of the role of technology in combatting banditry and food insecurity in the North-West. Given the posture of this analysis a qualitative research design is adopted. Secondary sources of data are relied upon and in-depth desk review

technique is used to review extant literature. Frustration-aggression provided the theoretical framework used for analysis. The paper assert that banditry threatens food production in the North-West therefore recommend among others the deployment of modern technology to combat banditry and boost food production in order to prevent food crisis and its attendant humanitarian consequences throughout the nation.

Keywords: *Banditry, Food insecurity, Technology, Security*

EEN_007: Basic ICT and Educational Technology in 21st Century in Nigeria: Problems and Prospects

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Abstract

ICT (Information and Communication Technology) and Educational technology is not a panacea to all educational problems, but is a vehicle with great potential to improve or accelerate the developmental process of any developing nation. It can be examined as a system within a specialized framework to achieve particular tasks or objectives. it is agreed that it has numerous benefits but many challenges are preventing these benefits from being realized. Some of these challenges are poor funding and allocation for Educational Technology at various levels of educational systems, leads to inadequate supply of facilities, equipment and materials. Bureaucratic bottlenecks and rigid organizational structure which opposes innovation and insist on maintaining status quo. However, this paper is a simple review on the term ICT and educational technology wich figure out some recommendations like organizing workshops,seminars and conferences by authorities to correct the misconception about the importance of educational technology and for capacity building.

Keywords: *Education, ICT (Information and Communication Technology), Educational Technology*

EEN_008: Concept Mapping as a Pedagogic Tool in Teaching Undergraduate Biology in Nigeria

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Abstract

Biology both as a subject at post primary or a course at the undergraduate levels of education is the foundation of all life sciences. While some students find it easy and interesting, others view it as very broad and therefore stressful to read. In order to address both sides of the divide, novel methods are needed to make both the teaching and learning of the discipline easily grasped and welcomed by all. This is the reason why novel pedagogic tools are required to make the subject matter as clear as possible. The idea of concept mapping even though not entirely new in the field of education seems to be the new bride here. With advances in Science and technology, the

teaching of biology especially to undergraduates at the tertiary level becomes simpler and more valuable. This current review is an attempt to conscientize all stakeholders on the importance of applying this principle in teaching Biology particularly in breaking topics and concepts down to the level of the student's understanding and appreciation.

Keywords: *Biology, Education, Pedagogy, Concept Map, Undergraduates*

EEN_009: The Use of the Big Five Personality Traits in Developing Personalized Educational Modules

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Abstract

The Big 5 Personality traits were developed and later expanded between the mid to late 1900s. The Big 5 personality trait is a scientific measurement of human personality traits that is applicable across all domains of human endeavor. Recently, a personality assessment tool was used to measure individuals based on certain questions which were designed to rate individuals in the spectrum of any of the Big 5 personality traits. The Big 5 personality traits are Openness, Conscientiousness, Extraversion, Neuroticism, and Agreeableness. For each of these traits, a report is generated categorizing individuals. The comprehensive report rating individual based on a set of 5 personality traits, is used on the platform to match individuals even to prospective partners for a relationship. Businesses also use it to predict individual future prospects and the performance of employees. An area that has attracted less application of the Big 5 personality traits is Education. The aim of education is to apply proven methods in inculcating knowledge into the learners. The methods used in Formal Education, especially in Africa are unidimensional formats. It does not take into account different modes of information acquisition for different individuals. Personality has been proven to be a better predictor of success in academics than intelligence. This research seeks to bridge that gap. Based on this, by adopting a tool for accurate measurement of a person's personality, a more personalized, interactive and individualistic education model can be developed which will foster effective and efficient learning.

Keywords: *Personality traits, Education, Assessment, Human behavior*

EEN_010: Prevalence of Obesity among Adolescents in Private and Public Secondary Schools in Calabar Metropolis, Cross River State, Nigeria

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Abstract

This study was to investigate the prevalence of obesity among adolescents in private and public secondary schools in Calabar Metropolis of Cross River State, Nigeria. Survey method of research design was adopted for the study. Stratified random sampling technique was adopted to select 400 students (i.e. 200 from private and 200 from public secondary schools) in Calabar Metropolis.

Structured questionnaire titled Prevalence of Obesity among Adolescents (POAD) was used to obtain data. The data obtained were analyzed using Independent t-test statistic. All hypotheses were tested at 0.05 level of significance. The results indicated that significant differences existed between the students of private and public secondary schools as regards the prevalence of obesity in the study area. It was recommended among other things that Private school students most especially the adolescents should be involved in proper fitness programmes to help in improving their health thereby reducing the risk factors of having obesity related disorders.
Key words: Adolescents, Obesity, Prevalence, Private and Public

EEN_011: Unsustainable Developmental Practices in Nigeria: A Discourse on Sustainable Development

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Abstract

The world is a global village, and the consequence of unsustainable development practices as manifested in environmental degradation affects every person and inanimate being individually and collectively, nationally, regionally and globally. Already, planet Earth is degraded, and climate change is threatening the foundation upon which its continued existence is based. Grief caused by impact of climate change brought on by hurricanes, tsunamis, and soil deterioration in previous years is still vivid in the minds of the global world. In Africa and Nigeria, climate change-induced conflicts between farmers and herders have killed many people while many are homeless. Therefore, this paper interrogates critical issues regarding environmental difficulties and sustainable development challenges. In doing this, the article would critically examine the concept of sustainable development, a notion around which legally significant expectations regarding policies and strategies that are in place to ingrate the relationship between the environment and development in Nigeria. The paper argues that the lack of adherence to the existing policy framework is a testimony to Nigeria's commitment to sustainable development. It is the submission of the article that the issues of sustainable development should now be seen as an urgent problem confronting not only Nigeria but humanity at the broader level. Therefore, it's necessary to pursue a new developmental strategy that can ensure continued economic growth and ecological stability with less exploitation and use of natural resources. The paper uses a descriptive and quantitative approach as its analytical tool.
Keywords: *Climate Change, Environment, Humanity, Natural Resources and Sustainable Development.*

EEN_012: Education Technology: A new Business Direction

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Abstract

The epoch of 21st century is often regarded as an epoch of technology which plays a significant role in our life and seen as a basis of growth of an economy. The growth of various advanced technologies is one of the most crucial technological tools or applications that enable learners to create, generate and contribute knowledge in a form of information sharing. A questionnaire instrument was developed for the assessment of higher institution students e-learning utilization which was available electronically. Responses were electronically generated and analyzed. Results indicated that higher institution students mostly make use of mobile smartphones to connect to the internet via service provider on a monthly subscription bases, which they are financially responsible for. Since e-learning is gradually being recognized as a service industry, where the students are seen as customer, service providers are expected to comprehend that product or service alone cannot hold their customers alone rather the quality of service provided. Hence, higher institutions must keep in view of student's insight concerning the process of teaching and learning using technology.

Keywords: *Higher Institutions, Education Technology, EdTech, e-learning, Smartphone, Internet Service Provider*

EEN_013: Effects of Video Instructional Package (VIP) on Secondary School Students Retention in Biology in Makurdi Metropolis, Benue State

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Abstract

This study was designed to determine the effect of Video Instructional Package (VIP) on secondary school students' retention in Biology in Makurdi Metropolis, Benue State, Nigeria. Two research questions were asked and two hypotheses were formulated and tested. The study adopted a quasi-experimental design of non –randomized pretest-posttest control group type. The population of the study is 2,100 while the sample of 138 SS2 students was drawn from four secondary schools using the multistage sampling technique. In each of the schools, intact classes were randomly assigned to VIP and lecture methods. The Biology Retention Test (BRT), was constructed for the collection of data and was validated by five experts and used for the study. The data collected at the end of the research were analyzed using descriptive statistics of mean and standard deviation to answer research questions while the hypotheses were tested using analysis of covariance (ANCOVA) at 0.05 alpha level of significance. The result of the study revealed that students taught Biology using Video Instructional Package (VIP) retained higher mean scores than those taught using the Lecture method. The result also revealed no significant difference in the mean retention scores of male and female students taught Biology using VIP.

It was therefore recommended that Policy decisions should be made by education stakeholders to ensure that VIP form an integral part of the curriculum for Biology at secondary schools.
Key words: *Video Instructional Package (VIP), Retention, Biology*

ENGINEERING

ENG_001: The Design and Simulation of an Automatic Microcontroller (PIC 18F45K22A) Based Temperature Control System

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Abstract

Temperature monitoring and control as well as data acquisition is very essential in various industries. The microcontroller-based temperature control system controls the temperature of a device according to its requirement for any industrial application. In this study, we present an automatic microcontroller-based temperature control system using PIC 18F45K22 which controls all its functions, a temperature sensor LM35 is used to sense the temperature of the environment and the embedded Analog-to-Digital Converter (ADC) in the microcontroller takes the analog data from the sensor, and convert them to digital values which are easily acceptable to the microcontroller. The microcontroller being the processing unit processes the data, then the temperature is displayed on the 16*2 Liquid-Crystal Display (LCD) screen. The user's temperature requirement is stored as a reference value and the microcontroller compares the ambient temperature against the reference temperature value and then further initiates the controlling process using relays connected to it. The simulation result show that the scheme has good performance in terms of temperature monitoring and control and also has better performance than existing works with less energy consumption.

Keywords: *LCD display, Microcontroller, PIC 18F45K22, Temperature sensor LM35*

ENG_002: Optimization of the Servomotor Speed Control Using Fuzzy Logic Based Conventional Feedback Mode

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Abstract

With the application of an Intelligent Fuzzy Logic Controller (FLC), the servomotor speed control will be optimized. The mechanism is controlled by regulating the time servomotor, voltage, torque, and angle, but the servomechanism plays a dominant role in the optimization of the process. The DC motor

field excitation is provided with a constant DC source and the armature voltage is provided by selecting the controlled voltage source and a DC mode is selected for the same with a step signal as input. The optima system condition is constrained by inputting the value, so the FLC will be designed to maintain the steady state of the temperature. The mechanical system is modeled to provide load torque to the DC motor model. The dynamic response of the DC motor (speed and armature current) is captured using a scope with a step change of armature voltage for different loads. An active optimization mechanism using fuzzy logic controls is presented in this work. In view of the high energy consumption and low response speed of the traditional hydraulic system for a machine, a servo motor driven constant, which uses a servo motor, a constant pump, and a pressure sensor, a common motor, a constant pump, a pressure proportion valve, and a flow proportion valve, A model predictive control strategy based on fuzzy logic optimization is proposed to control Simulation results showed that this control method has good control precision and quick response. MATLAB/SIMULINK was used to obtain the optimal specifications, which are firing angle and fast decision with a fuzzy controller depending on the variations of rotating speed and armature current with variations of load torque. Also, the simulation results are tabulated and conclusions are drawn from the results.

Keywords: *Fuzzy logic controller, Servomotor, Feedback, Proportional-Velocity (PV)*

ENG_003: The Design and Simulation of Microcontroller-Based Office Automated Robot for Light-Weight Item Delivery

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Abstract

The impact of mobile robots working autonomously in the real world is one of the long-term purposes of the field of artificial intelligence. So far, the field lacks methods bridging the gap between the sophisticated symbolic techniques to represent and reason about action and more reliable low-level robot control and navigation systems. In this paper, we present the design and simulation of an office automated light-weight item delivery robot using microcontroller. With this robot, the office workers will not have to leave their locations to make deliveries of items such as office documents, supplies, prototype devices, and most important of all, coffee. We believe as a result; the workers will be able to focus on their task better and the productivity of the office will see an increase. Companies by nature thrive to increase efficiency of their operations in which such efforts have been translated to their needs to unman and automate office spaces. The prototype light-weight object delivery robot has been designed to receive order-request through android apps, then to collect items (max. 3 kilogram) from the sender and to travel to its destination for dispersion and again to come back to its source point completing the order of requested items. The simulation

result show that the scheme has good performance in terms of light-weight items delivery.
Keywords: *Location sensing, Microcontroller, Robot, Sensor*

ENG_004: Review Study on the Design and Development of Bird-like Unmanned Aerial Vehicle

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Abstract

This article aims to review various designs and development of bird-like Unmanned Aerial Vehicles (UAVs). A UAV is a remotely piloted or self-piloted aircraft that can carry cameras, sensors, communications equipment or other payloads. UAVs were predominantly used for military purposes such as surveillance, and combat and were later used for civilian applications such as agriculture and medical supplies. Research in UAVs has developed an interest over the past couple of decades. Birds everyday perform complex manoeuvres out of reach of current UAVs of comparable size. These capabilities are at least relatively linked to efficient flapping kinematics. As such, numerous devices have been developed for UAVs to achieve optimum natural flight capabilities. Today, researchers are motivated by the nature and making effort to develop biologically inspired UAVs since the impression of ornithopters or Flapping Aerial Vehicles (FAVs) prospered. This motivation has materialised and has become an important area within the field of UAV technology. The development of bird-like UAVs may perhaps assist in medical emergencies telecommunications, survey local areas for extended reconnaissance missions, and farming purposes among many others. Hence, in this paper, flapping wing technology and various bird-like UAVs designed are discussed.
Keywords: *Unmanned Aerial Vehicle, Birds, Payloads, Inspired, Ornithopters*

ENG_005: The use of Unmanned Aerial Vehicle (UAV) for Early Detection of Oil Spills from Crude Oil Pipelines

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Abstract

Drone aircrafts also known as an unmanned aerial vehicle (UAV) are gaining more importance in environmental monitoring as well as in oil spill response all over the world. Drone aircrafts have the potential to deliver information quickly and economically for difficult terrain areas and also have the potential to fill an important gap in surveillance capability. In case of an oil spill, decision makers are in need of relevant information in order to make optimal decisions and minimize environmental damage. Combined usage of UAVs and drifters and relevant web-based expert system was tested in the field by monitoring the spread of suspended matter from dredging

operation in harbor, which well simulates the oil spill behavior, as oil spills of such range are not possible in real life.The extent and area of suspended matter distribution will be assessed and a method will be introduced to derive distribution of suspended matter concentration from drone images from 4K video camera using linear relationship between measured TSM concentrations and pixel digital number. Two-band ratio between red and green will be used from the image raw data to establish the linear relationship. A drifter buoy can be used to track oil spills during response operations thereby providing the response teams the real-time environmental data as well as oil slick observations which are very crucial if a spill trajectory forecast is to be accurate. Concept of tactical scale oil spill response support system will be proposed based on the drifters and UAVs.

Key words: *Drone aircraft, Oil spill, Drifters, Suspended matter, Surveillance capability*

ENG_006: Recent Trends on Sol-Gel Synthesis of $MgHf_4P_6O_{24}$ Electroceramic Electrolyte in Fabricating Mg-Sensors

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Abstract

Modified sol-gel method was deployed for the chemical synthesis of a single phase monoclinic-structured $MgHf_4P_6O_{24}$ electroceramic electrolyte in this study. Thermal analysis (TGA-DSC), high-temperature x-ray diffraction (HT-XRD) and transmission electron microscopy (TEM) were some characterisation tools deployed for the phase identification and crystal structure of $MgHf_4P_6O_{24}$ electroceramic electrolyte. Based on the data from the simultaneous TGA-DSC and HT-XRD analyses, the calcination temperature of the single phase monoclinic $MgHf_4P_6O_{24}$ electroceramic electrolyte was achieved at 900 ^oC whereas, phase stability of the electrolyte was sustained by sintering process at 1300 ^oC, after pelletisation of the calcined nano-powders through uniaxial compression system at 5 kN. Transmission electron microscopy (TEM) was also deployed for the visualization of possible extraneous phase formation of the electrolyte. Electrochemical impedance spectroscopy (EIS) was thereafter deployed to determine the ionic conductivity of the elelctroceramic electrolyte using a two-probe analysis ranging from 182 - 764 ^oC impedance temperature, and at a frequency ranging from 100 mHz to 32 MHz. In this analysis, promising bulk ionic conductivity of 4.52 x 10^{-4} Scm^{-1} was measured at 747 ^oC for $MgHf_4P_6O_{24}$ electroceramic electrolyte, which is sufficient for the fabrication of Mg-sensors.

Keywords: Sol-Gel, Calcination, Sintering, Magnesium, Electrochemical Sensors

ENG_007: Finite Element Analysis of Kenaf Fibre Reinforced HDPE Composites for Crash Helmet Application

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Abstract

Road accidents and crashes are major causes of death and mortality worldwide, with the prevalence of high mortality in most developing countries, crash helmets are designed to safeguard against head injuries, craniomaxillofacial injuries, isolated trauma and penetration associated with crashes or accidents. Material components for crash helmet consist of rigid outer shell made from thermoplastics such as Polycarbonate (PC) and Acrylonitrile butadiene styrene (ABS); and the inner liner of expanded polystyrene (EPS) foam and Polyurethane foam which compensate for shock absorption. This study aims to investigate the suitability of Kenaf fibre reinforced HDPE composite for rigid outer shell of crash helmet using finite element analysis FEA. Mechanical properties such as tensile strength, flexural, impact and hardness were evaluated. The constitutive properties were used to develop the FEA using the NX NASTRAN solver. The results of the analysis showed that the strain energy properties of the Kenaf/HDPE (0.6680N.mm) is higher compared to the ABS (0.2020N.mm) which implies that, higher elastic work of fracture is required to propagate failure in the Kenaf/HDPE composites. The FEA of the composite has potential to significantly aid the process of testing and validating the adoption of Kenaf/HDPE for crash helmet application.

Keywords: *Crash helmet, craniomaxillofacial injuries, Kenaf/HDPE helmet, FEA, Road accident*

ENG_008: Digitalization in The Construction Industry: Problems and Prospects

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Abstract

The complex field and practice of construction is a quest to solve problems and make systems and technology more efficient. The real-world application of scientific knowledge and research in its scope, embraces construction done in the fields of engineering and the environmental sciences. With the advent of ever new and increasingly enriching technology, there is a need for increased adoption of digital techniques during construction. Similar to other sectors, construction worldwide faces a paradigm shift and the driving forces in the industry indicate the competitiveness of innovative capabilities. The construction sector is fast transforming, yet it remains one of the least digitalized sectors in Nigeria's economy. The challenges facing this sector are lack of capacity, critical knowledge and digital transformation enthusiasm among managerial teams, resource and energy efficiency and productivity. The integration of digital technologies is

key to tackling these challenges. Despite great digital economic potential, Nigeria captures but a minute fraction. Strategic investments in the construction sector should be put in place to better data storage, enhance management capacity, increase employee productivity and also gain competitive advantage. The results will put together strategies that would locate the industry in the right track towards digital transformation.

Keywords: *Construction Industry, digitalization, transformation*

ENG_009: Optimum Replacement Levels of Ordinary Portland Cement with Rice Husk Ash from Varieties of Rice for Low-Cost Housing

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Abstract

It has been established that Rice husk ash (RHA) possess cementing properties, thus, can be used to replace cement in parts in lightweight construction. With the increasing cost of building materials on daily basis, especially cement, resulting in very high cost of housing, RHA has been found to be an alternative sustainable material that will lead to cost reduction in housing delivery. The objective of the study is to characterize the pozzolanic properties of three identified RHA varieties (China black, Jamila and Faro) in Bauchi, the study area, with a view to determining the mechanical properties of lightweight concrete strength at different replacement levels of ordinary Portland cement with the identified RHA varieties. Standard cubes (100mm x 100mm x 100mm) and prisms (100mm x 100m x 500mm) were produced in laboratory. In all, 894 specimens of M15 grade mix were produced and tested by crushing. The strength of the concrete at various replacement of cement viz: 15%, 20%, 25%, and 30% with Rice Husk Ash were compared with controlled mix of same grade M15. The compressive and the flexural strength at 7, 14, 21 and 28 days were determined, and the results at respective days of curing was encouraging. The optimum replacement of rice husk ash with OPC was found to be 20% for china black, 20% for Jamila and 15% for Faro. This can be used for lightweight construction in low cost housing.

Keywords: *Rice husk ash, Optimum replacement level, Cost Performance, Housing*

ENG_010: Evaluation of the Effects of Heat on the Tensile and Bond Strength of Slag Cement Concrete

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Abstract

Slag cement have proven to have better mechanical properties compared to ordinary Portland cement, however, there is need to assess it performance at thermal conditions, this work examine the effects of thermal variance on the bond strength and split tensile strength of slag cement

concrete. In this research, slag cement was prepared by blending 50% Portland cement with Ground Granular Blast Furnace Slag and used as the binder. Concrete cubes of 100mmx100mm were prepared using slag cement, the cubes were reinforced with 10mm steel bars, the samples were cured for 28 days to achieve strength. Also, cconcrete cylinders of 100mmx300mm were prepared using slag cement; the samples were cured for 28 days to achieve strength. Thereafter, some samples of the cubes were selected and tested to determine the bond strength using pull out test while some were subjected to varying thermal conditions of 150, 200, 250 and 300C at time intervals of 30, 45 and 60 minutes after which pull out test was conducted on the heated samples to determine effects of varying temperature conditions. Also, some samples of the cylinders were selected and tested to determine the tensile strength using split tensile test while some were subjected to varying thermal conditions of 150, 200, 250 and 300C at time intervals of 30, 45 and 60 minutes after which split tensile test was conducted on the heated samples to determine effects of varying temperature conditions. At the end of the research, it was observed that slag cement concrete has good thermal performance compare to ordinary Portland cement.

Keyword: *Tensile, Bond strength, Heat, Slag cement*

ENG_011: Design and Fabrication of a Motorized Fruit Juice Extractor

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Abstract

There is some agriculture equipment for post harvesting of watermelon, fruit juice extraction is the act of wringing out the juice content of fruit by way of an effective processing and storage which enhance reduction in wastage. Fruit juice which literally have high antioxidant help in increasing serum capacity of the body at some time balance the oxidative stress and discomfort normally caused by high-fatty and sugar meals .The history of juice extraction back to ninetieth century .The extraction of juice from it fruit has progressed tremendously from the old tedious method of squeezing to an automated juice extractor machine across the world making it an essential tool for citrus famer .juice extractor machine are classified broadly into four types centrifugal ,matriculating triturating and press juice which may be operated manually or electrically .These machine models exist all over the world with very limitation then simple portable machine that squeeze the juice from the orange are to be reviewed in this work for better and health juice extraction.

Keyword: *Agricultural equipment, fruit juice, extraction, Oxidative stress*

ENG_012: Design and Fabrication of Direct Current Blender

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Abstract

DC blender is one of the tumbling type blender which widely used in many field for blending and mixing ,this project is to design and develop a table top .DC blender is for grinding and mixing .The main parameter to consider in the design and development of table machine is the angle of 90 and the mixing speed is control by power window DC motor and a DC 12volt the mixing capability or performance of the machine is tested by using crushed plastic ,from the testing ,the machine is equipped with a safety cover to prevent from any object accidentally hit the canister .during the blending process the development this DC blender can be very useful in kitchen for small scale research.

Keywords: *DC blender, DC motor, Grind and mixing capacity*

ENG_013; Validation Of Apsim Model For Rainfed Rice Yield Simulation At Kano River Irrigation Project

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Abstract

Agricultural Production Simulation Model (Model) was validated for simulation of rain-fed rice yield at Kano River Irrigation Project (KRIP). Twelve years of rice yield at KRIP was obtained from Hadejia Jama'are River Basin Development Authority, Hotoro, Kano State. Corresponding weather data (2000-2011) for KRIP were obtained and converted to APSIM Met File. Management practices, soil and crop data were obtained from secondary sources, through field interviews and review of papers. These were used in model validation. The validation result shows that the simulated yield agrees with observed yield with Determination and Nash-Sutcliffe efficiency coefficients of 0.6147 and 0.92, respectively. RMSE was also determined to be 115.99kg/ha, which is low compared to the observed mean of 3622.5kg/ha. Therefore, the model can well simulate rain-fed rice and can be used for such simulation purposes.

Keywords*: Validation, APSIM, KRIP, simulation, rice, secondary data*.

MATHEMATICS AND STATISTICS

MST_001: Application of Linear Programming (A Case Study of Nylon Producing Company)

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Abstract

Linear programming is a technique that is used for optimizing a linear function in order to reach the best outcome. The application of liner programming cannot be overemphasized because of the role it plays in depicting and solving complicated real-world problems. Linear Programming applications may include production scheduling, inventory policies, investment portfolio, allocation of advertising budget, construction of warehouses, Resource allocation, Transportation problem, etc. In this paper, we focus on the production scheduling by maximizing the profit of a nylon-producing firm, Albarka Plastics Company, which is located at Dan Kande Village along Kaduna-Zaria Express Way, Kaduna State, Nigeria. The firm produces six nylon products, which include Water Roll (high density), Water Roll (low density), Bread Nylon, Shopping Bag, Cellophane and Santana using limited raw materials such as Low Density Polythene (LDPE), High Density Polythene (HDPE), Ink, Linear Low Density Polythene (LLDPE), Exceed, Exon Mobil and Roughages. A linear programming model was formulated using the data collected on the quantity of each raw material required for producing each product as well as the profit per kilogram of these products. The linear programming model was then solved using LINGO 15.0 software. Four of the products variables were found to be nonzero while the other two were zero in order to maximize the profit using the available raw materials at the disposal of the company.

Keywords: *Linear Programming, Optimization, Nylon*

MST_002: Prevalence of Intestinal Parasitic Infections in HIV Positive and Negative Groups in some Selected Semi-Urban Areas in Nasarawa State, Nigeria

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Abstract

The objective of the study is to determine the prevalence of intestinal parasites among HIV positive and negative groups. A case control study was conducted in four semi-urban areas in Nasarawa State. The study enrolled 422 prospective individuals. Stool sample test was conducted for all in examining the presence of intestinal parasites. Blood sample was collected to investigate for HIV infection. The overall prevalence of intestinal infections among HIV positive individuals was 19.0% (78/411). For Geohelminth infections, HIV positive were infected more by Hookworm at a

rate of 9.7% (20/207). For protozoa infections, HIV positive groups were diagnosed more with G. Lamblia, at a rate of 8.2% (17/207). The binary logistic regression showed that, factors significantly associated with parasite infections amongst HIV positive individuals included study subjects less than 43 years (OR = 2.192, CI: 0.082, 3.736) and subjects with diarrhea (OR = 1.521, CI: 0.112, 2.891) for geohelminth parasite; and, higher among study subjects with diarrhea (OR = 1.767, CI: 0.111, 3.009) for protozoa infections. HIV positive individuals are more susceptible to co-infections with Hookworm (Geohelminth) and G. Lamblia (Protozoa) which is predominantly higher amongst HIV-positive persons with poor personal hygiene habits, indicating a need for integrated approach hygiene promotion, surveillance and treatment.

Keywords: *Coinfection, Helmints, HIV, Intestinal parasites, Protozoa.*

MST_003: Some Estimate for Spatially Unbounded Solutions of Burgers Equation With Non-Autonomous Forcing

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Abstract

In this paper, we consider 1-Dimensional Burgers equation in $\mathbb{R}$ with a time-dependent forcing term that may be allowed to grow slightly as the spatial variable grows. We have introduced some family of special weights, given the attendant difficulty of considering a function in the whole space, to gain control of the function. Under a special assumption, it is found that the Burgers equation possess, at least, one solution in the phase space of the weight that satisfies the dissipative estimates. The existence and uniqueness of the solution is also been obtained.

Keywords*: Unbounded domain, Burgers equation, weights, estimates, dissipativity.*

MST_004: Classification of Crypto Assets, Non-Fungible Tokens (NFTs) and Blockchain Technology in Macroeconomic Statistics: Panel Data Analysis

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Abstract

A Crypto asset is a virtual or digital currency design to serve as a medium of exchange through a computer network called “Blockchain”. Transactions carried-out through the blockchain system are not subject to any form of central authority such as a government or bank that uphold the transactions and maintain it. This paper seeks to assess and elaborate these crypto indicators effectiveness to substantiate the assets returns of some selected cryptocurrencies and examine whether crypto assets and NFTs are classified as financial and economic assets. In this paper, five-years (21st October, 2018 – 21st October, 2022) cryptocurrecies indicators such as opening price, closing price, asset volume, asset high price and asset low price for the top ten (10) crypto assets

with high market capitalization are considered as explanatory (independent) variables to estimate crypto assets returns. The secondary data is collected at a regular daily frequency; these indicators are derived from both Coin Market Cap and Yahoo Finance cryptocurrency's websites. The study uses three-panel data models, the pooled OLS, fixed and random effects, to evaluate crypto assets returns for the cross-sectional data of these ten crypto assets. The study revealed that the identified crypto indices employed are significant and positively affects the market capitalization of these crypto assets. Finally, the study reveals that crypto assets can be classified and considered as economic assets since holders or investors derive economic benefits in terms of holding gain/losses and other benefits. Also, they have monetary value and their price is determined by the market in which they trade.

Keywords: *Cryptocurrencies & NFTs, Blockchain and tokenization, Macroeconometric statistics, Panel data analysis*

MST_005: Facemask Violation Detection System Using Convolutional Neural Network

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Abstract

Evidence is needed on the effectiveness of wearing face masks in the community where there are schools, markets, organization etc. to prevent severe acute respiratory syndrome coronavirus2 (SARS-CoV-2) transmission. Mask wearing is considered as a serious challenge in our societies today due to the spread of corona virus disease, the proposed model system is to help these initiatives and public health sector by developing a real-time video-based research and a related interactive resource dedicated to checking face mask wearing by leveraging a webcam. In this paper, a face mask detection model for static and real time videos has been presented which classifies the images as "with mask" and "without mask". The model is trained and evaluated using the data-set sourced from Kaggle. The gathered data-set comprises 4,000 pictures and attained a performance accuracy rate of 98%. The paper developed a computer vision system to automatically detect the violation of face mask wearing among workers or students in various places using buzzer to assure their safety during the working or learning. Also, to prevent the spread of corona virus by promoting the use of face masks with the help of effective technology to detect the face masks and help to take necessary precaution for the safety of society. The system use convolutional neural network method to detect object and classify data into train and test classes. The outstanding performance of the proposed model is highly suitable for video surveillance devices.

Keywords: *Facemask detection system, Deep learning, Computer vision, Keras, Covid-19*

MST_006: On Quotient Based Graphs for Finite Abelian Groups

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Abstract

A quotient based graph $\varphi_H(G)$ of a group G relative to its normal subgroup H, is a graph in which two distinct elements $x, y \in G$ are adjacent iff $xy \notin H$. In this paper, we investigated the quotient based graphs of finite abelian groups relative to all their subgroups since every subgroup of an abelian group is normal. We came up with a formula for getting the size of the graphs and illustrated using examples.

Keywords: *Quotient Based Graphs, Normal Subgroups, Abelian Groups, Size of Graphs.*

MST_007: Effect of DPL on Natural Convection Couette Flow of An Oldroyd-B Fluid in a Vertical Micro-Channel with Asymmetric Thermal Boundary Conditions

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Abstract

This paper investigates the effect of dual phase lag heat conduction on natural convection couette flow of an Oldroyd - B fluid in a vertical micro-channel. The channel boundary plates are kept at asymmetric thermal boundary conditions in a slip flow regime, while the energy equation follows the DPL heat conduction model. The method of Laplace transform was used to solve the resulting governing equations while the Riemann-sum approach is employed to transform the solution from the Laplace domain to the time domain in order to obtain the temperature, velocity, skin-friction and rate of heat transfer. The obtained results are described by line graphs. It has been observed that at the early stage of time, the phase lags in both heat flux (τq) and temperature gradient (τT) on the micro-channel thermal behaviour have a sinusoidal effect on fluid temperature and velocity. Also at the heated plate, the skin friction and the Nusselt number are observed to decrease with increase in the retardation time (τT , λT), while they both increase with increase in the relaxation time (τq, λq).

Keywords*: Dual Phase Lag, natural convection, Coueette flow, Oldroyd-B, Micro-channel*

MST_008: On Multirings

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Abstract

The concept of multiset as a generalization of Cantor's set has kindled a lot of windows of research in the areas of analogy between the classical set and multisets theories. Following the introduction of multiring which is a ring structure in multiset context, we studied the closure of multiset operations on a class of finite multirings over a ring and established a relationship between a

multiring and a ring in this paper. Also, commutative multiring with identity has been defined and a necessary and sufficient condition for the commutativity of a multiring with identity is established.

Keywords: *Ring, Multisets, Multiset Operations, Multiring, Commutative Multiring*

MST_009: Multilevel Logistic Analysis of Infant Mortality in Nigeria across the Geopolitical Zones

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Abstract

According to UNICEF, (2013), every single day, Nigeria loses about 2300 under-five year old, this makes the country the second largest in the world. Infant mortality rate in Nigeria is 74.09 deaths in 1000 live births. It is unfortunate that more attention is given to the individual factors influencing infant mortality with less given to the group factor where the individual is nested. This research examined the effects of individual- and group-level characteristics on infant mortality in Nigeria and also determined the extent to which characteristics at these levels influence regional variations in infant mortality in the country. Multilevel logistic regression analysis was carried out on Nigeria Demographic and Health Survey data (NDHS, 2018) of representative sample of 41822 women and children who are also nested in states. The results indicate that group-level factors (such as geopolitical region) and individual-level factors (including child's sex, size of baby, mother's education, mother's age, baby's postnatal checked up within two months, number of antenatal visit, place of delivery, mother's place of residence) are important determinants of infant mortality in Nigeria. Also, the effect of geopolitical zones is significant in two geopolitical zones (North West (NW) and South East (SE)) regions. Furthermore, both individual- and state-level characteristics have influence on infant mortality in Nigeria. The results underscore the need to look beyond the influence of individual-level factors in addressing regional variations in infant mortality in Nigeria. It is recommended that considerable investment is needed in terms of training, education, health infrastructure and resources to enable all stakeholders save lives.

Keyword: *Infant mortality, Multilevel logistic regression, Nigeria*

MST_010: Geo-additive Model of Count Data: The Impact of Fertility Level on Female Education Among Childbearing Age Women in Nigeria

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Abstract

Female education is a great investment that concerned every well-meaning citizen because of long time benefits in transforming the immediate communities, countries and the world at large. There exist an inverse relationship between the level of female education and the fertility level. In this study, we aim at investigating the spatial variations and likely key socio-demographic and socio-economic factors responsible for the number of children ever born to women aged 15-49 years in Nigeria. The dataset used for this study was an extract from the 2018 NDHS. A Bayesian stepwise regression approach was used for the selection of variables and smoothing parameters. To model the effects of the chosen socio-demographic and socio-economic covariates and spatial effects on fertility flexibly; we use a geo-additive regression model, and our inference was based on MCMC techniques. We estimate the model of the number of children ever born to explore state patterns. The result from the spatial analysis revealed that women of reproductive age from Sokoto, Jigawa, Katsina, Niger, Kwara, Benue, Ogun, Ondo, Rivers, and Abia have a higher number of children ever born than their counterparts from Kebbi, Zamfara, Kogi, Oyo, Lagos, Delta, Imo, Anambra, Cross River, and Adamawa. The current age, age at first birth, age at first marriage, age at first sex, husband's age, religion, regions, locality, literacy, husband's educational level, educational attainment, wealth quantile, ideal number of children, number of living children, and currently feeding are significantly responsible for the number of children ever born.

Keywords: *Geo-additive model, Female education, Spatial, NDHS, Fertility.*

MST_011: Modelling the impact of Vaccination and Treatment in Controlling the Spread of Hepatitis B Virus with Infective Migrants

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Abstract

Infection with Hepatitis B virus (HBV) is a challenge to global health mostly due to increased migration. In this research, we extended a six deterministic compartmental model that has been established with the aim of immigrants being subjected to test to reduce the number of immigrants with disease. Therefore, to reflect reality, we incorporate treated class, its relapse rate and recovered class respectively which were not considered in order to model the impact of vaccination and treatment in Controlling the Spread of HBV with infective migrants. First, we obtained the existence and uniqueness of the solution and then compute the effective reproduction number. This

model exhibits a unique disease free steady state using the linearization and Lyapunov function methods, which is locally and globally asymptotically stable respectively for $R_r^c < 1$. Otherwise, the model has a unique endemic steady state. The local and global stability of the endemic equilibrium is investigated using the method of row elimination and Lyapunov function approach when $R_r^c > 1$. The epidemiological consequence of this key finding is that controlling the disease with ineffective (or no) intervention strategies in the presence of infective migrants will be difficult. Furthermore, the sensitivity analysis and numerical simulations affirm that increasing vaccination rate has high impact than treatment rate in decreasing the effective reproduction number which in turn decreases HBV transmission in the population. In addition, numerical results show that long-term adherence to high-effective vaccination and treatment options are required to curtail the spread of HBV with infective migrants.

***Keywords**: Hepatitis B Virus, migrants, vaccination, treatment*

MST_012: Free Convection Slip Flow with Thermal Radiation in a Convectively Heated Vertical Channel Filled with Porous Material

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Abstract

This paper reports an analytical investigation of fully developed free convection flow with thermal radiation under Navier slip condition and Newtonian heating in a channel filled with porous material. The non-dimensional governing equations of the velocity, temperature, skin friction as well as Nusselt number are solved subject to a set of appropriate boundary conditions using perturbation technique. The solutions obtained are graphically represented and the effect of various controlling parameters such as thermal radiation (R), thermal Boit number (Br), Darcy number (Da), Navier slip condition (L) are discussed. During the course of the analytical computations, it is found out that, the velocity of the fluid is higher for increasing values of Da and L respectively while increase in Br and R significantly improves both the temperature and velocity flow profiles respectively.

***Keywords:** Free convection, Thermal radiation, Navier slip condition, Newtonian heating, Porous material*

MST_013: Construction of Education Development Index (EDI) for Monitoring Academic Performance in the NUC program of the Air Force Institute of Technology (AFIT), Kaduna

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Abstract

This paper aims at developing an Educational Development Index (EDI), a composite index of educational performance in AFIT. This will facilitate the decision-making process for resource allocation and policy directions, the primary objective is to monitor the academic progress of the Institution. In this paper, a study of resources in the NUC program of the Institute will be studied and composites standardized index will be generated for the construction of EDI using the Principal Component Analysis (PCA) and in comparison, to the Average methods to compare the relationship of the access, participation, and equity index. A stepwise regression model will be developed for the model. All test of significance was at a 5 per cent level.

Keywords: *Principal Component Analysis, Factor Analysis, Regression, Indicators, and EDI*

MST_014: Hausdorff Bitopological Space in Multiset Context

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Abstract

In this paper, the concept of Hausdorff Bitopologocal Space in multiset context is introduced and, the subspace of the Hausdorff Multiset Bitopological Space is studied. It is established that the root set of the Hausdorff Multiset Bitopological Space is Hausdorff Bitopological Space.

Keywords: *Hausdorff topological space, Subspace, Multiset and root set, Multiset bitopological space, Hausdorff multiset bitopological space*

MST_015: Unsteady Taylor-Couette Flow Formation with Slip Boundary Conditions: A semi-analytical Approach

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Abstract

Transient Taylor-Couette flow of an incompressible fluid with a rotating inner cylinder under slip boundary conditions is investigated. The fluid flow is due to the rotation of the inner cylinder, with fixed outer cylinder, and with no application of azimuthal pressure gradient. Expressions for the

velocity profile and shear stress for the cases of non-homogeneous, homogeneous and no-slips are obtained exactly in Laplace domain by using the Laplace transform technique. The solutions obtained exactly in Laplace domain is then converted to time domain using Laplace inversion method based on Riemann-sum approximation (RSA). The steady-state solutions for the velocity profile and the shear stress are obtained for the validation of the method employed. Graphical illustrations of the problem are plotted for analysis and tables are tabulated for comparison of the RSA and the exact solutions at larges value of time. During the course of analysis and numerical computation, it is found that (i) for homogeneous and non-homogeneous slip coefficients, the velocity profile of the fluid reaches steady-state at large values of dimensionless time T which is greater compares to that of no-slip at the boundary (ii) skin friction at $R = \eta$ and $R = 1$ decreases with an increase in the values of the dimensionless time. However, skin friction at $R = \eta$ increases with respect to the increase in dimensionless time for the case where $\beta_1 > \beta_2$.

Keywords: *Transient, Taylor-Couette flow, Riemann-sum approximation, cylindrical annulus, slip coefficients*

MST_016: Boundary Layer Flow Over A Continuously Moving Plate With Convective Surface Boundary Condition

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Abstract

An incompressible and viscous flow fluid over a moving plate with thermal boundary conditions of the mixed kind is fully examined. The governing equations representing the fluid transport consist of sets of two-dimensional partial differential equations which are transformed to one-dimensional ordinary differential equations through the similarity transformation. The reduced dimensionless equations are solved using Runge-Kutta Ferlberg fourth-fifth order (RKF45) method in Maple software. Four fluids namely; mercury (Pr=0.044), air (Pr=0.72), sulphur oxide (Pr=2.0) and water (Pr=7.0) were used as working fluids. The results reveal that the temperature distribution decreases with Bi increment, the boundary layer thickness also decreases with the Prandtl number increase for both gases and liquid fluid. The findings also show that the plate temperature decreases with N augment for both gases and liquid fluid but the decrease is more pronounced in liquid than in gas fluid. The convective parameter is directly proportional to the rate of heat transfer for gas fluid but the converse is true for the liquid fluid. The rate of heat transfer is enhanced with N for gas fluid but decreases for liquid fluid.

Keywords: *Boundary layer flow; Similarity solution; Moving plate; Convective boundary conditions*

MST_017: Effect of the Zonal Harmonics of the Secondary on $L_{4,5}$ in the Photogravitational ER3BP

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Abstract

We investigate in the framework of the elliptic restricted three-body problem (ER3BP), the effect of the zonal harmonics (J_2 & J_4) of the secondary and the radiation pressure of the primary on the positions and stability of the triangular equilibrium points. The triangular points of the problem are affected by the parameters involved in the systems' dynamics. The positions change with increase in the zonal harmonics, eccentricity and radiation pressure. The triangular points are found to be unstable for $\mu_c < \mu < \frac{1}{2}$ as shown arbitrarily.

Keywords*: Celestial Mechanics, ER3BP, Pulsar: Individual PSR J1903+0327*

MST_018: Caputo Fabrizio Fractional Time Derivative Approach On Transient Mixed Convection Flow Of Heat Generating/Absorbing Fluid In A Vertical Porous Channel With Exponentially Decaying Pressure Gradient: Semi Analytical Approach

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Abstract

Theoretical analysis on transient mixed convection flow of viscous incompressible and heat generating/absorbing fluid in a vertical porous channel in the existence of porous material is studied taking into account the effects of exponentially decaying pressure gradient. Caputo Fabrizio fractional time derivative approach is employed in solving the nonlinear Partial Differential Equation and semi-analytical solution is presented. Expressions for velocity, temperature, shear stress, rate of heat transfer and mass flow rate are obtained in Laplace domain. Interesting influence of pertinent flow parameters on flow formation are computed by utilizing the Riemann Sum Approximations and results presented using graphs for air and water flow situations. Results from the study reveals that in the occurrence of fractional order parameters, fluid velocity and temperature distribution in both air and water flow situations could be improved by increase in dimensionless time. Furthermore, results also shows that momentum boundary layer enhances with increase in injection whereas it reduces with increase in suction.

Keywords: *Fractional time derivative, Caputo Fabrizio Approach, heat generation/absorption, suction/injection, porous material*

MST_019: Perturbing Effects of P-R Drag on Location of Triangular Lagrangian Points and Zero Velocity Surfaces of the Photogravitational Restricted Problem of Three Oblate Bodies

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Abstract

This research work unveils effects of the Poynting-Robertson (P-R) drag on the Location of triangular Lagrangian points of a test body in the circular restricted three-body problem under effect of small perturbations in the Coriolis and centrifugal forces when the three bodies are oblate spheroids and the primaries are emitters of radiation pressure. The equations governing the dynamical system have been derived and positions of triangular equilibrium points are located. It is seen that the positions are influenced by the combined effect of perturbations, mass parameter, oblateness, radiation pressure and the P-R drag. Using the software *Mathematica*, we conduct numerical analysis to demonstrate how the perturbing elements: mass ratio, oblateness, radiation pressure, P-R drag and centrifugal perturbation influence the positions of triangular equilibrium points and the zero velocity surfaces.

Keywords: *R3BP; Triangular points; Radiation pressure; Oblateness; P-R drag.*

MST_020: Model of Queuing System on First Bank (A Case Study of Jos Main Branch, Plateau State, Nigeria)

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Abstract

This research has to do with queuing models, the work figure out ways of delivering adequate services to the customers in the First bank of Nigeria Plc, Jos main branch Opposite Revenue House on the four types of services; deposit, withdrawal, opening account and balance checking. The study was carried out using the questionnaire method and analyzed the data using M/M/N model with no limit on the system capacity and first come first served (FCFS) queuing discipline. The results from the analysis for waiting time and the service time of customers in the bank shows that the probability of having at least one or more customer waiting is higher than the probability of having no customer which indicates that there is a poor service delivery specifically on balance checking and account opening which can lead to losing customers. This research also shows that the management should give the servers proper orientation or employ well experienced servers for a better service.

Keywords: *Model of queuing system, Probabilistic steady state analysis, Study reduction level of customers waiting time.*

MST_021: Facemask Violation Detection System Using Convolutional Neural Network

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Abstract

Evidence is needed on the effectiveness of wearing face masks in the community where there are schools, markets, organization etc. to prevent severe acute respiratory syndrome coronavirus2 (SARS-CoV-2) transmission. Mask wearing is considered as a serious challenge in our societies today due to the spread of corona virus disease, the proposed model system is to help these initiatives and public health sector by developing a real-time video-based research and a related interactive resource dedicated to checking face mask wearing by leveraging a webcam. In this paper, a face mask detection model for static and real time videos has been presented which classifies the images as "with mask" and "without mask". The model is trained and evaluated using the data-set sourced from Kaggle. The gathered data-set comprises 4,000 pictures and attained a performance accuracy rate of 98%. The paper developed a computer vision system to automatically detect the violation of face mask wearing among workers or students in various places using buzzer to assure their safety during the working or learning. Also, to prevent the spread of corona virus by promoting the use of face masks with the help of effective technology to detect the face masks and help to take necessary precaution for the safety of society. The system use convolutional neural network method to detect object and classify data into train and test classes. The outstanding performance of the proposed model is highly suitable for video surveillance devices.

Keywords: *Facemask detection system, Deep learning, Computer vision, Keras, Covid-19*

MST_022: Optimal Control Analysis of Onchocerciasis Transmission Model

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Abstract

A deterministic model for the transmission dynamics of Onchocerciasis is developed and analyzed. The model consists of two populations namely; human and vector (blackfly) populations, with four (4) mutually exclusive compartments for humans and three (3) for the vectors. The disease-free equilibrium state and its stability are performed in terms of the basic reproduction number of the model. The sensitivity analysis is carried out using Partial Rank Correlation Coefficient (PRCC) and the result is used in formulating the optimal control model with three control strategies. The Pontryagin's Maximum Principle is employed to the optimal control model to establish the

optimality system for controlling onchocerciasis disease. This is further solved numerically to show the impact of the control strategies on the transmission of the disease.

***Keywords**: Onchocerciasis, Basic reproduction number, Sensitivity analysis, Optimal control*

MST_023: Commutativity and Cancellability Closure of Multiset Operation on Class of Finite Semi-Multigroup

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Abstract.

In this paper, the concepts of Semi-group in (multiset context) (semi-multigroup) is introduced. The condition for a sub multiset of a semi-multigroup to be a sub semi-multigroup is established and a study of the closure of multiset operations on the class of finite semi-multigroup is carried out. It is also established that the root set of a semi-multigroup is a sub semi-group and also a sub semi-multigroup. We have also deduced that all semi-multigroups are multigroupoids however the converse need not true. Furthermore, the cancellability of an element of a semi-multigroup and that of semi-multigroup also defined. A necessary and sufficient condition for cancellability of a semi-multi group is established. Homomorphism of semi-multigroup is defined. The cancellability of the homomorphic image of a cancellable element and that of a cancellable semi-multigroup is determined. Commutative semi-multigroup has been shown regular whose root set is a commutative semi-group. We also study the multiset operations on the class of the commutative and cancellable semi-multigroup among others.

***Keywords:** Semi-group, Multiset, Semi-multigroup, Root sets, Cancellation, Commutativity and Homomorphisms of Semi-group*

MST_024: Naira per US Dollar Exchange Rate Modeling Using ARFIMA Method

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Abstract

This paper analyses the long-memory properties of the conditional mean of Naira per US Dollar exchange rate data over the period 2008-2021 by estimating a univariate ARFIMA model. ARFIMA model is appropriate for long-term memory data series since it is flexible enough to assume a non-integer difference value (d) to cater for the long-term memory or the long-term dependency. The presence of long memory in mean of the exchange rate series *(d = 0.50)* is confirmed. The study obtained ARFIMA (0, d, 3) as the best model.

***Keywords**: Fractional integration, Long memory, Hurst exponent, GPH, Exchange rate.*

PHYSICS AND SPACE

PHS_001: Photovoltaic Potentials of a Silver Implanted Diamond-like Carbon Thin Film

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Abstract

This paper investigated the optical response of silver implanted carbon-based thin films (deposited on quartz substrates) due to varying fluence of energetic Ag ions in the range 2.5 - 3.4 x 10^{16} ions/cm^2. Raman spectroscopy was used to observe the microstructural specifics of the Ag:a-C composites. Atomic force microscopy (AFM) revealed significant increase in particle grain size and surface roughness of the films at varying fluence. Optical absorption spectra showed that the Surface Plasmon Resonance (SPR) of pristine Ag occurs at visible wavelength of about 428 nm but exhibited a blue shifting (~ 32 nm) in the implanted films. The blue shift in plasmonic wavelength occurs due to the fluence-induced increase in grain size and density of the Ag particles as confirmed by AFM. Optical band gap energy (E_g) and Urbach parameter (E_u) of the pristine carbon film increased, with fluence, from 2.89 eV to 1.60 eV and 3.60 eV to 4.22 eV respectively. The observed optically active parameters strongly indicate that the composites would make good candidates for photon retention towards the enhancement of solar cells' efficiency.

Keywords: *Amorphous carbon, Optical absorbance, Surface plasmon resonance, Fluence, Efficiency*

PHS_002: Groundwater Development, Protection and Storage Mechanisms the Key Factors for Water Security and Sustainability.

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Abstract

Water security is the central mission of the Millennium Development Goals (MDG). Delineation of groundwater potential, adequate aquifer storage capacity and protection are key factors to water development, security and sustainability under the growing water demand and challenge. This study identifies the aquifer potential zone, its storage capacity and protective capacity, and proposes alternative water storage support mechanisms in the face of climate variability with adverse impact on drought and rainfall, affecting groundwater. This challenge is addressed through geophysical application and storage support mechanisms. An electrical resistivity technique was

applied to acquire a total of sixty (60) vertical electrical sounding (VES) points with Schlumberger arrays. The aquifer potential, storage capacity, recovery and vulnerability were examined. The applied geophysical technique indicates a promising approach. Groundwater quality and the risk of surface contamination were examined through aquifer protective capacity. Groundwater enhancement and sustainability through management strategies require adequate knowledge of the area aquifer storage capacity and protectability. The deeper zones (thick aquifer) where the basement rocks are fractured were also examined and it was suggested as the most promising zones for groundwater development security and sustainability.

Keywords:

PHS_003: Assessing the Water Content and Electrical Conductivity of Soil Samples for Agricultural Precision Using a Digital Dialysate Meter

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Abstract

Efforts have been continuously made in achieving the central mission of Sustainable Development Goals (SDGs) but yet to yield the desired results. Food security remains a key for global poverty alleviation to safeguard the next generations. This paper addresses the challenge of low crop yield through soil electrical conductivity (SEC). The study applied digital dialysate meter to soil samples obtained from different parts of Nigeria to determine soil water content (SWC) and soil electrical conductivity (SEC) for evaluating soil fertility. The results showed the electrical conductivities of the individual soil sample as A "76.692µS", B "67.344µS", C "88.380µS", D "50.544µS" and E "78.408µS". SEC was classified into three major performances as good, moderate and poor, and each performance was suggested for various crops production.

Keywords: *Electrical conductivity, Soil Water content, Dialysate meter, Agricultural Precision.*

PHS_004: Space Weather Impacts on Small Satellites; Investigation of the Features of February Geomagnetic Moderate Storm

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Abstract

One of the most important of 2022 was the February geomagnetic storm. In the history of solar storm, only intense geomagnetic storm has been recognized as a serious problem by the community of space scientists. However, much attention has been drawn by the February geomagnetic storm

of Dst = -66nT, a moderate geomagnetic storm that reportedly destroyed over 40 spaceX starlink satellites out of the 49 satellites launched to space at an altitude of approximately 550km above the Earth surface. This work seeks to investigate on the interplanetary factors from the solar storm that led to the demise of these satellites by comparing the interplanetary parameters with the Dst-index. Results have shown that the flow pressure and proton density showed a weak correlation with the Dst. However, the electric field, solar wind speed and the plasma temperature showed negative correlation R = -0.64, -0.35 and -0.08 respectively. The observed strong relationship in the correlational analysis of the electric field and the Dst could be attributed to one of the factors that affected the satellite due to the induced electric currents in the conducting sheet of the satellites.

Keywords: *Geomagnetic storm, SpaceX, Interplanetary Parameters, Solar wind, Dst*

PHS_005: Development and Efficiency of Box-Type Solar Cooker Experiments in Zamfara State College of Education Maru-Nigerian

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Abstract

This work on the Development and Efficiency of Box-Type Solar Cooker Experiments in Zamfara state College of Education, Maru-Nigeria evaluates the thermal performance of a constructed box type solar cooker with reflector. The solar box cooker was used to perform an experiment with an ambient temperature of up to 34^0C and the air temperature inside the cooker rose to 63^0C and 53^0C for the stagnation and loaded test respectively. The temperature profiles without load and with load assure its good thermal performance and the ability to boil water and cook simple foods. The materials and methods used in constructing the solar box were 1.8cm plywood, 4mm mirror and glass which were cheap and locally available and the whole experiment were conducted in two days. The efficiency of the solar cooker with reflector was found to be about 90% while the energy radiated by the absorber plate per second is found to be 56.15J. The result shows that the cooker has a good reliability for cooking and boiling water. It was concluded that box-type solar cooker is reliable for boiling water and cooking simple foods. Hence, the researcher recommended that the cooker should be more emphasized and made available to the local communities.

Keyword: *Solar cooker, Stagnation test, Loaded test, Solar reflector, Temperature*

PHS_006: Qualitative and Quantitative Interpretation of Aeromangentic Data Over Parts of Middle Benue Trough, Nigeria

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Abstract

The aeromagnetic data over Lafia, Akiri, Makurdi and Akwana areas were interpreted qualitatively and quantitatively. The total magnetic intensity and residual intensity field showed range of

magnetic anomalies which revealed that the study area is magnetically heterogeneous. Source parameter imaging, Euler deconvolution, forward and inverse modelling techniques were employed in quantitative interpretation with the aim of determining depth/thickness of the sedimentary basin, magnetic susceptibilities and type of mineralization prevalent in the area. Oasis Montaj and Potent software were employed in the data analysis and interpretation. The magnetic susceptibility values from forward and inverse modelling for profiles 1 - 5 are 0.0400, 0.0003, 0.0002, 0.0001 and 0.0250 km respectively, with respective depths of 4650, 1160, 2420, 980 and 3420m. These susceptibility values indicate the presence of possible minerals like Pyrite and graphite and rock bearing minerals like granite, limestone and marble. The results from SPI estimated depth ranges from 318.7m (shallow magnetic bodies) to 4409.5m (deep lying magnetic bodies). Depths of the magnetic source bodies estimated from Euler deconvolution for the two different structural index (SI = 0.0 and 0.5) ranges from 902.3 m (outcropping magnetic bodies) to 4909.3m (deep lying magnetic bodies). The study area has revealed potentials for mineral deposits which could serve as raw materials for many factories and industries in Nigeria. The sedimentary thickness obtained from the different methods in this work indicates the possibility of hydrocarbon accumulation in the area.

Keywords: *Aeromagnetic Data, Source Parameter Imaging, Euler Deconvolution, Sediment Thickness, Magnetic Anomalies*

PHS_007: Assessment of Natural Radioactivity Levels and Associated Hazard Indices in Surface Rocks around Ikogosi Warm Spring Area of Ekiti State, Southwest Nigeria using Gamma Ray Spectrometry

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Abstract

Water and soil are very crucial to existence of humans because most of our foods comes from them and it is imperative to investigate their radioactivity level. The radioactivity concentrations distribution of Thorium (^{232}Th), Uranium (^{238}U) and Potassium (^{40}K) were studied and recorded using Gamma ray spectrometer in randomly selected surface rocks radiation from 80 rock samples around the Ikogosi warm spring (IKGWS) area to assess the radiological risks and exposure to residents and tourists in the area especially in the usage of the spring water and the surrounding rocks (quarrying) as alternate building materials in the area. The Radium equivalent varied from 23.21-1224.08BqKg^{-1} with mean value of 442.32 BqKg^{-1}. The Absorbed dose rates in air outdoors are measured in the range of 0.64-190.53BqKg^{-1} with an average value indoor of 51.72 BqKg^{-1} and outdoor 871.68BqKg^{-1}. The corresponding effective dose rates indoor ranges from 0.046-0.523 mSvy^{-1} with a mean value of 0.251 mSvy^{-}1 and outdoor varied from 0.011-0.133 mSvy^{-1} with a mean value of 0.064 mSvy^{-1}.The external index value varied from 0.057-0.637 with a mean value of 0.3 while the internal index varied from 0.133-6.23 with a mean value of 2.4 which was higher than unity. The Excess Lifetime cancer risk outdoor varied from 32.53 to 384.68 with an

average of 186.09 while the indoor varied from 0.190 to 6.636 with an average value of 2.718. However, the values of the $AEDE_{out}$ and $AEDE_{in}$ are considerably lesser than the recommended limit of 1 mSv $year^{-1}$. Our findings revealed that, the locations sampled posed a high risk for residents and tourists as natural radioactivity in the area is significant.

Keywords: *Radioactivity concentrations, Gamma ray spectrometer, Dose rates, Water and soils, Radiological risks*

PHS_008: Thermal Characterization of the Pb-Zn Bearing Zone in the Lower Benue Trough of Nigeria through the Curie Point Depth, Geothermal Gradient, and Heat Flow

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Abstract

The Pb-Zn mineralization in the lower Benue Trough (LBT) is triggered by a high geothermal gradient that accompanies the continental rifting process. The Pb-Zn deposits are closely associated with intrusions and its ore formation has been related to regional processes having a temperature range of 90 – 200 ℃. An essential parameter to understand the thermal history of a region is the Curie point depth (CPD). Despite several works within LBT, none, to the best of our knowledge has determined CPD to delineate thermal characteristics of the Pb-Zn bearing regions despite geochemical reports on the thermal attributes of the mineralization zones. In this work, the CPD, geothermal gradient, and heat flow of the LBT were determined. The CPD value within the region with known Pb-Zn mining activities in the LBT indicates the mineral is formed in a low-temperature zone which widens beyond the mining sites. This suggests the possible presence of Pb-Zn within the extension. The zone trends in the NE direction and extends to Abakaliki which is known to be a low-temperature region. The result reveals those mining areas have high geothermal gradients and heat flow.

Keywords: *Curie point depth, geothermal gradient, heat flow, Lower Benue Trough, Pb-Zn*

PHS_009: Application of Sponteneous Potential Method to Delineate Subsurface Salinization Level in Fadama Areas of Kurfi Town, Sokoto State Nigeria

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Abstract
Self-potential survey was carried out using resistivity meter (Ohmega) to map out subsurface salinization levels in Kurfi Fadama, Sokoto State Nigeria. The study area lies between latitudes 13°03′13″N and 13°08′21.47″N and longitudes 5°06′36″ E and 5°17′25.31″E during which Self Potential values were measured. A total of six profiles 200m long were surveyed using Wenner array configuration with minimal electrode spacing of 5m and repeated with integer multiple of 5 that explored up to 30m. Interpretation of the Self Potential data disclosed that the SP anomalies are related to subterraneous fluid flow and therefore the movement of ions that has a great advantage in characterizing sources related with these phenomena of high and low anomalies. Trend orientation of peak abnormal zones occur roughly Northwestern direction on the profiles. The observed positive anomalies probably correspond to areas with higher hydraulic conductivity and with low water retention capacity. The study reveals that the excess utilization of agrochemicals changes the chemical composition of the medium and, therefore, the concentration (or distribution) of ions in the soil.
Keywords: *Self-potential, Subsurface, Salinization, Delineation, 2D model*

PHS_010: An Evaluation of Nuclear Energy's Potential Role in Nigeria's Electricity Production

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Abstract
Nigeria's progress has been hindered by the nation's epileptic electricity supply, which is an issue. In accordance with the foregoing, there is a need to assess Nuclear Energy's Potential Role in Nigeria's Electricity Production. The IAEA's instruments for energy system planning and nuclear energy system assessments, MAED (Demand) and MESSAGE (Supply), were applied in three economic growth scenarios, and some projections were made. Total energy demand in 2005 was 5, 746 MW, and it was projected to grow to 119,200 MW, 192, 000 MW, and 297,900 MW by 2030, with average growth rates of 7%, 10%, and 13% for the reference, high growth, and optimistic scenarios, respectively. By the year 2030, the 397.59 kWh total per capita energy demand was expected to increase to 2,222.35 kWh, 4,263.64 kWh, and 6,474.24 kWh,

respectively, for the three scenarios. To fulfill demand in all scenarios, the supply model projected the creation of 125,390 MWe, 205,468 MWe, and 321,958 MWe between 2005 and 2030 for the Reference, High Growth, and Optimistic Scenarios, respectively. Nuclear power is expected to supply an average of 22,545 MWe by 2030, accounting for nearly 10% of total output. This would go beyond Nigeria's anticipated 4,000MW of nuclear power.

Keywords: *Nuclear Energy, Energy Demand, Energy Supply, Economic Growth*

PHS_011: Efficient multicolor emission from Eu^{3+}/Dy^{3+} co-doped doro-telluro-borate (DTB) glasses for Lasers and W-LEDs application

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Abstract

Herein, multicolor emission has been achieved in doro-telluro-borate (DTB) glasses by tailoring Eu^{3+}/Dy^{3+} ratio. These glasses were produced by adopting melt quenching approach and optically explored through absorption, excitation, emission, CIE1931 diagram and fluorescence decay profiles, respectively. The calculated Judd-Ofelt intensity parameters obeying $\Omega_2 > \Omega_4 > \Omega_6$ order alongside enhanced radiative entities designates the lasing potency of the as-quench glasses. Furthermore, the empirical spectral overlap and decay in the fluorescence lifetime of Eu^{3+} with increasing content of Dy^{3+} affirmed bi-directional ($Eu^{3+} \leftrightarrow Dy^{3+}$) energy transfer process in DTB glasses. Additionally, the emission tonality, estimated from the CIE1931 chromaticity coordinates and correlated color temperature (*CCT*) can be tuned from the reddish-orange zone to cold white light region with effective quantum efficiency up to 65.10% and color purity of 24.94%, depending on Eu^{3+}/Dy^{3+} proportion. Conclusively, the attained results declared the candidateship of DTB glasses for the development of low-cost solid state lasers and white LEDs.

Keywords: *DTB glasses; Multicolor emission; Eu^{3+}/Dy^{3+} ratio; White light emitting diodes.*

PHS_012: Structural, Electronic and Optical Properties of Double Perovskite Halide $Cs_2In_{-x}SbCl_6$

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Abstract

Efforts to replace the lead-based perovskite have gain significant improvements in the last decade. Lead free double halide perovskite are being considered to replace the toxic lead-based perovskite materials for solar cell applications. Density functional theory (DFT) and linear response time-dependent density functional theory (TDDFT) were used in this study to simulate and investigate the effect of vacancy in the Indium (In) site of lead-free double halide perovskite $A_2BB'X_6$ (A = Cs; B = In, B′ = Sb; X = Cl) on the structural, electronic, and optical properties for possible solar

cell application. On the structural properties, the total bond length of the material $Cs_2InSbCl_6$ was found to be 30.3848 Å and the creation of the indium vacancy raises the value to 30.594 Å. The bulk modulus of $Cs_2InSbCl_6$ was calculated to be 28.44 Gpa and 26.22 Gpa for $Cs_2In_{-x}SbCl_6$. The calculated band structure for $Cs_2InSbCl_6$ reveals semiconducting behavior with a direct energy band gap of 0.99 eV along Γ point symmetry while the created indium vacancy band structure reveals metallic behavior with an overlap of electronic states along the Γ - W – Γ symmetry. The result of the optical properties calculations shows that the material $Cs_2InSbCl_6$ has higher absorption coefficient, low refractive index, low reflectivity and higher conductivity when compared to the created indium vacancy material.

Keywords: *Perovskite, Defect, Solar cells*

PHS_013: Design and Implementation of Light Fidelity Based Home Automation System

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Abstract

Wireless communication technologies such as RF, IR, Bluetooth, GSM, Zigbee and Wi-Fi are widely used in order to interact with the hardware components of any home automation system. The appropriate wireless technology is subject to many factors such as flexibility, efficiency, accuracy, latency/speed, and security, but excessive exploitation of the present technologies has led to the shortage of bandwidth. Light Fidelity (Li-Fi) technology is a high speed and fully networked wireless communication technology similar to Wi-Fi, which makes it a suitable alternative to conventional method of wireless signal transmission for controlling household appliances. In this work, a simple prototype of a novel light fidelity (Li-Fi) based remote control transmitter and receiver that can be used locally to remotely control household appliances via visible light signal from white LED bulb was designed and implemented. The system was made using readily available materials and the transmitter and receiver can communicate up to a maximum distance of 41cm.

Keywords: *Light Fidelity (Li-Fi), Light Emitting Diode (LED), Arduino Platform, Automation, Home Appliances.*

PHS_014: Elastic Properties of Zinc Tellurite Glass System Doped with Samarium Nanoparticles

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Abstract

Modifying the elastic properties of rare-earth-doped inorganic glasses for a variety of purposes is a major challenge in materials research and technology. The work reports an improvement in the visible emissions of zinc-tellurite glasses doped with Sm^{3+} NPs ions. Analysis is done on how different Sm^{3+} NPs ion concentrations affect the elastic properties of such glasses. By using the melt quenching approach, zinc tellurite glasses $[(TeO_2)_{0.7}\ (ZnO)_{0.3}]_{1-x}\ [Sm_2O_3NPs]_x$, with molar fractions x = 0.01, 0.02, 0.03, 0.04 and 0.05, are created. The materials' structural properties were examined using a densimeter, a Fourier transform infrared (FTIR) and an X-ray diffraction (XRD) device. The functional vibration of the tellurite network was found by analysis of FTIR spectra. Through the use of high-resolution transmission electron microscopy, the presence of Sm_2O_3 NPs was confirmed. The samples shear and longitudinal velocities were measured under room temperature at 5 *MHz* of frequency. Elastic moduli, Debye temperature (θ_D) and Softening temperature (T_S) were calculated to reveal the quantitative analysis with respect to the structure of the synthesized glasses. The obtained results revealed the adverse effect of samarium nanoparticles on the host materials by enhancing the properties and strengthening the synthesized glass network.
Keywords: *Tellurite glasses, Ultrasonic velocities, Elastic moduli, Debye temperature, Softening temperature.*

PHS_015: Optimization of ETM and Absorber Layers' thickness in an inorganic lead free $RbGeI_3$ based perovskite solar cells by device simulation

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Abstract

The presence of toxic lead in perovskite solar cells has hindered its commercial viability. In this present work, a mesoscopic inorganic lead free perovskite solar cells based on $RbGeI_3$ was proposed and implemented using SCAPs simulation tool. The effect of electron transport material (ETM) and Absorber thickness were analyzed. Upon the initial simulation of the device, its Power conversion efficiency (PCE), fill factor (FF), current density (J_{sc}), open circuit voltage (V_{oc}) attained values of 3.584%, fill factor attained a value of 48.477%, J_{sc} reached 25.385 mA/cm^2 and V_{oc} attained 0.291 V value. The PCE growth tends to be stable with the optimum thicknesses of the ETM and absorber at 0.08 μm and 0.40 μm. The optimized PSC device using the

aforementioned parameters gave a PCE of 3.601%, J_{sc} of 25.386 mA/cm^2, V_{oc} of 0.291 V, and FF of 48.637%. This shows an improvement of ~ 1.01 times in PCE over the initial device without optimization. The results show that the $RbGeI_3$-based HTM-free PSCs can absorb the light intensity of the incident photons and convert it to electricity and can pave the path for developing cost effective and eco-friendly device.

Keywords: *perovskite solar cells, $RbGeI_3$, SCAPS, layer thickness*

PHS_016: Ab-Initio Prediction of Stable Boron Doping Lattice Site in 3C-SiC Crystal Structure

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Abstract

3C-SiC has been given more priority among the silicon carbide in most recent research of semiconductor materials due to its peculiar advantage over the other polytopes, such as high electron mobility, electron saturation, and drift velocity which is ideal for improving the efficiency of power electronic devices integrated circuits. The introduction of point defects into semiconductor material enables the control of the concentration of charge carriers and thereby influencing the electrical properties of the microelectronic devices. In this study, we investigated the favorable doping lattice site of boron impurity in the 3C-SiC crystal structure using equilibrium lattice parameters of the pure 3C-SiC obtained from Quantum Espresso's self-consistent field (SCF) calculation with the optimized fitted result. We observed that B substituted favorably in Si lattice site, showing reasonable agreement as suggested by other theoretical and experimental reports, whereas observed B Substituting C lattice site with higher formation energy.

Key words: 3C-SiC, Point defect, DFT Method, and Quantum Espresso.

PHS_017: Stabilization of Monovalent and Mixed Valent Cations in Sn*n*Om Clusters and Predictive Applications – First Principles Calculations

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Abstract

In this work, the stoichiometric dependent structural stability and electronic properties of Tin oxide nanoclusters (Sn_nO_m, n = 1 - 6; m = 1 - 2n) is explored by employing first principles density functional calculations. The results show that stable Sn_nO_n ($m = n$) clusters found to have large binding energy, in given n series, due to having high structural symmetry, large energy gap between highest occupied molecular orbital and lowest unoccupied molecular orbital (HOMO-

LUMO gap), and univalent charge distributions among Sn and oxygen atoms. On the other hand, stable Sn_nO_{2n} clusters have possessed with mixed charge states of Sn ions. The presence of both Sn^{2+} and Sn^{4+} ions in these clusters originates weakly adsorbed O_2 molecule on these clusters, which is quite consistent with earlier experimental work. Interestingly, the structure of some of large sized stable clusters is observed to be resemblance with fused form of two stable isomers. By calculating chemical hardness of Sn_nO_m clusters, we also show that Sn_nO_n clusters are chemically inert and they can be used for optoelectronic devices owing to presence of lone pair Sn^{2+} ions. Whereas, in Sn_nO_m clusters ($m > n$), both Sn^{2+} and Sn^{4+} ions are presented, thus, they can be used for catalytic or sensing applications.

Keywords: *Nanoclusters; DFT methods; HOMO-LUMO; Optoelectronic; Catalytic*

PHS_018: Performance Evaluation of a New Temperature Base Models For Estimating Global Solar Radiation in Sokoto Metropolis

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Abstract

Information on the availability of solar radiation at a location is an important factor in selecting suitable solar energy system and devices for various applications. Maximum and minimum temperature data measured in Sokoto Metropolis, Sokoto state, for a period of eleven years (2005 –2015), were used to establish Angstrom-type regression equations (models) for estimating the global solar radiation received on a horizontal surface in Sokoto. The results of the correlation were also tested for error using statistical test methods of the Mean Bias Error (MBE), root mean square error (RMSE), and mean percentage error (MPE). The values of the correlation coefficient (R) and the coefficient of determination (R^2) were also determined for the models to assess the performance of the model. It was observed that temperature data could be used to estimate, (to a very reasonable accuracy); the total solar radiation incident on a location.

Keywords: *Solar radiation, Temperature, Energy, Angstrom-type regression*

PHS_019: The Ahmadu Bello University's High Voltage Materials Laboratory

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Abstract

The idea behind the establishment of the High Voltage (HV) Laboratory is to revive the high voltage research activities of the university that supported the study of high voltage insulation performance in Nigeria up till the early 80s. The HV lab has the capacity for research and testing of high voltage equipment components and materials to support the teaching and training in dielectric physics, electrical insulation, and high voltage engineering at Ahmadu Bello University. The materials science laboratories that house the high-voltage lab in the department of physics are equipped with high-voltage AC and DC sources. There are sample preparation and other

measuring equipment that support the experimental activities of the lab. This paper presents the current facilities and research activities in the lab. The outcome of the research on a sustainable alternative insulating fluid from non-food grade seed oil is impressive. The research work on the assessment of the health status of in-service transformers through their insulating fluid is progressing. The Lab is broadening its capabilities towards providing support services to address some of the country's high voltage related challenges.

PHS_020: Determination of The Presence of Gamma Rays Using Gammapix In Some Locations In Abuja And Kaduna.

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Abstract
Living in a radiation-free environment is a task scientist are bent on undertaking with all available resources within reach. A lot has been said about the effects of radiation on our bodies and our environment, thus, the need to stay free from radiation becomes imperative. This was the motivation that gave life to the determination of the presence of Gamma radiation in some selected locations in Abuja, the Federal Capital Territory and in Kaduna, Kaduna state both in Nigeria by using a smartphone application known as GammaPix. We conducted and obtained results by taking repeated measurements in the following locations: 8 Cosmos Avenue, FCT, 99 Sa'adu Zungur Avenue, FCT, Plot 292 Ada C. Okwuosa Street, district, FCT, Murtala Mohammed Expressway, Abuja, FCT, 5 Kokoma Close, Abuja, FCT, 40 Suez Crescent, Abuja, FCT, Tafawa Balewa Way, Abuja, FCT, 1 Ahmadu Bello Way, Kaduna, Kaduna, Nidan Avenue, Kaduna, Kaduna. We used two Gamma Pix active two smartphones in taking the measurements. Both smartphones are made by Tecno. They are Tecno Camon 16S and Tecno Spark 4 with the following configurations respectively: 8MP front camera with dual flash, 48MP Quad rear camera with Quad flash, and 13 MP triple rear camera with dual flash 8MP front camera with flash. We took 5 measurements per smartphone in each of the nine locations in Abuja. The same number of measurements were carried out in Kaduna locations as well. In all, a total number of 180 measurements were made in both Abuja and Kaduna locations using Camon 16S and Spark 4. The results were displayed in two formats by GammaPix mobile app. The first results were written in the English language which states whether or not the location is free of Gamma rays. And the second results were in linear plots indicating with colors if a location is free of Gamma rays or not. In all (both in Abuja and Kaduna), there was no Gamma-ray detected or recorded by GammaPix.
Keywords: *GammaPix, Gamma-ray, Smartphone, Detection.*

BCH_049: Physicochemical and Heavy Metals Evaluation Of *Indigofera conferta* (Fabaceae)

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ABSTRACT
Indigofera conferta is a plant that belongs to the family Fabaceae. It is commonly found growing on red soil and it is an annual herb with sticky leaves, branches and flowers, 1 to 2 feet high. Physicochemical evaluation and elemental analysis was carried out using the powdered material

of the plant. The physiochemical evaluation indicated that the plant has low moisture content of 6%, low ash values of 5%, low acid insoluble ash values of 2.3%, low water soluble ash of 1.3% and moderate alcohol extractive values of 28.3%. The results of heavy metals indicated the presence of copper, zinc, iron, nickel, manganese very low concentration of lead and absence of chromium in the powdered material of the plant species. The concentrations of these heavy metals are in order of world health organization limit.

Keywords: *Indigofera conferta, Physicochemical, Heavy metals*

MST_025: A Generalization of New Exponential-Gamma Distribution with Applications

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ABSTRACT

In this paper, a new life time distribution called Generalized New Exponential-Gamma Distribution (GNE-GD), which includes the Exponential, Weibull, Lindley, Power Lindley and New Exponential-Gamma distributions as special cases was derived and studied. The graphical nature and behavior of the distribution was discussed. Some properties of this new distribution were obtained. The hazard rate and mean residual life functions were equally determined. The expressions for the coefficient of variation, skewness, kurtosis, and index of dispersion of the distribution were also discussed. The Parameters of the distribution were estimated using the maximum likelihood method. Its goodness-of-fit was examined on real-life data sets. The performance of this new Distribution was compared with some related existing distributions. The results showed That the GNE-G distribution was relatively more efficient than the distributions considered. The distribution is there for commended as credible alternative for modelling real life data.

Keywords*: New Exponential-Gamma, Hazard rate, Mean residual life, Goodness-of-fit*