SUBJECT INDEX

BASIC RESEARCH - THE BASIS FOR NEW TECHNOLOGIES AND THE WELFARE OF SOCIETY

The Great Challenge, 1; Science – Based Technology as Foundation of Welfare, 1; The General Merit of Curiosity-Driven (Fundamental) Science, 3; Some Aspects Concerning Developing Countries, 6; Education and Training, 7; Cooperation at Large Facilities, CERN and SESAME, 8.

BASIC RESEARCH AND LARGE-SCALE PRODUCTION OF RADIO-PHARMACEUTICALS

The Economic Returns to Basic Research: An Intuitive Approach, Overview, Toole, (2000), Science and the Economy: Scoping the Benefits, **122**; Pharmaceutical Industry, **123**; Radiopharmaceuticals, **124**; Large-Scale Production of Radiopharmaceuticals and Distribution Considerations: Pattern of Demand, Requirements of Purity, Stability and Shelf-Life of Radiopharmaceuticals, Special Requirements of Quality-Control, Cost of Production, Radiation Protection, Research and Development, **127**; Current Activities of Isotope-Production Division: Goals, Research and Development Programme, **130**; Economic Scale of Utilization of Radiation in Medicine: Comparison Between Japan And USA: Radiation Imaging, **130**; Conclusion, **132**; References, **132**.

BRIDGING THE GAP BETWEEN BASIC SCIENCES AND INDUSTRIAL APPLICATIONS; HUMAN RESOURCE DEVELOPMENT AT PAEC

Introduction, **63**; Basic Idea, **65**; Lessons Learned, **66**; Adaptation / Transformation: *Appraisal of Constraints on Science in the South*, **66**; Prerequisites, **66**; Knowledge: *Knowledge Development, Knowledge Management*, **68**; facilitators and Difficulties, **68**; Strategies, **69**; Social Contract For Science, **70**; Case History: The Pakistan Atomic Energy Commission (PAEC): *Infrastructure Development, Human Resource Development*, **71**; Conclusions, **73**; References, **73**.

¹³C UREA BREATH TEST RESEARCH AND FACILITY ESTABLISHED AT PAEC: CHALLENGES AND OPPORTUNITIES

Introduction, **149**; Diagnostic Methods for H. Pylori Infection: *Urea Breath-Test*, **151**; Research Done at PINSTECH, **153**; Introduction to Facility Established by PAEC, **154**; Opportunities/Advantages of ¹³C Urea Breath-Test, **155**; Some Other Breath-Tests, **156**; Challenges/Constraints, **157**; Conclusions, **158**; References, **158**.

COLLABORATION BETWEEN UNIVERSITY AND INDUSTRY FOR BASIC AND APPLIED RESEARCH

Introduction, **75**; Strategies: Build Greater Public Understanding and Awareness, Vision and Commitment, Capture Emerging Trends, Work-Experience as Essential Part of Curriculum, Appropriate Mechanisms and Activities for "University-Industry-Government" Linkage for Development, Balanced Weightage to Basic and Applied Research, Improve the Flow of Communication and Information-Technology, Provide and Enhance Incentives and Support for Cooperation, Internship of Faculty and Post-Doctoral Fellows, Provide a Proper Coordinating Center for the "University-Industry -Government" Linkage, 77.

COMMERCIALIZATION OF TECHNOLOGIES: TECHNOLOGY BUSINESS INCUBATOR (TBI)

Introduction, **79**; Requirement of Business-Incubators in Pakistan, **80**; Stake Holders/ Promoters of Business-Incubators, **80**; Feasibility Report of Business-Incubator, **81**; Incubator Sponsorship & Financing, **81**; Program For Development of Entrepreneurship, **81**; Industrial/Business Training of Students, As Internees During College/University Courses, **82**; Assessment of the Operational Efficiency of the Business-Incubators, **82**; Risk-Factors to be Considered Before Starting a Business-Incubator, **82**; Model Incubator in the UK, **83**; Sources Of Grants From International Organizations, **83**; Plans in Pakistan: *Sialkot, Gujrat, Gujranwala, Peshawar, Lahore, Lahore, Karachi, Karachi, Faisalabad*, **85**.

GOVERNMENT-UNIVERSITY-INDUSTRY RESEARCH ROUNDTABLE: CULTIVATION OF A COOPERATIVE RESEARCH ALLIANCE FOR MITIGATION OF ENVIRONMENTAL PROBLEMS

Introduction, **58**; Benefits of University-Industry Research Cooperation, **59**; Problems Arising from University-Industry Linkage: *Loss of Academic Freedom*, **60**; Conclusions, **61**.

IMPERATIVES OF INDUSTRIAL RESEARCH

Introduction, **87**; Significance of Basic and Applied Research, **89**; Relationships Between Industry and University, Current Status and Need for Industrial Research in Pakistan, **90**; Innovation & Productivity, **93**; Cooperation, **93**; Government–University-Industry Research Roundtable Conference (GUIRRC), **94**; Benchmarking Study in Cotton Spinning in Pakistan, **95**; Performance of the Manufacturing Sector in Pakistan (1990-91 to 1995-96), **96**; Summary & Conclusion, **97**; References, **97**.

INITIATIVES OF PCSIR LABORATORIES PESHAWAR FOR TECHNOLOGY-TRANSFER THROUGH TECHNOLOGY BUSINESS INCUBATORS

Introduction, **100**; Risk Factors for the Existing as well as New Small & Medium Enterprises, **100**; Establishing Technology-Business Incubators for Rapid Industrialization, **101**; Initiatives of PCSIR Laboratories for Establishing TBIS, **101**; **A** Successful Case-Study: *Background, Objective of the Skardu Business Incubator, Cost of Business Incubators, Available Facilities in the Business Incubator, Strategy, Achievements*, **103**; Conclusion, **103**; References, **104**.

INVESTIGATION OF AIR GASIFICATION PROCESS WITH A BUBBLING FLUIDISED BED GASIFIER FOR ELECTRICITY GENERATION

Introduction, 141; Development of Air Gasification Process With Bubbling Fluidised

Bed Gasifier, 142; References, 147; Acknowledgment, 147.

R&D AND PRODUCTION OF NUCLEAR INSTRUMENTS IN PINSTECH AND THEIR APPLICATIONS

Introduction, **135**; New Trends of Electronic Instruments, **136**; R&D on Electronic Instruments at PINSTECH: *Electronic Instruments Developed By PINSTECH, Repair and Maintenance Facility Of Nuclear and Scientific Instruments*, **139**; References, **140**.

SCIENTIFIC AND TECHNOLOGICAL RESEARCH: AN IMPERATIVE FOR DEVELOPMENT

Introduction, **19**; Science and Technology, **20**; Science and Technology: Dissimilarities, **20**; Science and Technology: Similarities, **23**; Scientific Research: Basic Research, Importance of Basic Research, The Unpredictable Nature of Basic Research, Applied Research, Importance of Applied Research, Mission Oriented Research, Problem Oriented Research, Industrial Research, **41**; Conclusions and Recommendations, **42**; References, **46**.

SPECTROSCOPIC OPTIMIZATION OF DISCHARGE-PARAMETERS FOR SURFACE IONITRIDING OF STAINLESS STEEL 304

Introduction, **105**; Experimental Setup, **106**; Optical-Emission Spectroscopy, **108**; Results and Discussions: *Effect of H*₂ *Percentage in the Mixture, Effect of Electrical Power, Effect of Filling Pressure, Comparison Between the* N_2^+ *and* N_2 *Species, Ionitriding of SS 304 Samples Under Optimum Discharge Conditions*, **116**; Conclusions, **117**; Acknowledgments, **117**; References, **117**.

THE ROLE OF UNIVERSITY – INDUSTRY PARTNERSHIP ON ENHANCING BASIC RESEARCH AND INDUSTRIAL APPLICATIONS IN PAKISTAN

Introduction, **47**; The Socio-Economic Dynamics Of University-Industry Partnership, **48**; The Need and Reasons for Cooperation, **50**; The Prerequisites for Effective Interaction,**51**; Co-Relation of Basic Research with Industrial Application, **52**; A Case Study of Academia – Industry Linkage, **52**; Some Practical Recommendations, **53**; References, **54**.

WHY BASIC SCIENCES ARE NECESSARY FOR TECHNOLOGY AND INDUSTRY

History: Greek Theoretical Tradition, The golden age of science in Islam, So-called Dark ages between 12th and 17th century, 13; The Scientific Process, 13; Technology, 14; What Drives Basic Science Research: Basic Sciences are Essential for the following reasons, Basic Sciences form the Backbone of Technological and Economic Development, 15; What Drives Technology, 16.