

Maulana Abul Kalam Azad University of Technology, West Bengal
(Formerly West Bengal University of Technology)
Syllabus of B. Tech. in Computer Science and Business Systems
(Applicable from the Academic Session 2020-2021)

Semester-VIII

Name of the Course:	CRYPTOLOGY	
Course Code: PEC-CSBS801A	Semester: VIII	
Duration:6 months	Maximum Marks:100	
Teaching Scheme		Examination Scheme
Theory:3 hrs./week		Mid Semester exam: 15
Tutorial: NIL		Assignment and Quiz: 10 marks
		Attendance: 5 marks
Practical: NIL		End Semester Exam:70 Marks
Credit Points:	3	

UNIT I

INTRODUCTION

Security trends – Legal, Ethical and Professional Aspects of Security, Need for Security at Multiple levels, Security Policies – Model of network security – Security attacks, services and mechanisms – OSI security architecture – Classical encryption techniques: substitution techniques, transposition techniques, steganography- Foundations of modern cryptography: perfect security – information theory – product cryptosystem – cryptanalysis.

UNIT II

SYMMETRIC KEY CRYPTOGRAPHY

MATHEMATICS OF SYMMETRIC KEY CRYPTOGRAPHY: Algebraic structures – Modular arithmetic-Euclid’s algorithm- Congruence and matrices -Groups, Rings, Fields- Finite fields- SYMMETRIC KEY CIPHERS: SDES – Block cipher Principles of DES – Strength of DES – Differential and linear cryptanalysis – Block cipher design principles – Block cipher mode of operation – Evaluation criteria for AES – Advanced Encryption Standard – RC4 – Key distribution.

UNIT III

PUBLIC KEY CRYPTOGRAPHY

MATHEMATICS OF ASYMMETRIC KEY CRYPTOGRAPHY: Primes – Primality Testing –Factorization – Euler’s totient function, Fermat’s and Euler’s Theorem – Chinese Remainder Theorem – Exponentiation and logarithm – ASYMMETRIC KEY CIPHERS: RSA cryptosystem – Key distribution – Key management – Diffie Hellman key exchange -ElGamal cryptosystem – Elliptic curve arithmetic-Elliptic curve cryptography.

UNIT IV

MESSAGE AUTHENTICATION AND INTEGRITY

Authentication requirement – Authentication function – MAC – Hash function – Security of hash function and MAC – SHA –Digital signature

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and authentication protocols – DSS- Entity Authentication: Biometrics, Passwords, Challenge Response protocols- Authentication applications – Kerberos, X.509

UNIT V

SECURITY PRACTICE AND SYSTEM SECURITY

Electronic Mail security – PGP, S/MIME – IP security – Web Security –
SYSTEM SECURITY: Intruders – Malicious software – viruses – Firewalls.

Name of the Course:	Quantum Computing	
Course Code: PEC-CSBS801B	Semester: VIII	
Duration: 6 months	Maximum Marks:100	
Teaching Scheme		Examination Scheme
Theory:3 hrs./week		Mid Semester exam: 15
Tutorial: NIL		Assignment and Quiz: 10 marks
		Attendance : 5 marks
Practical: NIL		End Semester Exam :70 Marks
Credit Points:	3	
Objective:		
1	The course will provide an insight of basic of quantum physics from a computer scientist's perspective, and how it describes reality and understand the philosophical implications of quantum computing	
Pre-Requisite:		
1	Linear Algebra, Theory of Computation	

Unit	Content	Hrs/Unit	Marks/Unit
1	Qubit & Quantum States: The Qubit, Vector Spaces. Linear Combination Of Vectors, Uniqueness of a spanning set, basis & dimensions, inner Products, orthonormality, gram-schmidt orthogonalization, bra-ket formalism, the Cauchy-Schwarz and triangle Inequalities.	3	
2	Matrices & Operators: Observables, The Pauli Operators, Outer Products, The Closure Relation, Representation of operators using matrices, outer products & matrix representation, matrix representation of operators in two dimensional spaces, Pauli Matrix, Hermitian unitary and normal operator, Eigen values & Eigen Vectors, Spectral Decomposition, Trace of an operator, important properties of Trace, Expectation Value of Operator, Projection Operator, Positive Operators,	10	
3.	Commutator Algebra, Heisenberg uncertainty principle, polar decomposition & singular values, Postulates of Quantum	5	

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	Mechanics.		
4.	Tensor Products: Representing Composite States in Quantum Mechanics, Computing inner products, Tensor products of column vectors, operators and tensor products of Matrices. Density Operator: Density Operator of Pure & Mix state, Key Properties, Characterizing Mixed State, Practical Trace & Reduce Density Operator, Density Operator & Bloch Vector.	5	
5.	Quantum Measurement Theory: Distinguishing Quantum states & Measures, Projective Measurements, Measurement on Composite systems, Generalized Measurements, Positive Operator- Valued Measures.	8	
6.	Recent trends in Quantum Computing Research, Quantum Computing Applications of Genetic Programming.	6	

Text book and Reference books:

1. Quantum Computing without Magic by Zdzislaw Meglicki
2. Quantum Computing Explained By DAVID Mc MAHON
3. Quantum Computer Science By Marco Lanzagorta, Jeffrey Uhlmann
4. An Introduction to Quantum Computing Phillip Kaye, Raymond Laflamme, Michele Mosca.

Course Outcomes:

On completion of the course students will be able to
 knowledge of Vector spaces, Matrices, Quantum state, Density operator and
 Quantum

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Services Science & Service Ops Management(HSMCCSBS801)

Course Pre Requisite(s):

Fundamentals of Management, Operations Research

Course Outcome(s):

Students will be able to

- Understand concepts about Services and distinguish it from Goods
- Able to identify characteristics and nature of Services
- Comprehend ways to design Services and evaluate them using Service qualities
- Understand how various methods can be used to operate and manage Service businesses
- Understand how innovation can be approached from Services point of view

Topics to Be Covered:

UNIT – I

Introduction: Introduction to the course, Introduction to service operations, Role of service in economy and society, Introduction to Indian service sector

Nature of Services and Service Encounters: Differences between services and operations, Service package, characteristics, various frameworks to design service operation system, Kind of service encounter, importance of encounters

Service-Dominant Logic: From Goods-Dominant logic to Service-Dominant logic, Value Co-creation

UNIT – II

Service Strategy and Competitiveness: Development of Strategic Service Vision (SSV), Data Envelopment Analysis

New Service Development: NSD cycle, Service Blueprinting, Elements of service delivery system

Service Design: Customer Journey and Service Design, Design Thinking methods to aid Service Design

Locating facilities and designing their layout: models of facility locations (Huff's retail model), Role of service-scape in layout design

Service Quality: SERVQUAL, Walk through Audit, Dimensions of Service quality & other quality tools

UNIT – III

Service Guarantee & Service Recovery: How to provide Service guarantee? How to recover from Service failure?

UNIT – IV

Forecasting Demand for Services: A review of different types of forecasting methods for demand forecasting.

Managing Capacity and Demand: Strategies for matching capacity and demand, Psychology of waiting, Application of various tools used in managing waiting line in services.

Managing Facilitating Goods: Review of inventory models, Role of inventory in services

Managing service supply relationship: Understanding the supply chain/hub of service, Strategies for managing suppliers of service

Vehicle Routing Problem: Managing after sales service, Understanding services that involve transportation of people and vehicle, Techniques for optimizing vehicle routes

UNIT – V

Service Innovation: Services Productivity, Need for Services Innovation

Student Project:

Option 1: Choose any service organization around and present it from the perspective of: nature of service, classification of service, blueprint or service design analysis, service quality, and any additional perspective you would like to add.

Option 2: Choose any latest research paper in services and explain your understanding and feedback on the same.

Text Books:

1. Fitzsimmons & Fitzsimmons, Service Management: Operations, Strategy, Information Technology, McGraw Hill publications (7th edition)

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Reference Books:

1. Wilson, A., Zeithaml, V. A., Bitner, M. J., & Gremler, D. D. (2012). *Services marketing: Integrating customer focus across the firm*. McGraw Hill.
2. Lovelock, C. (2011). *Services Marketing, 7/e*. Pearson Education India
3. Reason, Ben, and Lovlie, Lavrans, (2016) *Service Design for Business: A Practical Guide to Optimizing the Customer Experience*, Pan Macmillan India,
4. Chesbrough, H. (2010). *Open services innovation: Rethinking your business to grow and compete in a new era*. John Wiley & Sons.

Reference Papers:

1. Karmarkar, U. (2004). Will you survive the services revolution? *Harvard Business Review*, 100-107.
2. Vargo, S. L., & Lusch, R. F. (2008). From goods to service (s): Divergences and convergences of logics. *Industrial marketing management*, 37(3), 254-259.
3. Vargo, S. L., & Lusch, R. F. (2008). "Service-Dominant Logic: Continuing the Evolution," *Journal of the Academy of Marketing Science* (36:1), pp. 1-10
4. Silvestro, R., Fitzgerald, L., Johnston, R., & Voss, C. (1992). Towards a classification of service processes. *International journal of service industry management*, 3(3), 62-75.
5. Vargo, S. L., Maglio, P. P., & Akaka, M. A. (2008). On value and value co-creation: A service systems and service logic perspective. *European management journal*, 26(3), 145-152.
6. Shostack, G.L., (1984), "Designing Services That Deliver," *Harvard Business Review*, January-February 1984, pp. 132-139
7. Evenson, S., & Dubberly, H. (2010). Designing for service: Creating an experience advantage. *Introduction to service engineering*, 403-413.
8. Edvardsson, B., & Olsson, J. (1996). Key concepts for new service development. *Service Industries Journal*, 16(2), 140-164.
9. Goldstein, S. M., Johnston, R., Duffy, J., & Rao, J. (2002). The service concept: the missing link in service design research? *Journal of Operations management*, 20(2), 121-134.
10. Kumar, A., Zope, N. R., & Lokku, D. S. (2014, April). An approach for services design by understanding value requirements, identifying value carriers, developing value proposition, and subsequently realizing value. In *Global Conference (SRII), 2014 Annual SRII* (pp. 298-304). IEEE.
11. Parasuraman, A., Zeithaml, V.A., and Berry, L.L., (1985), "A Conceptual Model of Service Quality and Its Implications for Future Research," *The Journal of marketing*, Vol. 49, No. 4, pp. 41-50
12. Cronin, J.J., and Taylor, S.A., (1992), "Measuring Service Quality: A Reexamination and Extension," *The Journal of Marketing*, Vol. 56, No. 3, pp. 55-68
13. Van Ree, H. J., (2009), *Service Quality Indicators for Business Support Services*, Ph.D. Thesis, University College London, London.
14. Zope, N. R., Anand, K., & Lokku, D. S. (2014, April). Reviewing Service Quality for IT Services Offerings: Observations in the Light of Service Quality Models & Determinants. In *Global Conference (SRII), 2014 Annual SRII* (pp. 43-49). IEEE.
15. Heskett, J.L., Jones, T.O., Loveman, G.W., Sasser, W.E., and Schlesinger, L.A., (2008), "Putting the Service-Profit Chain to Work," *Best of HBR, Harvard Business Review*, July-August 2008, pp. 118-128
16. Clatworthy, S. (2011). Service innovation through touch-points: Development of an innovation toolkit for the first stages of new service development. *International Journal of Design*, 5(2).
17. Barras, R. (1986). "Towards a Theory of Innovation in Services," *Research Policy* (15), pp. 161-173.
18. Gustafsson, A., and Johnson, M. (2003). *Competing in a Service Economy: How to Create a Competitive Advantage Through Service Development and Innovation*, San Francisco: Jossey-Bass.
19. Barrett, M., Davidson, E., Prabhu, J., & Vargo, S. L. (2015). "Service innovation in the digital age: key contributions and future directions". *Mis Quarterly*, 39(1), 135-154.
20. Lusch, R. F., and Nambisan, S. (2015). "Service Innovation; A Service-Dominant Logic Perspective," *MIS Quarterly* (39:1), pp.155-175

RESEARCH METHODOLOGIES(PROJCSBS801)

Pre-requisites: NA

COURSE OBJECTIVE(S)

- To understand some basic concepts of research and its methodologies
- To identify appropriate research topics
- To select and define appropriate research problem and parameters
- To prepare a project proposal (to undertake a project)
- To organize and conduct research (advanced project) in a more appropriate manner
- To write a research report and thesis
- To write a research proposal (grants)

Unit 1: (9 hrs)

RESEARCH FORMULATION AND DESIGN

Motivation and objectives – Research methods vs. Methodology. Types of research – Descriptive vs. Analytical, Applied vs. Fundamental, Quantitative vs. Qualitative, Conceptual vs. Empirical, concept of applied and basic research process, criteria of good research. Defining and formulating the research problem, selecting the problem, necessity of defining the problem, importance of literature review in defining a problem, literature review - primary and secondary sources, reviews, monograph, patents, research databases, web as a source, searching the web, critical literature review, identifying gap areas from literature and research database, development of working hypothesis.

Unit 2: (9 hrs)

DATA COLLECTION AND ANALYSIS

Accepts of method validation, observation and collection of data, methods of data collection, sampling methods, data processing and analysis strategies and tools, data analysis, with statically package (Sigma STAT, SPSS for student t-test, ANOVA, etc.), hypothesis testing.

Unit 3: (9 hrs)

RESEARCH ETHICS, IPR AND SCHOLARY PUBLISHING

Ethics - ethical issues, ethical committees (human & animal); IPR - intellectual property rights and patent law, commercialization, copyright, royalty, trade related aspects of intellectual property rights (TRIPS); scholarly publishing - IMRAD concept and design of research paper, citation and acknowledgement, plagiarism, reproducibility and accountability.

Unit 4: (9 hrs)

INTERPRETATION AND REPORT WRITING

Meaning of Interpretation, Technique of Interpretation, Precaution in Interpretation, Significance of Report Writing, Different Steps in Writing Project Report, Layout of the Project/Research Report, Types of Reports, Oral Presentation, Mechanics of Writing a Project/Research Report, Precautions for Writing Research Reports, Conclusions.

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RESOURCES:

Text books:

1. Garg, B.L., Karadia, R., Agarwal, F. and Agarwal, U.K., 2002. An introduction to ResearchMethodology, RBSA Publishers.
2. Kothari, C.R., 1990. Research Methodology: Methods and Techniques. New Age International.418p.
3. Sinha, S.C. and Dhiman, A.K., 2002. Research Methodology, Ess Ess Publications. 2 volumes.

Reference books and Materials:

1. Trochim, W.M.K., 2005. Research Methods: the concise knowledge base, Atomic Dog Publishing. 270p.
2. Wadehra, B.L. 2000. Law relating to patents, trademarks, copyright designs and geographical indications. Universal Law Publishing.
3. Anthony, M., Graziano, A.M. and Raulin, M.L., 2009. Research Methods: A Process of Inquiry, Allyn and Bacon.
4. Carlos, C.M., 2000. Intellectual property rights, the WTO and developing countries: the TRIPS agreement and policy options. Zed Books, New York.

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OEC-CSBS801B: Financial Management

Course Objectives

1. To develop the knowledge of business finance and management decision.
2. To know the different concepts of long term and short term finance and measurement of cost of capital.
3. To know the definition, assumption and symbols relating to capital structure theories.
4. To know the meaning and importance of capital budgeting decisions and the concept of capital budgeting appraisal methods.
5. To know the concept and classification of working capital and importance of working capital management.
6. To know the concept and types of dividend and different dividend theories.

Course Outcomes (CO):

SL NO.	Course Outcome	Mapped Modules
1	Ability to determine the value and wealth maximization of business and scope of financial management.	Module I – Unit 1
2	Ability to calculate the cost of equity shares, preference share, debenture and other sources of finance.	Module I – Unit 2
3	Ability to determine the relationship between leverage and cost of capital as per major capital structure theories.	Module I – Unit 3
4	Ability to estimate the required return of projects as per different capital budgeting methods and evaluating investment decisions.	Module II – Unit 4
5	Ability to compute working capital using both the cash cost approach and the operating cycle approach.	Module II – Unit 5
6	Ability to evaluate the impact of different dividend policy on share price and also the significance of both relevance and irrelevance theory.	Module II – Unit 6

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MODULE 1

Unit 1: Introduction to Financial Management (8L)

Meaning, core elements, objectives and scope –Role of Finance Manager –Concept of time value of money –Techniques for dealing with time value of money.

Unit 2: Sources of Finance (10L)

Cost of Capital: Different sources of finance: Long term and short term sources –Cost of Capital: Meaning, relevance and classification –Calculation of specific cost of capital and weighted cost of capital.

Unit 3: Capital Structure Analysis (12L)

Capital Structure-Concept, importance and determinants, Theories of Capital Structure (Net Income, Net Operating Income, MM Hypothesis, Traditional Approach), Concepts of DOL, DFL, DTL and Trading on equity.

MODULE 2

Unit 4: Capital Budgeting Decision (14L)

Meaning and importance of capital budgeting decisions –Capital budgeting appraisal methods: Payback period method, accounting rate of return method, net present value method, internal rate of return method and profitability index method –Capital rationing.

Unit 5: Working Capital Management (8L)

Meaning and classification of working capital –Concept and importance of working capital management –Determinants of working capital requirement –Estimating working capital requirement.

Unit 6: Dividend Decisions (8L)

Meaning, nature and types of dividend, some dividend policies, Determinants of dividend policy, Dividend theories: Walter's model, Gordon's model, Modigliani and Miller Irrelevance theory.

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Suggested Readings:

1. Chandra, P., Financial Management: Theory and Practice, TMH.
2. Khan, M.Y. and Jain, P.K., Financial Management: Text, Problems and Cases, Tata McGrawHill Publishing Co., Ltd.
3. Pandey, I.M., Financial Management, Vikas Publishing House Pvt. Ltd.
4. Sur, D. and Sarkhel, J., An Introduction to Financial Management, Book Syndicate
5. Parasuraman, Financial Management: A Step by Step Approach, Cengage