M.Tech. Computer Science & Engineering

Semester - 1

Sr. No:	Paper Code	Paper Name	Class Hours			Credit
		Theory	L	T	P	
1	PGCSE101	Advanced Engineering Mathematics [Compusory]	3	1	0	4
2	PGCSE102	Advanced Oprating System [Compulsory]	4	0	0	4
3	PGCSE103	Advanced Computer Architecture [Compulsory]	4	0	0	4
4	PGCSE104	Advanced Algorithms [Compulsory]	4	0	0	4
5	PGCSE105	Elective - I A) Artificial Neural Networks [BCRCE-Durgapur] B) Agent Based Intelligent Systems [,,] C) Advanced Soft Computing [BCRCE-Durgapur]	4	0	0	4
		Total	19	1	0	**20**
		Practical				
6	PGCSE191	Operating System Laboratory [Compulsory]	0	0	3	2
7	PGCSE192	A) Advanced Programming Lab [BCRCE-Durgapur]	0	0	3	2
		Total	0	0	6	**4**
		Seminar				
8	PGCSE193	Seminar – Based on literature survey	0	2	0	**1**
		Total	19	3	6	**25**

Semester - 2

Sr. No:	Paper Code	Paper Name	Class Hours			Credit
		Theory	L	T	P	
1	PGCSE201	Advanced DBMS [Compulsory]	4	0	0	4
2	PGCSE202	Advanced Computer Network & Security [Compulsory]	4	0	0	4
3	PGCSE203	Theory of Computation [Compulsory]	4	0	0	4
4	PGCSE204	Elective - I I A) Cloud Computing [BCRCE-Durgapur] B) Mobile Computing [BCRCE-Durgapur] C) Advanced Web Technology [BCRCE-Durgapur]	4	0	0	4
5	PGCSE205	Elective - III A) Image Processing [BCRCE-Durgapur] B) Pattern Recognition [BCRCE-Durgapur] C) Real-time Embedded Systems & Programming [,,] D) Complex Systems [BCRCE-Durgapur]	4	0	0	4
		Total	20	0	0	**20**
		Practical				
6	PGCSE291	Part-I – Computer Networking & Part-II - DBMS [Compulsory]	0	0	3	2
		Total	0	0	3	**2**
		Seminar & Viva				
7	PGCSE292	Seminar – Term paper leading to project.	0	2	0	1
8	PGCSE293	Comprehensive Viva Voce				4
		Total	20	2	6	**27**

Semester - 3

Sr. No:	Paper Code	Paper Name	Class Hours			Credit
		Theory	L	T	P	
1	PGCSE301 Management	A: Project Management & Enterpreneurship B: Teaching & Research Methodologies	4	0	0	4
2	PGCSE302	Elective - IV A) Human Computer Interaction [BCRCE-Durgapur] B) Bioinformatics [BCRCE-Durgapur] C) Cryptography & Network Security [BCRCE]	4	0	0	4
		Total	8	0	0	**8**
		Project				
3	PGCSE393	Project – Part 1 (Dissertation I + Defence of Project - I)	0	0	18	4+8=12
		Total	8	0	18	**20**

Semester - 4

Sr. No:	Paper Code	Paper Name	Class Hours			Credit
		Project	L	T	P	
1	PGCSE491	Project – Part 1I (Dissertation II + Defence of Project - II)	0	0	24	6+18=24
		Total	0	0	24	**24**

Total credits = 96

PGCSE101: Advanced Engineering Mathematics (Yet to be received from Prof. Amitabha Bagchi [HIT-2] & Dr. P.Jalan [MCKVIE]); [A unified syllabus for CSE & IT to be worked out with more modules; each subject is to choose the modules needed for that subject]

PGCSE102: Advanced Oprating System [Compulsory]

Module – I

[L = 31]

Operating System Introduction, Structures - Simple Batch, Multi programmed, time-shared, Personal Computer, Parallel, Distributed Systems, Real-Time Systems, System components, Operating-System services, System Calls, Virtual Machines, System Design and Implementation. [~4L]

Process and CPU Scheduling - Process concepts and scheduling, Operation on processes, Cooperating Processes, Threads, and Interposes Communication Scheduling Criteria, Scheduling Algorithm, Multiple -Processor Scheduling, Real-Time Scheduling. [~5L]

Memory Management and Virtual Memory - Logical versus Physical Address Space, Swapping, Contiguous Allocation, Paging, Segmentation, Segmentation with Paging. Demand Paging, Performance of Demanding Paging, Page Replacement, Page Replacement Algorithm, Allocation of Frames, Thrashing. [~6L]

File System Interface and Implementation -Access methods, Directory Structure, Protection, File System Structure, Allocation methods, Free-space Management, Directory Management, Directory Implementation, Efficiency and Performance. [~6L]

Deadlocks - System Model, Dead locks Characterization, Methods for Handling Dead locks Deadlock Prevention, Deadlock Avoidance, Deadlock Detection, and Recovery from Deadlock. [~4L]

Process Management and Synchronization - The Critical Section Problem, Synchronization Hardware, Semaphores, and Classical Problems of Synchronization, Critical Regions, Monitors. [~5L]

Operating System Security Issues- Introduction to the topic of Security in Operating Systems, Principles of Information Security, Access Control Fundamentals, Generalized Security Architectures. [~5L]

Module – II

[L = 10]

Introduction to Distributed systems: Goals of distributed system, hardware and software Concepts, design issues. [~1L]

Communication in Distributed systems: Layered protocols, ATM networks, the Client – Server model, remote procedures call and group communication. [~3L]

Synchronization in Distributed systems: Clock synchronization, Event Handling, Mutual exclusion, E-tech Algorithms, the Bully algorithm, a ring algorithm, atomic transactions [~3L]

Distributed Systems Deadlock: deadlock in distributed systems, Distributed deadlock prevention, and distributed Deadlock detection. [~3L]

Module – III

[L = 20]

Elementary introduction to the terminologies within Modern Oss: Parallel, Distributed, Embedded & Real Time, Mobile, Cloud and Other Operating System Models. [~2L]

Elementary introduction to the terminologies within Emerging Research Areas:Virtual machines: implementations and applications, File Systems: Performance and Integrity, Communication Models, Resource usage accounting, Multiprocessor Scheduling , Large-scale memory management, Fault Tolerance and Reliability, Language Tools for Systems, Systems Monitoring , Security: Dilemmas and Mechanisms, Mobility and Energy Management, Extensibility and Flexibility. [~5L]

Case studies on Windows Xp, Windows NT, Unix, Solaris [~3L]

design issues. [~1L]

Communication in Distributed systems: Layered protocols, ATM networks, the Client – Server model, remote procedures call and group communication. [~3L]

Synchronization in Distributed systems: Clock synchronization, Event Handling, Mutual exclusion, E-tech Algorithms, the Bully algorithm, a ring algorithm, atomic transactions [~3L]

Distributed Systems Deadlock: deadlock in distributed systems, Distributed deadlock prevention, and distributed Deadlock detection. [~3L]

Reference Books

-Operating System Principles- Abraham Silberchatz, Peter B. Galvin, Greg Gagne 7th Edition, John Wiley

- Distributed Operating System - Andrew. S. Tanenbaum, PHI

- Operating System a Design Approach-Crowley, TMH.

- Operating Systems – Internals and Design Principles Stallings, Fifth Edition–2005, Pearson Education/PHI

- Modern Operating Systems, Andrew S Tanenbaum 2nd edition Pearson/PHI

- Operating Systems, Dhamdhere, TMH

- Tanenbaum, Modern Operating Systems, 2nd ed.

- Silberschatz & Galvin, Operating System Concepts, 6th ed.

- Saltzer & Kaashoek, Principles of Computer System Design, 2009

- Coulouris et al., Distributed Systems: Concepts and Design, 3rd ed.,

- Lynch, Distributed Algorithms,

- Lynch et al., Atomic Transactions,

- Casevant & Singhal, Readings in Distributed Computing Systems,

- Ananda & Srinivasan, Distributed Computing Systems: Concepts and Structures

- Mullender, Distributed Systems

- Filman & Friedman, Coordinated Computing: Tools and Techniques for Distributed Software,

- Andrews, Concurrent Programming: Principles and Practice.

- Jain, The Art of Computer Systems Performance Analysis.

- Schneier, Secrets and lies: digital security in a networked world.

- Gray & Reuter, Transaction processing: concepts and techniques.

- **Comment:**

Total Lecture hours are 61. This is impractical. With 12 weeks @ 4 hours per week the syllabus must be covered within 48 lectures. Lecc number of lecture hours leaves more time for discussion in class.

PGCSE103: Advanced Computer Architecture [Compulsory] (Yet to be received from Prof. A.K. Bhattacharjee [NSEC] + Dr. A.Bose [MCKVIE] + Dr. S. Barman [HIT-1] + Dr. M.Maitra [GCECT])

PGCSE104: Advanced Algorithms [Compulsory]
Algorithms as a technology.

Mathematical background: Summations; Sets, relations, functions, graphs, trees; Counting, Probability, random variables, distributions; Matrices, operations & properties.

Preliminaries: Basic data structures, sorting, searching, graph traversal, heuristics.

Algorithm design: Techniques- greedy, dynamic programming, backtracking, divide & conquer; Correctness;

Modeling.

Algorithm analysis: Basics; Standard notations; Common functions; Recurrences; Amortized analysis Data structures: Contiguous data structures, list data structures, dictionaries, priority queues, tree data structures, suffix trees and arrays, Kd-trees, graph data structures, set data structures.

Combinatorial problems: Sorting, searching, median and selection, generating permutations, generating subsets, generating partitions, generating graphs, calendrical calculations, job scheduling, satisfiability.

Polynomial-time graph problems: Connected components, topological sorting, minimum spanning tree, shortest path, transitive closure and reduction, matching, eulerian cycle/chinese postman, edge and vertex connectivity, network flow, drawing graphs nicely, drawing trees, planarity detection and embedding.

Hard graph problems: Clique, independent set, vertex cover, traveling salesman problem, hamiltonian cycle, graph partition, vertex coloring, edge coloring, graph isomorphism, steiner tree, feedback edge/vertex set.

Computational geometry: Robust geometric primitives, convex hull, triangulation, voronoi diagrams, nearest neighbor search, range search, point location, intersection detection, bin packing, medial-axis transform, polygon partitioning, simplifying polygons, shape similarity, motion planning, maintaining line arrangements, minkowski sum.

Set and string problems: Set cover, set packing, string matching, approximate string matching, text compression, cryptography, finite state machine minimization, longest common substring/subsequence, shortest common superstring.

Numerical problems: Solving linear equations, bandwidth reduction, matrix multiplication, determinants and permanents, constrained and unconstrained optimization, linear programming, random number generation, factoring and primality testing, arbitrary-precision arithmetic, knapsack problem, discrete fourier transform.

Advanced areas: NP-completeness, approximation algorithms, randomized algorithms, multithreaded algorithms, parallel algorithms.

Course guidelines: The majority of lectures would focus on covering a standard algorithms for popular problems, with remaining lectures covering a conceptual overview of peripheral areas.

Books:

Any standard textbook on Algorithms.

Comments:

1. ***No modular break-up.***
2. ***No lecture hours specified. So the feasibility of the syllabus cannot be assessed.***
3. ***No book list given***

PGCSE291: Compulsory Laboratory on Operating System: (Yet to be received from Dr. A.Bose [MCKVIE] + Dr. J.Pal [NIT] + Dr. M.Dhar [GNIT])

PGCSE204 & PGCSE205: Electives.

The Colleges are yet to send their elective lists.

The elective papers are to be compiled and common papers to be edited jointly.

Semester – 2.

PGCSE201: Advanced DBMS [Compulsory] (Yet to be received from Dr.B.Barman [NIT] + Dr. S.Goswami [IEM] + Dr. K.Karmakar [NIT])

PGCSE202:Advanced Computer Network & Security [Compulsory] Total Lecture Hours: 44

1. INTRODUCTION TO INTERNETWORKING: HOW NETWORKS DIFFER, HOW NETWORKS CAN BE CONNECTED, CONNECTIONLESS INTERNETWORKING, TUNNELING, FRAGMENTATION, OVERVIEW OF UNDERLYING TECHNOLOGIES (ETHERNET, TOKEN RING, TOKEN BUS, FDDI, PPP). [6 Lectures]

2. NETWORK LAYER PROTOCOLS: IPV4, IPV6, NAT, ARP, RARP, DHCP, ICMP, OSPF, BGP, IGMP, CIDR. [4 Lectures]

3. TRANSPORT LAYER PROTOCOLS: UDP, REMOTE PROCEDURE CALL, RTP, TCP, TCP TAHOE, TCP RENO, TCP NEW RENO, TCP SACK. [4 Lectures]

4. MOBILE TELEPHONE SYSTEMS: INTRODUCTION TO WIRELESS NETWORKS AND CELLULAR TECHNOLOGY, AMPS, D-AMPS, GSM, GPRS, CDMA, BLUETOOTH. [4 Lectures]

5. WIRELESS NETWORKS: WLAN: INTRODUCTION, PROBLEMS AND SOLUTIONS, PROTOCOL STACK, ACCESS METHODS, SERVICES, WIMAX, WIFI, ZIGBEE. [4 Lectures]

6. AD-HOC NETWORKS: INTRODUCTION, ROUTING CHALLENGES FOR AD-HOC NETWORKS, ROUTING PROTOCOLS (AODV, DSDV, DSR,), TRANSPORT PROTOCOLS (ATCP, TCP-F, TCP BUS). [4 Lectures]

7. WIRELESS INTERNET: MIPV4, MIPV6, TCP PERFORMANCE, I-TCP, TCP SNOOP, FREEZE TCP, WWP, TCP REAL. [4 Lectures]

8. CONGESTION CONTROL: GENERAL PRINCIPLES, CONGESTION PREVENTION POLICIES, CHOKE PACKET, RED, ECN, ELN, ELN-ACK. [4 Lectures]

9. QOS PROVISIONING: DELAY GUARANTEES, NETWORK DELAY, DELAY JITTER, PLAY OUT DELAY,

ADMISSION CONTROL, QOS OBJECTIVES, THE RSVP APPROACH.
[4 Lectures]

10. SECURITY: INTRODUCTION TO CRYPTOGRAPHY, SYMMETRIC KEY AND PUBLIC KEY ALGORITHMS, DIFFIE HELLMAN KEY EXCHANGE ALGORITHM, DIGITAL SIGNATURES, IPSEC, FIREWALL, VPN, VLAN, WIRELESS SECURITY, AUTHENTICATION PROTOCOLS.
[6 Lectures]

BOOKS

1. INTERNETWORKING WITH TCP/IP: PRINCIPLES, PROTOCOLS, AND ARCHITECTURE - DOUGLAS COMER.

2. COMPUTER NETWORKS –A.S.TANNENBAUM.

3. DATA AND COMPUTER COMMUNICATIONS – WILLIAM STALLINGS

4. WIMAX SECURITY & QOS-AN END-TO-END PERSPECTIVE: ISBN: 978-0-470-72197-1, WILEY PUBLICATION.

PGCSE203: Theory of Computation [Compulsory]
Mathematical preliminaries.

Models of Computation
: Models of computation - classification, properties and equivalences.

Finite Automata
: Formal definition of a Finite Automata (FA) -Examples of FA, Designing FA, DFA and NFA, regular operations. Equivalence of NFAs and DFAs. FA with Epsilon-Transitions, Epsilon-Closures, Eliminating epsilon -Transitions. Applications of FAs. Mealy and Moore machine, Dead state, Minimization of FA, Incompletely specified machine. FA on infinite inputs.

Regular expression and Languages
: Definition of a Regular Expressions (RE), The Operators of RE – Building RE, Conversions DFA's to RE. Equivalence of RE and NFA with Epsilon-moves, - Application of REs. Equivalence of regular grammar and FA.; Properties of Regular Languages (RL), Proving Languages not to be Regular, Pumping Lemma for RLs. Applications of the Pumping Lemma. Closure Properties of RLs, Decision Properties of Rls

Context Free Languages
: Context free languages, Derivation and languages, Relationship between derivation and derivation trees, Leftmost and Rightmost Derivations. Simplification of context free grammars – Normal forms for context free grammars, CNF, and GNF. Applications of Context-Free Grammars. Non determinism vs. ambiguity in CFLs. Closure properties of CFLs. Algorithmic

properties about CFLs. Pumping Lemma for CFL.

Push Down Automata
: Definition, Acceptance by a Push Down Automata (PDA), DPDA & NPDA, example, Equivalence of PDA's and CFG's (conversion : PDA's to CFG's and reverse). Multi stack PDA. Non-determinism adds power to PDAs.

Turing Machine
: Unsolvable Problems. Definition, notation and Example of Turing Machine (TM). Programming techniques -Computable languages and functions, Church Turing hypothesis, Universal TM, Random Access TM. Multitape TM, Equivalence of One-Tape and Multitape TM's , Nondeterministic TMs. Conversion of RE to TM. Multi-stack PDA & TM.

Computability and Decidability: Church-Turing Thesis, Decision Problems, Decidability and undecidability, unsolvable problems; Halting Problem of
Turing Machines; Problem reduction (Turing and mapping reduction), Intractability (Hierarchy Theorems). Mapping reductions. More undecidable languages. Rice theorem. Reductions using controlled executions. RE Completeness.
Reductions using computation histories. Linear Bounded Automata. Unrestricted grammars.
Computational Complexity:
Resource-constrained computation. Time Complexity- notion of complexity classes, classes P NP, NP-complete, Boolean satisfiability, NP-Completeness of CSAT and 3SAT , NP-Hard, CookLevin Theorem. The concept of reduction, co-NP, polynomial Hierarchy. Some natural NP-complete problems. Space Complexity-Savich's Theorem. The class PSPACE. Optimization, search, and decision problems. Approximate solutions to optimization problems.

Logic: Propositional and First-order logic and their applications to theorem proving and logic programming.

Advanced/Emerging areas
: Elementary introductions to DNA Computing, Quantum Computing, Cellular Automata, Circuit complexity, Structural Complexity, Parallel Complexity, Algorithmic Information.

Course Guidelines: Large majority of the lectures would focus only on the core areas, with only elementary introduction to other remaining advanced areas.

Comments:

1. ***No modular break-up.***
2. ***No lecture hours specified. So the feasibility of the syllabus cannot be assessed.***
3. ***No book list given***

PGCSE203 & PGCSE204: Elective - II & Elective - III (Each college to send their details)

Colleges are yet to send their elective lists.

The elective papers are to be compiled and common papers to be edited jointly.

Semester 3

PG301A: PROJECT MANAGEMENT & ENTREPRENEURSHIP

COURSE DESCRIPTION

THIS COURSE IS INTENDED TO BE AN INTRODUCTION TO THE FIELD OF PROJECT MANAGEMENT. THE PRIMARY OBJECTIVE OF THIS COURSE IS TO ACQUAINT STUDENTS WITH A BROAD BASIC OVERVIEW OF PROJECT MANAGEMENT, AND THE ROLE OF A PROJECT MANAGER THROUGHOUT THE FIVE PRIMARY PROCESSES OF MANAGING PROJECTS. THE OTHER THREE REQUIRED CORE COURSES WILL PROVIDE A MORE COMPREHENSIVE COVERAGE. THIS IS A 15-HOUR COURSE.

SYLLABUS:

WHAT "PROJECT MANAGEMENT" MEANS. ABOUT THE CONTEXT OF MODERN PROJECT MANAGEMENT. HOW TO MANAGE PROJECTS THROUGHOUT THE FIVE MAJOR PROCESS GROUPS. HOW THE TRIPLE CONSTRAINT AFFECTS THE PROJECT MANAGER. HOW TO DEVELOP AN EFFECTIVE PROJECT PLAN. HOW TO GAIN COMMITMENT TO THE PROJECT PLAN. HOW TO EFFICIENTLY EXECUTE THE PROJECT PLAN. HOW TO MINIMIZE OR ELIMINATE SCOPE CREEP. HOW TO ORGANIZE AND DEVELOP SUCCESSFUL PROJECT TEAMS. HOW TO DEVELOP AN EFFECTIVE PROJECT CONTROL SYSTEM. HOW TO DEVELOP REALISTIC PROJECT SCHEDULES. HOW TO EFFICIENTLY CLOSE OUT A PROJECT.

OBJECTIVES:

TO DEVELOP AN APPRECIATION FOR THE EVOLUTION OF ENTREPRENEURSHIP AS AN ACADEMIC DISCIPLINE. TO GAIN UNDERSTANDING OF THE ENTREPRENEURIAL PROCESS THROUGH ANALYSIS OF VARIOUS SITUATIONS. TO LEARN DIVERSE RESEARCH THEMES IN THE AREA OF ENTREPRENEURSHIP

COURSE FORMAT:

ENTREPRENEURSHIP IS AN INTENSIVE COURSE INVOLVING THE STUDY OF JOURNALS ARTICLES, ANALYSIS OF CASES, TO EVOLVE PERSPECTIVE ON ENTREPRENEURSHIP AS AN ACADEMIC DISCIPLINE

ENTREPRENEURSHIP: AN INTRODUCTION, NEW VENTURE CREATION, FINANCING ENTREPRENEURIAL VENTURES AND THE BUSINESS PLAN, FAMILY BUSINESS MANAGEMENT, MANAGING A GROWING BUSINESS, VENTURE GROWTH STRATEGIES, ENTREPRENEURIAL SKILLS AND STRATEGIES, ENTREPRENEURIAL SKILLS AND STRATEGIES, INTRAPRENEURSHIP: ENTREPRENEURIAL VENTURES IN A CORPORATE SETTING, ENTREPRENEUR AS CHANGE AGENT, SUSTAINABLE INNOVATION AND ENTREPRENEURSHIP, SOCIAL ENTREPRENEURSHIP

REFERENCE BOOKS:

1. M. Y. YOSHINO AND U. S. RANGAN, STRATEGIC ALLIANCES: AN ENTREPRENEURIAL APPROACH TO GLOBALIZATION, HBS PRESS, 1995.
2. FOSTER, RICHARD N., INNOVATION: THE ATTACKER'S ADVANTAGE, LONDON, MACMILLAN, 1986.
3. HOWARD H. STEVENSON, MICHAEL J. ROBERTS, AMAR BHIDE, WILLIAM A. SAHLMAN (EDITOR), THE ENTREPRENEURIAL VENTURE (THE PRACTICE OF MANAGEMENT SERIES).
4. UDAYAN GUPTA (EDITOR), DONE DEALS: VENTURE CAPITALISTS TELL THEIR STORIES.
5. STEVE KEMPER, CODE NAME GINGER: THE STORY BEHIND SEGWAY AND DEAN KAMEN'S QUEST TO INVENT A NEW WORLD.
6. PAUL A. GOMPERS AND JOSH LERNER, THE MONEY OF INVENTION: HOW VENTURE CAPITAL CREATES NEW WEALTH.
7. LARRY BOSSIDY, RAM CHARAN AND CHARLES BURCK, EXECUTION: THE DISCIPLINE OF GETTING THINGS DONE.
8. JEFFRY TIMMONS AND STEPHEN SPINELLI, NEW VENTURE CREATION: ENTREPRENEURSHIP FOR THE 21ST CENTURY WITH POWERWEB AND NEW BUSINESS MENTOR CD.

9. THE ENTREPRENEUR'S GUIDE TO BUSINESS LAW, CONSTANCE E. BAGLEY AND CRAIG E. DAUCHY, WEST EDUCATIONAL PUBLISHING, 1998.
10. MARY COULTER, ENTREPRENEURSHIP IN ACTION, PRENTICE-HALL, 2001.
11. TRACY KIDDER, THE SOUL OF A NEW MACHINE, AVON BOOKS, 1990.
12. H. L. MORGAN, A. KALLIANPUR, AND L. M. LODISH, ENTREPRENEURIAL MARKETING: LESSONS FROM WHARTON'S PIONEERING MBA COURSE, JOHN WILEY & SONS, 2001.
13. RITA GUNTHER MCGRATH AND IAN MACMILLAN, THE ENTREPRENEURIAL MINDSET.
14. JAMES COLLINS, WILLIAM C. LAZIER, BEYOND ENTREPRENEURSHIP: TURNING YOUR BUSINESS INTO AN ENDURING GREAT COMPANY.

REFERENCE (LIST OF) CASES:
1. KODAK (A), HBS CASE # 703503
2. COMMERCE BANK, HBS CASE # 603080
3. HAUSSER FOOD PRODUCTS CO., HBS CASE: 402055
4. E INK IN 2005, HBS CASE # 705506
5. WHOLE FOODS MARKET, INC., HBS CASE # 705476
6. DISCIPLINED ENTREPRENEURSHIP, HBS CASE # SMR156

PGCSE301B: Teaching & Research Methodology
Total Lecture Hours: 44

MODULE A: TEACHING METHODOLOGY [16 Lectures]

Unit 1 Instruction
:
Introduction to content, Elements of instruction, Learning objectives, Roles of the teacher and the learner in instruction. [4 Lectures]

Unit 2 Teaching and Learning
:
Application of theories of learning to teaching and learning, Sequence of learning and Strategies of learning, Teaching methods, their merits and demerits, Use of ICT in teaching & learning, Classroom management, Individual differences. [4 Lectures]

Unit 3 Planning for teaching and learning
: Understanding the syllabus, Preparation of a scheme of work, Lesson plan preparation, Micro teaching. [4 Lectures]

Unit 4 Assessment and Evaluation
: Define measurement, assessment, test, evaluation, Purpose of assessment and evaluation, Types of tests, Grading and reporting the results assessment, Evaluating teaching and learning. [4 Lectures]

MODULE B: RESEARCH METHODOLOGY [28 Lectures]

Unit 1 Definition and explanation of research: Types and Paradigms of Research, History and Philosophy of Research (esp. Philosophical evolution, pathways to major discoveries & inventions), Research Process decision, planning, conducting, Classification of Research Methods; Reflective Thinking, Scientific Thinking.

Research problem formulation: Literature review- need, objective, principles, sources, functions & its documentation, problem formulation esp. sources, considerations & steps, Criteria of a good research problem, Defining and evaluating the research problem, Variables esp. types & conversion of concepts to variables. Research design esp. Causality, algorithmic, quantitative and qualitative designs, Various types of designs. Characteristics of a good research design, problems and issues in research design; Hypotheses: Construction, testing, types, errors; Design of experiments especially classification of designs and types of errors. [8 lectures]

Unit 2 Problem solving
: Understanding the problem- unknowns, data & conditions, conditions - satisfiability, sufficiency, redundancy & contradiction, separation of parts of the problem and conditions, notations; devising a plan- connection between data and unknown, similar/related problems, reuse of previous solutions, rephrasing/transforming the problem, solving partial or related problem, transforming data and unknowns; carrying out the plan- esp. correctness of each step in multiple ways; evaluation of solution and method- checking correctness of solution, different

derivations, utility of the solution. [5 lectures]

Unit 3 Theoretical methods of research
: Algorithmic methods including probabilistic, soft computing, and numerical methods; Modeling and Simulation; Engineering Design & Optimization (techniques); Statistical methods in research: Central tendency, Dispersions, Skewness, Moments, Kurtosis, esp. Distributions, Time series, Overview of Non-parametric tests & Multivariate analysis; Emerging techniques in discrete mathematics, algorithms, probability-statistics, internet technology and software engineering, and their application to research in computer science and information technology.
[8 lectures]

Unit 4 Foundation of Hypothesis: Meaning of assumption, postulate and hypothesis, nature of hypothesis, function and importance of hypothesis, Characteristics of good hypothesis, formulating hypothesis.
[2 Lectures]

Unit 5 Data & Reports: Infrastructural setups for research; Methods of data collection esp. validity and reliability, Sampling; Data processing and Visualization espicially Classification; Ethical issues espicially. bias, Misuse of statistical methods, Common fallacies in reasoning. Research Funding & Intellectual Property; Research reports: Research Proposal & Report writing esp. Study objectives, study design, problems and limitations; Prototype micro-project report implementing a major part of all the above (compulsory assignment) [5 lectures]

Course guidelines:
Faculty member will introduce the elementary ideas of most of the topics with emphasis on 3-5 topics preferably from those that are highlighted.

Books:

1. Teaching Methodology, Caroline W. Ndirangu, African Virtual University.

2. R. Paneerselvan: Research Methodology, Prenctice-Hall India

3. G. Polya, How to Solve It, Princeton University Press

4. Fundamental of Research Methodology and Statistics, Yogesh Kumar Singh, New Age International Publishers.

5. Research Methodology Methods and Techniques (Second Revised Edition), C. R. Kothari, New Age International Publishers.

PGCSE302: Electives.

List not received yet.

M.Tech. Information Technology

Semester - 1

Sr. No:	Paper Code	Paper Name	Class Hours			Credit
		Theory	L	T	P	
1	PGIT101	Advanced Engineering Mathematics [Compusory]	3	1	0	4
2	PGIT102	Advanced Oprating System [Compulsory]	4	0	0	4
3	PGIT103	Advanced Computer Architecture [Compulsory]	4	0	0	4
4	PGIT104	Software Engg & Case Tools [Compulsory]	4	0	0	4
5	PGIT105	Elective - I A) Communication Systems [BCRCE-Durgapur]	4	0	0	4
		Total	19	1	0	**20**
		Practical				
6	PGIT191	Operating System Laboratory [Compulsory]	0	0	3	2
7	PGIT192	College specific elective laboratory.	0	0	3	2
		Total	0	0	6	**4**
		Seminar				
8	PGIT193	Seminar – Based on literature survey	0	2	0	**1**
		Total	19	3	6	**25**

Semester - 2

Sr. No:	Paper Code	Paper Name	Class Hours			Credit
		Theory	L	T	P	
1	PGIT201	Advanced DBMS [Compulsory]	4	0	0	4
2	PGIT202	Real Time Operating System [Compulsory]	4	0	0	4
3	PGIT203	Distributed Computing System [Compulsory]	4	0	0	4
4	PGIT204	Elective - I I A) Web Technologies [BCRCE-Durgapur] B) Object Oriented Systems [BCRCE-Durgapur] B) Cloud Cluster & Grid Computing [,,]	4	0	0	4
5	PGIT205	Elective - III A) Electronic Commerce Technology [BCRCE] B) Enterprise Resource Planning [BCRCE-Durgapur] C) Mobile Computing [BCRCE-Durgapur] D) Complex Systems [BCRCE-Durgapur]	4	0	0	4
		Total	20	0	0	**20**
		Practical				
6	PGIT291	Elective PART 1: Java & Web Tech Lab [BCRCE-Durgapur] PART 2: Dot Net Lab [BCRCE-Durgapur]	0	0	3	2
		Total	0	0	3	**2**
		Seminar & Viva				
7	PGIT292	Seminar – Term paper leading to project.	0	2	0	1
8	PGIT293	Comprehensive Viva Voce				4
		Total	20	2	6	**27**

Semester - 3

Sr. No:	Paper Code	Paper Name	Class Hours			Credit
		Theory	L	T	P	
1	PGIT301 Management	A: Project Management & Enterpreneurship B: Teaching & Research Methodologies	4	0	0	4
2	PGIT302	Elective - IV A) Supply Chain Management [BCRCE-Durgapur] B) BioMedical Informatics [BCRCE-Durgapur] C) Human Computer Interaction [BCRCE-Durgapur]	4	0	0	4
		Total	8	0	0	**8**
		Project				
3	PGIT393	Project – Part 1 (Dissertation I + Defence of Project - I)	0	0	18	4+8=12
		Total	8	0	18	**20**

Semester - 4

Sr. No:	Paper Code	Paper Name	Class Hours			Credit
		Project	L	T	P	
1	PGIT491	Project – Part 1I (Dissertation II + Defence of Project - II)	0	0	24	6+18=24
		Total	0	0	24	**24**

Total credits = 96

Detailed Syllabus of Information Technology

PGIT101: Advanced Engineering Mathematics (Yet to be received from Prof. Amitabha Bagchi [HIT-2] & Dr. P.Jalan [MCKVIE]); [A unified syllabus for CSE & IT to be worked out with more modules; each subject is to choose the modules needed for that subject]

PGIT102: Real Time Oprating System [Compulsory]

UNIT-I

INTRODUCTION: DEFINITION OF REAL TIME, APPLICATIONS OF REAL-TIME SYSTEMS, A BASIC MODEL OF A REAL-TIME SYSTEMS, CHARACTERISTICS OF REAL-TIME SYSTEMS, SAFETY AND RELIABILITY, TYPES OF REAL-TIME TASKS, TIMING CONSTRAINTS, MODELING TIMING CONSTRAINTS.

UNIT-II

REAL-TIME TASK SCHEDULING SOME IMPORTANT CONCEPTS, TYPES OF REAL TIME TASKS AND THEIR CHARACTERISTICS, TASK SCHEDULING, CLOCK-DRIVEN SCHEDULING, HYBRID SCHEDULERS, EVENT-DRIVEN SCHEDULING, EARLIEST DEADLINE FIRST (EDF) SCHEDULING. RATE MONOTONIC ALGORITHM. SOME ISSUES ASSOCIATED WITH RMA, ISSUES IN USING RMA IN PRACTICAL SITUATIONS. HANDLING RESOURCE SHARING AND DEPENDENCIES AMONG REAL-TIME TASKS: RESOURCE SHARING AMONG REAL TIME TASKS, PRIORITY INVERSION, PRIORITY INHERITANCE PROTOCOL, HIGHEST LOCKER PROTOCOL, PRIORITY CEILING PROTOCOL, DIFFERENT TYPES OF PRIORITY INVERSIONS UNDER PCP, IMPORTANT FEATURES OF PCP, SOME ISSUES IN USING A RESOURCE SHARING PROTOCOL, HANDLING TASK DEPENDENCIES.

UNIT-III

SCHEDULING REAL-TIME TASKS IN MULTIPROCESSOR: MULTIPROCESSOR TASK ALLOCATION, DYNAMIC ALLOCATION OF TASKS, FAULT-TOLERANT SCHEDULING OF TASKS, CLOCKS IN DISTRIBUTED REAL-TIME SYSTEMS, CENTRALIZED CLOCK SYNCHRONIZATION, DISTRIBUTED CLOCK SYNCHRONIZATION.

COMMERCIAL REAL-TIME OPERATING SYSTEMS: TIME SERVICES, FEATURES OF A REAL-TIME OPERATING SYSTEM, UNIX AS A REAL-TIME OPERATING SYSTEM, UNIX - BASED REAL-TIME OPERATING SYSTEMS, WINDOWS AS REAL-TIME OPERATING SYSTEM, POSIX, A SURVEY OF CONTEMPORARY REAL TIME OPERATING SYSTEMS, BENCHMARKING REAL-TIME SYSTEMS.

UNIT-IV

REAL-TIME COMMUNICATION: EXAMPLES OF APPLICATIONS REQUIRING, REAL-TIME COMMUNICATION, BASIC CONCEPTS, REAL-TIME COMMUNICATION IN A LAN, HARD REAL-TIME COMMUNICATION IN LAN, BOUNDED ACCESS PROTOCOLS FOR LANS, PERFORMANCE COMPARISON, REAL-TIME COMMUNICATION OVER PACKET SWITCHED NETWORKS, Q0S FRAMEWORK, ROUTING, RESOURCE RESERVATION, TATE CONTROL, QOS MODELS.

UNIT-V

REAL-TIME DATABASES EXAMPLE APPLICATIONS OF REAL-TIME DATABASES, REVIEW OF BASIC DATABASE

CONCEPTS, REAL-TIME DATABASES, CHARACTERISTICS OF TEMPORAL DATA, CONCURRENCY CONTROL IN REAL-TIME DATABASES, COMMERCIAL REAL-TIME DATABASES.

REFERENCES:

1. RAJIB MALL "REAL TIME SYSTEM THEORY & PRACTICE" PEARSON EDUCATION ASIA.
2. JANE W.S. LIU "REAL TIME SYSTEM", PEARSON EDUCATION ASIA-200 I
3. R. BENNETT, "REAL-TIME COMPUTER CONTROL". PRENTICE-HALL, 1994
4. SHEM TOY LEVI & ASHOK K. AGRAWALA, "REAL TIME SYSTEM DESIGN" MCGRAW HILL PUBLISHING COMPANY-1990.
5. C.M. KRISHNA AND KANG 0. SHIN, "REAL TIME SYSTEMS", MCGRAW HILL COMPANIES INC., 1997.

Comments:

i. No lecture hours specified. So the feasibility of the syllabus cannot be assessed.

ii. No book list given

PGIT103: Advanced Computer Architecture [Compulsory] (Yet to be received from Prof. A.K. Bhattacharjee [NSEC] + Dr. A.Bose [MCKVIE] + Dr. S. Barman [HIT-1] + Dr. M.Maitra [GCECT])

PGIT104: Software Engg & Case Tools

PRINCIPLES AND MOTIVATIONS
DEFINITIONS AND NEED FOR ENGINEERED APPROACH TO SOFTWARE DEVELOPMENT; SOFTWARE DEVELOPMENT PROCESS MODELS FROM THE POINTS OF VIEW OF TECHNICAL DEVELOPMENT AND PROJECT MANAGEMENT: WATERFALL, RAPID PROTOTYPING, INCREMENTAL DEVELOPMENT, SPIRAL MODELS, AND EMPHASIS ON COMPUTER-ASSISTED ENVIRONMENTS.
INTRODUCTION TO MODELING TOOLS BASICS OF OBJECT-ORIENTED APPROACH, OBJECT-ORIENTED PROGRAMMING AND LANGUAGES, OMT, VISUAL MODELING, UML, RATIONAL ROSE TOOL
OBJECT MODELING AND DESIGN
CLASSES, OBJECTS, RELATIONSHIPS, KEY ABSTRACTIONS, COMMON MECHANISMS, DIAGRAMS, CLASS DIAGRAMS, ADVANCED CLASSES, ADVANCED RELATIONSHIPS, INTERFACES, TYPES, ROLES, PACKAGES, INSTANCES, OBJECT DIAGRAMS, INTERACTIONS, USE CASES, USE CASE DIAGRAMS, INTERACTION DIAGRAMS, ACTIVITY DIAGRAMS, EVENTS AND SIGNALS, STATE MACHINES, PROCESSES, THREADS, STATE CHART DIAGRAMS, COMPONENTS, DEPLOYMENT, COLLABORATIONS, PATTERNS AND FRAMEWORKS, COMPONENT DIAGRAMS, SYSTEMS AND MODELS, CODE GENERATION AND REVERSE ENGINEERING.
SOFTWARE DEVELOPMENT METHODS
FORMAL, SEMI-FORMAL AND INFORMAL METHODS; REQUIREMENTS ELICITATION, REQUIREMENTS SPECIFICATION; DATA, FUNCTION, AND EVENT-BASED MODELING; SOME OF THE POPULAR METHODOLOGIES SUCH AS YOURDON'S SAD, SSADM ETC; CASE TOOLS-CLASSIFICATION, FEATURES, STRENGTHS AND WEAKNESSES; ICASE; CASE STANDARDS.
SOFTWARE PROJECT MANAGEMENT
PRINCIPLES OF SOFTWARE PROJECTS MANAGEMENT; ORGANIZATIONAL AND TEAM STRUCTURE; PROJECT PLANNING; PROJECT INITIATION AND PROJECT TERMINATION; TECHNICAL, QUALITY, AND MANAGEMENT PLANS; PROJECT CONTROL; COST ESTIMATION METHODS - FUNCTION POINTS AND COCOMO.
REFERENCES:

1. ROGER PRESSMAN; SOFTWARE ENGINEERING - A PRACTITIONER'S APPROACH, MCGRAW HILL, NEW YORK.
2. IAN SOMMERVILLE; SOFTWARE ENGINEERING, ADDISON-WESLEY PUBLISHING COMPANY, ENGLAND
3. PANKAJ JALOTE; AN INTEGRATED APPROACH TO SOFTWARE ENGINEERING, NAROSA PUBLISHING HOUSE, NEW DELHI.
4. 4. GRADY BOOCH, JAMES RUMBAUGH, IVAR JACOBSON, THE UNIFIED MODELING LANGUAGE USER GUIDE, PEARSON EDUCATION, NEW YORK.

Semester – 1: Electives.

PGIT105A: Communication Systems Total Lecture Hours: 44

1 Introduction: A layered view of digital communication [2 Lectures]

2 Discrete source encoding, Memory-less sources, prefix free codes, and entropy, Entropy and asymptotic equipartition property, Markov sources and Lempel-Ziv universal code. [6 Lectures]

3 Fourier series and Fourier transforms, Discrete-time Fourier transforms and sampling theorem, Quantization, high-rate quantizers, and waveform encoding, Nyquist theory, pulse amplitude modulation (PAM), quadrature amplitude modulation (QAM), and frequency translation, Degrees of freedom, orthonormal expansions, and aliasing. [6 Lectures]

4 Signal space analysis, projection theorem, and modulation. [4 Lectures]

5 Random processes, Jointly Gaussian random vectors and processes and white Gaussian noise (WGN), Linear functional and filtering of random processes. [4 Lectures]

6 Introduction to detection, Detection for random vectors and processes, Theorem of irrelevance, M-ary detection, and coding. [4 Lectures]

7 Review of theorem of irrelevance and introduction to wireless communication, Discrete-time baseband models for wireless channels. [4 Lectures]

8 Doppler spread, time spread, coherence time, and coherence frequency. [4 Lectures]

9 Spread Spectrum modulation, properties of pseudo random sequences, M-sequences, Kasami sequences, Gold sequences, Principles of DSSS and FHSS, Code Division Multiple Access (CDMA). [6 Lectures]

10 Detection for flat Rayleigh fading and incoherent channels, & Rake receivers. [4 Lectures]

Books:

1 DIGITAL COMMUNICATION, 4TH ED. - J. G. PROAKIS, MGH INTERNATIONAL EDITION.

2 PRINCIPLE OF COMMUNICATION SYSTEMS – TAUB, SCHILLING, TMH

3 DIGITAL AND ANALOG COMMUNICATION SYSTEMS, 7TH ED. – LEON W. COUCH, PHI.

4 PRINCIPLES OF DIGITAL COMMUNICATION – HAYKIN

5 DIGITAL COMMUNICATION – ZEIMER, TRANTER.

6 COMMUNICATION SYSTEMS, 4TH ED. – A. BRUCE CARLSON, PAUL B. CRILLY, JANET C. RUTLEDGE, MGH INTERNATIONAL EDITION.

7 DIGITAL COMMUNICATIONS, 2ND ED. – BERNARD SKLAR, PEARSON EDUCATION.

8 ELECTRONIC COMMUNICATIONS, 4TH ED. – DENNIS RODDY, JOHN COOLEN, PHI

9 MODERN DIGITAL AND ANALOG COMMUNICATION SYSTEMS– B.P.LATHI.

10 FUNDAMENTALS OF COMMUNICATION SYSTEMS – JOHN G. PROAKIS & MASOUD SALEHI

List of other electives has not reached us so far.

Semester – 2:

PGIT201: Advanced DBMS [Compulsory] (Yet to be received from Dr.B.Barman [NIT] + Dr. S.Goswami [IEM] + Dr. K.Karmakar [NIT])

PGIT202:Advanced Computer Network & Security [Compulsory] Total Lecture Hours: 44

1. INTRODUCTION TO INTERNETWORKING: HOW NETWORKS DIFFER, HOW NETWORKS CAN BE CONNECTED, CONNECTIONLESS INTERNETWORKING, TUNNELING, FRAGMENTATION, OVERVIEW OF UNDERLYING TECHNOLOGIES (ETHERNET, TOKEN RING, TOKEN BUS, FDDI, PPP). [6 Lectures]

2. NETWORK LAYER PROTOCOLS: IPV4, IPV6, NAT, ARP, RARP, DHCP, ICMP, OSPF, BGP, IGMP, CIDR. [4 Lectures]

3. TRANSPORT LAYER PROTOCOLS: UDP, REMOTE PROCEDURE CALL, RTP, TCP, TCP TAHOE, TCP RENO, TCP NEW RENO, TCP SACK.

[4 Lectures]

4. TELEPHONE SYSTEMS: INTRODUCTION TO WIRELESS NETWORKS AND CELLULAR TECHNOLOGY, AMPS, D-AMPS, GSM, GPRS, CDMA, BLUETOOTH.
[4 Lectures]

5. WIRELESS NETWORKS: WLAN: INTRODUCTION, PROBLEMS AND SOLUTIONS, PROTOCOL STACK, ACCESS METHODS, SERVICES, WIMAX, WIFI, ZIGBEE.
[4 Lectures]

6. AD-HOC NETWORKS: INTRODUCTION, ROUTING CHALLENGES FOR AD-HOC NETWORKS, ROUTING PROTOCOLS (AODV, DSDV, DSR,), TRANSPORT PROTOCOLS (ATCP, TCP-F, TCP BUS).
[4 Lectures]

7. WIRELESS INTERNET: MIPV4, MIPV6, TCP PERFORMANCE, I-TCP, TCP SNOOP, FREEZE TCP, WWP, TCP REAL.
[4 Lectures]

8. CONGESTION CONTROL: GENERAL PRINCIPLES, CONGESTION PREVENTION POLICIES, CHOKE PACKET, RED, ECN, ELN, ELN-ACK.
[4 Lectures]

9. QOS PROVISIONING: DELAY GUARANTEES, NETWORK DELAY, DELAY JITTER, PLAY OUT DELAY,

ADMISSION CONTROL, QOS OBJECTIVES, THE RSVP APPROACH.
[4 Lectures]

11. SECURITY: INTRODUCTION TO CRYPTOGRAPHY, SYMMETRIC KEY AND PUBLIC KEY ALGORITHMS, DIFFIE HELLMAN KEY EXCHANGE ALGORITHM, DIGITAL SIGNATURES, IPSEC, FIREWALL, VPN, VLAN, WIRELESS SECURITY, AUTHENTICATION PROTOCOLS.
[6 Lectures]

BOOKS

1. INTERNETWORKING WITH TCP/IP: PRINCIPLES, PROTOCOLS, AND ARCHITECTURE - DOUGLAS COMER.

2. COMPUTER NETWORKS –A.S.TANNENBAUM.

3. DATA AND COMPUTER COMMUNICATIONS – WILLIAM STALLINGS

4. WIMAX SECURITY & QOS-AN END-TO-END PERSPECTIVE: ISBN: 978-0-470-72197-1, WILEY PUBLICATION.

PGIT203: Distributed Computing System (Yet to receive from Dr. Pinakpani Chakraborty [NITMAS] + Dr. I.Mukherjee [IEM])

PGIT204 & PGIT205. Electives

List of electives has not reached us so far.

Semester – 3.

PGIT301A: PROJECT MANAGEMENT & ENTREPRENEURSHIP

COURSE DESCRIPTION

THIS COURSE IS INTENDED TO BE AN INTRODUCTION TO THE FIELD OF PROJECT MANAGEMENT. THE PRIMARY OBJECTIVE OF THIS COURSE IS TO ACQUAINT STUDENTS WITH A BROAD BASIC OVERVIEW OF PROJECT MANAGEMENT, AND THE ROLE OF A PROJECT MANAGER THROUGHOUT THE FIVE PRIMARY PROCESSES OF MANAGING PROJECTS. THE OTHER THREE REQUIRED CORE COURSES WILL PROVIDE A MORE COMPREHENSIVE COVERAGE. THIS IS A 15-HOUR COURSE.

SYLLABUS:

WHAT "PROJECT MANAGEMENT" MEANS. ABOUT THE CONTEXT OF MODERN PROJECT MANAGEMENT. HOW TO MANAGE PROJECTS THROUGHOUT THE FIVE MAJOR PROCESS GROUPS. HOW THE TRIPLE CONSTRAINT AFFECTS THE PROJECT MANAGER. HOW TO DEVELOP AN EFFECTIVE PROJECT PLAN. HOW TO GAIN COMMITMENT TO THE PROJECT PLAN. HOW TO EFFICIENTLY EXECUTE THE PROJECT PLAN. HOW TO MINIMIZE OR ELIMINATE SCOPE CREEP. HOW TO ORGANIZE AND DEVELOP SUCCESSFUL PROJECT TEAMS. HOW TO DEVELOP AN EFFECTIVE PROJECT CONTROL SYSTEM. HOW TO DEVELOP REALISTIC PROJECT SCHEDULES. HOW TO EFFICIENTLY CLOSE OUT A PROJECT.

OBJECTIVES:
TO DEVELOP AN APPRECIATION FOR THE EVOLUTION OF ENTREPRENEURSHIP AS AN ACADEMIC DISCIPLINE. TO GAIN UNDERSTANDING OF THE ENTREPRENEURIAL PROCESS THROUGH ANALYSIS OF VARIOUS SITUATIONS. TO LEARN DIVERSE RESEARCH THEMES IN THE AREA OF ENTREPRENEURSHIP
COURSE FORMAT:
ENTREPRENEURSHIP IS AN INTENSIVE COURSE INVOLVING THE STUDY OF JOURNALS ARTICLES, ANALYSIS OF CASES, TO EVOLVE PERSPECTIVE ON ENTREPRENEURSHIP AS AN ACADEMIC DISCIPLINE
ENTREPRENEURSHIP: AN INTRODUCTION, NEW VENTURE CREATION, FINANCING ENTREPRENEURIAL VENTURES AND THE BUSINESS PLAN, FAMILY BUSINESS MANAGEMENT, MANAGING A GROWING BUSINESS, VENTURE GROWTH STRATEGIES, ENTREPRENEURIAL SKILLS AND STRATEGIES, ENTREPRENEURIAL SKILLS AND STRATEGIES, INTRAPRENEURSHIP: ENTREPRENEURIAL VENTURES IN A CORPORATE SETTING, ENTREPRENEUR AS CHANGE AGENT, SUSTAINABLE INNOVATION AND ENTREPRENEURSHIP, SOCIAL ENTREPRENEURSHIP

REFERENCE BOOKS:

1. M. Y. YOSHINO AND U. S. RANGAN, STRATEGIC ALLIANCES: AN ENTREPRENEURIAL APPROACH TO GLOBALIZATION, HBS PRESS, 1995.
2. FOSTER, RICHARD N., INNOVATION: THE ATTACKER'S ADVANTAGE, LONDON, MACMILLAN, 1986.
3. HOWARD H. STEVENSON, MICHAEL J. ROBERTS, AMAR BHIDE, WILLIAM A. SAHLMAN (EDITOR), THE ENTREPRENEURIAL VENTURE (THE PRACTICE OF MANAGEMENT SERIES).
4. UDAYAN GUPTA (EDITOR), DONE DEALS: VENTURE CAPITALISTS TELL THEIR STORIES.
5. STEVE KEMPER, CODE NAME GINGER: THE STORY BEHIND SEGWAY AND DEAN KAMEN'S QUEST TO INVENT A NEW WORLD.
6. PAUL A. GOMPERS AND JOSH LERNER, THE MONEY OF INVENTION: HOW VENTURE CAPITAL CREATES NEW WEALTH.
7. LARRY BOSSIDY, RAM CHARAN AND CHARLES BURCK, EXECUTION: THE DISCIPLINE OF GETTING THINGS DONE.
8. JEFFRY TIMMONS AND STEPHEN SPINELLI, NEW VENTURE CREATION: ENTREPRENEURSHIP FOR THE 21ST CENTURY WITH POWERWEB AND NEW BUSINESS MENTOR CD.
9. THE ENTREPRENEUR'S GUIDE TO BUSINESS LAW, CONSTANCE E. BAGLEY AND CRAIG E. DAUCHY, WEST EDUCATIONAL PUBLISHING, 1998.
10. MARY COULTER, ENTREPRENEURSHIP IN ACTION, PRENTICE-HALL, 2001.
11. TRACY KIDDER, THE SOUL OF A NEW MACHINE, AVON BOOKS, 1990.
12. H. L. MORGAN, A. KALLIANPUR, AND L. M. LODISH, ENTREPRENEURIAL MARKETING: LESSONS FROM WHARTON'S PIONEERING MBA COURSE, JOHN WILEY & SONS, 2001.
13. RITA GUNTHER MCGRATH AND IAN MACMILLAN, THE ENTREPRENEURIAL MINDSET.
14. JAMES COLLINS, WILLIAM C. LAZIER, BEYOND ENTREPRENEURSHIP: TURNING YOUR BUSINESS INTO AN ENDURING GREAT COMPANY.

REFERENCE (LIST OF) CASES:
1. KODAK (A), HBS CASE # 703503
2. COMMERCE BANK, HBS CASE # 603080
3. HAUSSER FOOD PRODUCTS CO., HBS CASE: 402055
4. E INK IN 2005, HBS CASE # 705506
5. WHOLE FOODS MARKET, INC., HBS CASE # 705476
6. DISCIPLINED ENTREPRENEURSHIP, HBS CASE # SMR156

PGIT30B: Teaching & Research Methodology
Total Lecture Hours: 44

MODULE A: TEACHING METHODOLOGY [16 Lectures]

Unit 1 Instruction
:
Introduction to content, Elements of instruction, Learning objectives, Roles of the teacher and the learner in instruction. [4 Lectures]

Unit 2 Teaching and Learning
:
Application of theories of learning to teaching and learning, Sequence of learning and Strategies of learning, Teaching methods, their merits and demerits, Use of ICT in teaching & learning, Classroom management, Individual differences. [4 Lectures]

Unit 3 Planning for teaching and learning
: Understanding the syllabus, Preparation of a scheme of work, Lesson plan preparation, Micro

teaching. [4 Lectures]

Unit 4 Assessment and Evaluation
: Define measurement, assessment, test, evaluation, Purpose of assessment and evaluation, Types of tests, Grading and reporting the results assessment, Evaluating teaching and learning. [4 Lectures]

MODULE B: RESEARCH METHODOLOGY [28 Lectures]

Unit 1 Definition and explanation of research: Types and Paradigms of Research, History and Philosophy of Research (esp. Philosophical evolution, pathways to major discoveries & inventions), Research Process decision, planning, conducting, Classification of Research Methods; Reflective Thinking, Scientific Thinking.

Research problem formulation: Literature review- need, objective, principles, sources, functions & its documentation, problem formulation esp. sources, considerations & steps, Criteria of a good research problem, Defining and evaluating the research problem, Variables esp. types & conversion of concepts to variables. Research design esp. Causality, algorithmic, quantitative and qualitative designs, Various types of designs. Characteristics of a good research design, problems and issues in research design; Hypotheses: Construction, testing, types, errors; Design of experiments especially classification of designs and types of errors. [8 lectures]

Unit 2 Problem solving
: Understanding the problem- unknowns, data & conditions, conditions - satisfiability, sufficiency, redundancy & contradiction, separation of parts of the problem and conditions, notations; devising a plan- connection between data and unknown, similar/related problems, reuse of previous solutions, rephrasing/transforming the problem, solving partial or related problem, transforming data and unknowns; carrying out the plan- esp. correctness of each step in multiple ways; evaluation of solution and method- checking correctness of solution, different derivations, utility of the solution. [5 lectures]

Unit 3 Theoretical methods of research
: Algorithmic methods including probabilistic, soft computing, and numerical methods; Modeling and Simulation; Engineering Design & Optimization (techniques); Statistical methods in research: Central tendency, Dispersions, Skewness, Moments, Kurtosis, esp. Distributions, Time series, Overview of Non-parametric tests & Multivariate analysis; Emerging techniques in discrete mathematics, algorithms, probability-statistics, internet technology and software engineering, and their application to research in computer science and information technology. [8 lectures]

Unit 4 Foundation of Hypothesis: Meaning of assumption, postulate and hypothesis, nature of hypothesis, function and importance of hypothesis, Characteristics of good hypothesis, formulating hypothesis. [2 Lectures]

Unit 5 Data & Reports: Infrastructural setups for research; Methods of data collection esp. validity and reliability, Sampling; Data processing and Visualization espicially Classification; Ethical issues espicially. bias, Misuse of statistical methods, Common fallacies in reasoning. Research Funding & Intellectual Property; Research reports: Research Proposal & Report writing esp. Study objectives, study design, problems and limitations; Prototype micro-project report implementing a major part of all the above (compulsory assignment) [5 lectures]

Course guidelines:
Faculty member will introduce the elementary ideas of most of the topics with emphasis on 3-5 topics preferably from those that are highlighted.

Books:

1. Teaching Methodology, Caroline W. Ndirangu, African Virtual University.

2. R. Paneerselvan: Research Methodology, Prenctice-Hall India

3. G. Polya, How to Solve It, Princeton University Press

4. Fundamental of Research Methodology and Statistics, Yogesh Kumar Singh, New Age International Publishers.

5. Research Methodology Methods and Techniques (Second Revised Edition), C. R. Kothari, New Age International Publishers.

PGIT302 – Electives. (List not received yet.)