Jabalpur Engineering College, Jabalpur

Semester IV Credit Based Grading System (CBGS) w.e.f. July 2017

Scheme of Examination

Bachelor of Engineering B.E. (Information Technology)

Subject wise distribution of marks and corresponding credits

Scheme of Examination w.e.f. July-2017 (Academic Session-2017-18)

S. No.	Subject Code	Subject Name & Title	Maximum Marks Allotted						Hours / week.			Total Credits	Total Marks
			Theory			Practical		Total Marks					
			End Sem	Mid Sem. MST	Quiz, Assignment	End Sem.	Lab Work		L	T	P		
1	**MA4301**	Mathematics-III	70	20	10	-	-	100	3	1	-	4	
2	**IT4002**	Algorithm Design and Analysis	70	20	10	30	20	150	3	1	2	6	
3	**IT4003**	Principles of Communication	70	20	10	30	20	150	3	1	2	6	
4	**IT4004**	Computer Architecture	70	20	10	30	20	150	3	1	2	6	
5	**IT4005**	Structured System Analysis and Design	70	20	10	-	-	100	3	1	-	4	
6	**IT4006**	Python Programming Language Lab	-	-	-	30	20	50	-	-	2	2	
7	**IT4007**	Basic Computer Hardware (Internal Assessment)	-	-	-	-	50	50	-	-	2	2	
8	**IT4008**	Professional Ethics in Engineering (Internal Assessment)	-	-	-	-	50	50	-	-	2	2	
Total			**350**	**100**	**50**	**120**	**180**	**800**	**15**	**5**	**12**	**32**	**800**

MST: Minimum of two mid semester tests to be conducted.

L: Lecture T: Tutorial P: Practical

- **Students have to go for Industrial Training /Internship of 4 weeks at the end of IV Semester.**

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B.E. (CBGS) IV SEMESTER
INFORMATION TECHNOLOGY
MATHEMATICS-III

Course	Subject Title	Subject Code	Grade for End Sem.		CGPA at the end of every even semester
			T	P	
B.E. (CBGS)	Mathematics-III	MA4301	Min. "D"	Min. "D"	5.0

Unit-I:

Roots of algebraic and transcendental equations: Bisection method, Regula-Falsi method, Newton-Raphson method, iteration method, Graffes root squaring method.

Solution of system of linear equations: Gauss elimination method, Gauss Jordan method, LU decomposition method, relaxation method, Jacobi and Gauss-Seidel methods.

Unit –II:

Interpolation: Finite difference operator and their relationships, difference tables, Newton, Gauss, Bessel and Stirling's interpolation formulae, Divided differences, Lagrange Interpolation and Newton's divided difference interpolation.

Numerical differentiation and Integration: First and second order derivatives by various interpolation formulae, Trapezoidal, Simpsons 1/3rd and 3/8th rules with errors and their combinations, Gauss Legendre 2-points and 3-points formulae.

Unit –III:

Numerical Solution of ordinary differential equations: Solution of ODE by Taylor series, Picard's method, Modified Euller method, Runge-kutta Method, predictor corrector method.

Numerical solution of Partial Differential Equations :Classification, Finite –difference approximation to derivatives, solution of Laplace's equation by Jecobi's and Gauss Seidel method, parabolic equation, Iterative method for the solution of equations, Hyperbolic equation and its numerical solution.

Unit –IV:

Stochastic process and Markov Analysis: Introduction to stochastic process , Simple stochastic processes, Markove process, transition probability, Transition probability matrix, Markov chain, Some theorems and problems.

Unit –V:

Queuing Theory: Queuing systems, Transient and steady state, traffic intensity, Distribution of queuing systems, classifications of queuing models (M/M/1: infinity/FCFS, M/M/1: N / FCFS, M/M/1: infinity/SIRO, M/M/S: infinity/ FCFS, M/M/C: infinity/FCFS, M/M/R: (k/GD); K<R, Power supply model)

Books References:

1. Numerical Methods in Engineering and science by B.S. Grewal, Khanna Publishers.
2. Numerical Methods by E. Balagurusamy, Tata Mc Graw- Hill Publishing CompanyLtd., New Delhi.
3. Numerical Methods for Scientific and Engineering Computation by Jain, M. K. , Iyengar, S. R. K. and Jain, R. K., New Age Pvt. Pub.New Delhi.
4. Operation Research, Taha H.A; PHI.
5. Introduction to OR, Hiller and Lieberman; TMH.

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B.E. (CBGS) IV SEMESTER
INFORMATION TECHNOLOGY
ALGORITHM DESIGN AND ANALYSIS

Course	Subject Title	Subject Code	Grade for End Sem.		CGPA at the end of every even semester
			T	P	
B.E. (CBGS)	Algorithm Design and Analysis	IT4002	Min. "D"	Min. "D"	5.0

Unit- I:

Algorithm properties. Analysis of Algorithms: Priori analysis and Posteriori analysis. Worst, Best and Average case analysis. RAM model for analysis. Space and Time Complexities of algorithms. Step count and Recurrence, Relation. Asymptotic notations Big O , Big Ω, θ, little o, little ω.

Unit –II:

Introduction to divide and conquer technique, analysis, design and comparison of various algorithms based on this technique, example binary search, merge sort, quick sort, and Stassen's matrix multiplication.

Unit –III:

Study of Greedy strategy, examples of greedy method like optimal merge patterns, Huffman coding, minimum spanning trees, knapsack problem, job sequencing with deadlines, single source shortest path algorithm, etc.

Unit –IV:

Concept of dynamic programming, problems based on this approach such as 0/1 knapsack, multistage graph, reliability design, Floyd-War shall algorithm, etc. Backtracking concept and its examples like 8 queen's problem, Hamiltonian cycle, Graph coloring problem etc.

Unit –V:

Introduction to branch & bound method, examples of branch and bound method like traveling salesman problem etc. Lower bound theory and its use in solving algebraic problem. Deterministic and Non Deterministic Algorithm. NP-completeness: P, NP, NP-Hard and NP-Complete problems.

Text Books:

1. Horowitz & Sahani; Analysis & Design of Algorithm.
2. Anany Levitin, "Introduction to the Design and Analysis of Algorithm", Pearson Education Asia, 2003.

Books References:

1. Coremen Thomas, Leiserson CE, Rivest RL; Introduction to Algorithms; PHI.
2. Dasgupta; algorithms; TMH
3. Ullmann; Analysis & Design of Algorithm;
4. Michael T Goodrich, Robarto Tamassia, Algorithm Design, Wiely India

ALGORITHM DESIGN AND ANALYSIS LAB

Suggested Practical's List

Module no	Module name	Suggested Experiment list
1	**Introduction to analysis of algorithm**	selection sort insertion sort (for this experiment comparative analysis on the basis of comparison required to sort list is expected for large values of n)
2	**Dividend Conquer**	--binary search -finding minimum and maximum -**Merge sort analysis*** **-Quick sort analysis*** (the above two experiments marked as * should be considered as single experiment. For this experiment comparative analysis on the basis of comparisons required to sort list is expected for large values of n) -Strassen's matrix multiplication -The problem of multiplying long integers -**constructing Tennis tournament***
3	**Greedy Method**	**-Knapsack problem*** -Job sequencing with deadlines -**Minimum cost spanning trees-Kruskal and prim's algorithm*** -Optimal storage on tapes -Single source shortest path
4	**Dynamic Programming**	-Multistage graphs -all pair shortest path -single source shortest path -**Optimal binary search tree*** -0/1 knapsack -**Travelling salesman problem*** -Flow shop scheduling
5	**Backtracking**	**--8 queen problem(N-queen problem)*** -Sum of subsets -Graph coloring -Knapsack problem
6	**String Matching Algorithms**	-The naïve string matching Algorithms -The Rabin Karp algorithm -String matching with finite automata -The knuth-Morris-Pratt algorithm **-Longest common subsequence algorithm***
7	**Branch and bound**	**-15 puzzle problem*** -Travelling salesman problem

Implementations Programming Language must be in 'C'

B.E. (CBGS) IV SEMESTER
INFORMATION TECHNOLOGY
PRINCIPLES OF COMMUNICATION

Course	Subject Title	Subject Code	Grade for End Sem.		CGPA at the end of every even semester
			T	P	
B.E. (CBGS)	Principles of Communication	IT4003	Min. "D"	Min. "D"	5.0

Unit –I:

Data and signal-Analog and digital signals, Time and frequency domain, Composite signals, Bandwidth, bit rate, bit length, Baseband and broadband transmission, Attenuation, distortion, noise, Nyquist bit rate ,Shannon capacity ,Throughout, delay ,Jitter, Bandwidth delay product.

Unit –II:

Sampling theorem, quantization, PCM, Delta modulation, Adaptive delta modulation, DPCM, bandwidth of PCM and delta modulation.ASK, BPSK, QPSK, DPSK, BFSK.

Unit –III:

Data transmission – Parallel and serial transmission, synchronous, and Asynchronous transmission, Simplex, half duplex and full duplex , unipolar and polar line codes, Non return to zero codes, return to zero codes, bipolar line codes, bauds , modem, Line configurations Point to point and point to multipoint configuration. Multiplexer: TDM, FDM, WDM. Data compression devices, Inverse multiplexer.

Unit –IV:

Digital interface standards: RS-232 standard, hand shaking, connecting a DTE in RS-232 C, RS 449, RS-422A and RS-423A standards, RS 485 standards. High-speed desktop serial interfaces. Remote digital transmission carrier ISDN, Packet data network, Modems, multispeed modems, high speed modems, Error Correcting modems, data compression in modems. Short-wave modems.

Unit –V:

Data Integrity, sources of error control approaches. Implementation of error control Echo checking parity checking and cyclical purity, Hammering code, checksums, Cyclical Redundancy check. Security and security measures. Transmission media-Guided and unguided media, twisted pair, Unshielded twisted pair and Shielded twisted pair, coaxial cable, optical cable.

Text Book:

1. Data & Computer Communication, William Stallings – Pearson Education.

Books References:

1. Data & Network Communication, Michael A. Miller – DELMAR (Thomson learning) / Vikas Publication.
2. Understanding Data Communication & Networks, William A Shay – Thomson Learning / Vikas Publication.

PRINCIPLES OF COMMUNICATION LAB

List of Experiment:

1. Sampling of Analogy Signals.
2. TDM System.
3. FDM System.
4. PCM coding and decoding.
5. Delta modulation and Demodulation.
6. ASK, FSK and PSK encoding and decoding.
7. To study serial interface RS-232.
8. To study PC to Printer handshaking.
9. Study of Modem interfacing with PC.
10. Write a program in 'c' for PC to PC communication using RS-232 port.
11. Study of different transmission media.
12. Study error detection method CRC.
13. Write a program in 'c' for compute checksum.

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B.E. (CBGS) IV SEMESTER
INFORMATION TECHNOLOGY
COMPUTER ARCHITECTURE

Course	Subject Title	Subject Code	Grade for End Sem.		CGPA at the end of every even semester
			T	P	
B.E. (CBGS)	Computer Architecture	IT4004	Min. "D"	Min. "D"	5.0

Unit –I:

Computer Basics and CPU: Von Newman model, various subsystems, CPU, Memory, I/O, System Bus, CPU and Memory registers, Program Counter, Accumulator, Instruction register, Micro operations, Register Transfer Language, Instruction Fetch, decode and execution, data movement and manipulation, Instruction formats and addressing modes of basic computer.

Unit-II:

Control Unit Organization: Hardwired control unit , Micro programmed control unit Control Memory, Address Sequencing, Micro Instruction formats, Micro program sequencer, Microprogramming, Arithmetic and Logic Unit: Arithmetic Processor, Addition, subtraction, multiplication and division, Floating point and decimal arithmetic and arithmetic units, design of arithmetic unit.

Unit-III:

System Organization: Modes of data transfer – program controlled, interrupt driven and direct memory access, Interrupt structures, I/O Interface, Asynchronous data transfer, I/O processor , Multiprocessors: Pipeline and Vector processing, Instruction and arithmetic pipelines, Vector and array processors, Interconnection structure and inter-processor communication.

Unit-IV:

Memory organization: Memory Maps, Memory Hierarchy, Cache Memory - Organization and mappings. Associative memory, Virtual memory, Memory Management Hardware.

Unit-V:

Introduction to Microprocessor: 8085 architecture and organization, instruction set , counters and timing delays, stacks and subroutines , 8085 I/O structure, Interrupts , basic Interfacing concept , memory mapped and I/O mapped I/O, basic programming.

Books References:

1. Morris Mano: Computer System Architecture, PHI.
2. Gaonkar: Micro processor Architecture, Programming, Applications with 8085; Penram Int.
3. Tanenbaum: Structured Computer Organization, Pearson Education
4. J P Hayes, Computer Architecture and Organizations, Mc- Graw Hills, New Delhi
5. William Stallings: Computer Organization and Architecture, PHI
6. ISRD group; Computer Organization; TMH
7. Cart er; Comp ut er Architecture (Schaum); TMH
8. Carl Hamacher: Computer Organization, TMH

COMPUTER ARCHITECTURE LAB

List of Assemble Language Program

1. Write an 8085 ALP to find sum and average of 'n' integer numbers.
2. Write an 8085 ALP to find the factorial of a number.
3. Write an 8085 to find HCF of 2 unsigned 8-bit numbers.
4. Write an 8085 ALP to find LCM of 2, 8-bit unsigned numbers.
5. Write an 8085 ALP to print 'n' Fibonacci numbers.
6. Write an 8085 ALP to reverse a given string.
7. Write an 8085 ALP program to find the largest number from the array of numbers.
8. Write an 8085 ALP to perform Decimal to Binary conversions.
9. Write an 8085 ALP to perform Decimal to octal conversions.
10. Write an 8085 ALP that reads a list of numbers and makes a count of Even and Odd numbers.

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B.E. (CBGS) IV SEMESTER
INFORMATION TECHNOLOGY
STRUCTURED SYSTEM ANALYSIS AND DESIGN

Course	Subject Title	Subject Code	Grade for End Sem.		CGPA at the end of every even semester
			T	P	
B.E. (CBGS)	Structured System Analysis and Design	IT4005	Min. "D"	Min. "D"	5.0

Unit – I:

Introduction: System Definition and concepts: General Theory systems, Manual and automated systems, Real-life Business Sub-Systems. System Environments and Boundaries, Real-time and distributed systems, Basic principles of successful systems, Approach to system development: Structured System Analysis and Design, Prototype, Joint Application Development, Role and Need of Systems Analyst. Qualifications and responsibilities, System Analysis as a Profession.

Unit – II:

System Development Cycle: Introduction to Systems, Development Life Cycle (SDLC). Various phases of SDLC: Study Analysis, Design, Development, Implementation, Maintenance; Documentation: Principles of Systems Documentation, Types of documentation and their importance, Enforcing documentation discipline in an organization

Unit –III:

System Planning: Data and fact gathering techniques: Interviews, Group Communication -Questionnaires; Assessing Project Feasibility: Technical, Operational, Economic, Cost Benefits Analysis, Schedule, Legal and contractual, Political. Modern Methods for determining system requirements: Joint Application, Development Program, Prototyping, Business Process Re- engineering. System Selection Plan and Proposal

Unit –IV:

Modular and Structured Design: Module specifications, Top-down and bottom-up design. Module coupling and cohesion. Structure Charts.

Unit –V:

System Design and Modeling: Process Modeling, Logical and physical design, Conceptual Data Modeling: Entity /Relationship Analysis, Entity-Relationship Modeling, ERDs and DFDs, Concepts of Normalization. Process Description: Structured English, Decision Tree, Table; Documentation: Data Dictionary, Recording Data Descriptions.

Input/output and Interface Design: Classification of forms, Input/output forms design. User-interface design, Graphical interfaces. Standards and guidelines for GUI design, Designing Physical Files and Databases: Designing Fields, Designing Physical Records, Designing Physical Files, Designing Databases, Introduction to CASE Tools; Features, Advantages and Limitations of CASE Tools, Awareness about some commercial CASE Tools.

System Implementation and Maintenance: Planning considerations, Conversion methods, procedures and controls, System acceptance criteria, System Evaluation and Performance, Testing and Validation. Preparing, User Manual, Maintenance Activities and Issues.

Books References :

1. Hoofer J. A, George J.F, Valacich J.S, and Panigrahi P.K "Modern Systems Analysis and Design", Pearson Education, 2007.
2. A. Dennis and B. H. Wixom, "Systems Analysis and Design", John Wiley & Sons, Inc.
3. Whitten J. L, Bentley L. D, "Systems Analysis and Design Methods", Tata McGraw-Hill, 2008.
4. Kendall & Kendall, "Systems Analysis and Design", Seventh Edition, Pearson Education.

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B.E. (CBGS) IV SEMESTER
INFORMATION TECHNOLOGY
PYTHON PROGRAMMING LANGUAGE LAB

Course	Subject Title	Subject Code	Grade for End Sem.		CGPA at the end of every even semester
			T	P	
B.E. (CBGS)	Python Programming Language Lab	IT4006	Min. "D"	Min. "D"	5.0

Unit –I:

Introduction to Python Programming Language: Introduction to Python Language, Strengths and Weaknesses, IDLE, Dynamic Types, Naming Conventions, String Values, String Operations, String Slices, String Operators, Numeric Data Types, Conversions, Built In Functions

Unit –II:

Data Collections and Language Component: Introduction, Control Flow and Syntax, Indenting, the if Statement, Relational Operators, Logical, Operators, True or False, Bit Wise Operators, The while Loop, break and continue, the for Loop, Lists, Tuples, Sets, Dictionaries, Sorting Dictionaries, Copying Collections.

Unit –III:

Object and Classes: Classes in Python, Principles of Object Orientation, Creating Classes, Instance Methods, file Organization, Special Methods, Class Variables, Inheritance, Polymorphism, Type Identification, Custom Exception Classes.

Unit –IV:

Functions and Modules: Introduction, Defining Your Own Functions, Parameters, Function Documentation, Keyword and Optional Parameters, Passing Collections to a Function, Variable Number of Arguments, Scope, Functions - "First Class Citizens", Passing Functions to a Function, Mapping Functions in a Dictionary, Lambda, Modules, Standard Modules – sys, Standard Modules – math, Standard Modules – time, The dir Function

Unit –V:

I/O and Error Handling In Python: Introduction, Data Streams, Creating Your Own Data Streams, Access Modes, Writing Data to a File, Reading Data From a File, Additional File Methods, Using Pipes as Data Streams, Handling IO Exceptions, Working with Directories, Metadata, Errors, Run Time Errors, The Exception Model, Exception Hierarchy, Handling Multiple Exceptions

Books References:

1. Dive into Python, Mike
2. Learning Python, 4_{th} Edition by MarkLutz
3. Programming Python, 4_{th} Edition by MarkLutz

PYTHON PROGRAMMING LANGUAGE LAB

Suggested list of experiments:

Name of Experiment:

1. Write python program to Hello World using string variable.
2. Write python program to store data in list and then try to print them.
3. Write python program to do basic trim and slice on string.
4. Write python program to print list of numbers using range and for loop.
5. Write python program to store strings in list and then print them.
6. Write python program to let user enter some data in string and then verify data and print welcome to user.
7. Write python program in which an function is defined and calling that function prints Hello World.
8. Write python program in which an function(with single string parameter) is defined and calling that function prints the string parameters given to function.
9. Write python program in which an class is define, then create object of that class and call simple print function define in class.

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B.E. (CBGS) IV SEMESTER
INFORMATION TECHNOLOGY
BASIC COMPUTER HARDWARE

Course	Subject Title	Subject Code	Grade for End Sem.		CGPA at the end of every even semester
			T	P	
B.E. (CBGS)	Basic Computer Hardware	IT4007	Min. "D"	Min. "D"	5.0

Suggested list of experiment

1. Front panel indicators & switches and Front side & rear side Connectors.
2. Familiarize the computer system Layout: Marking positions of SMPS, Motherboard, FDD, HDD, CD, DVD and add on cards.
3. Configure BIOS setup program and troubleshoot the typical problems using BIOS utility.
4. Install Hard Disk and configure to the Pc's
5. Install and Configure a DVD Writer and a Blu-ray Disc writer and recording DVD and Blu-ray disk.
6. Printer Installation and Servicing and troubleshoot
7. Install and configure Scanner, Web cam, Cell phone and bio-metric device with system and troubleshoot the problems
8. Assemble a system with add on cards and check the working condition of the system and install OS.
9. Install and Configure Dual OS Installation
10. Assembling PC
11. Assembling and Disassembling of Laptop to identify the parts and to install OS and configure it.

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B.E. (CBGS) IV SEMESTER
INFORMATION TECHNOLOGY
PROFESSIONAL ETHICS IN ENGINEERING

Course	Subject Title	Subject Code	Grade for End Sem.		CGPA at the end of every even semester
			T	P	
B.E. (CBGS)	Professional Ethics in Engineering	IT4008	Min. "D"	Min. "D"	5.0

HUMAN VALUES SYLLABUS: Morals, values and Ethics – Integrity – Work ethic – Service learning – Civic virtue – Respect for others – Living peacefully – Caring – Sharing – Honesty – Courage – Valuing time – Cooperation – Commitment – Empathy – Self-confidence – Character – Spirituality – Introduction to Yoga and meditation for professional excellence and stress management.

ENGINEERING ETHICS: Senses of „Engineering Ethics" – Variety of moral issues – Types of inquiry – Moral dilemmas – Moral Autonomy – Kohlberg"s theory – Gilligan"s theory – Consensus and Controversy – Models of professional roles – Theories about right action – Self-interest – Customs and Religion – Uses of Ethical Theories.

ENGINEERING AS SOCIAL EXPERIMENTATION: Engineering as Experimentation – Engineers as responsible Experimenters – Codes of Ethics – A Balanced Outlook on Law.

SAFETY, RESPONSIBILITIES AND RIGHTS: Safety and Risk – Assessment of Safety and Risk – Risk Benefit Analysis and Reducing Risk – Respect for Authority – Collective Bargaining – Confidentiality – Conflicts of Interest – Occupational Crime – Professional Rights – Employee Rights – Intellectual Property Rights (IPR) – Discrimination.

GLOBAL ISSUES: Multinational Corporations – Business Ethics - Environmental Ethics – Computer Ethics - Role in Technological Development – Weapons Development – Engineers as Managers – Consulting Engineers – Engineers as Expert Witnesses and Advisors – Honesty – Moral Leadership – Sample Code of Conduct

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