

Rashtrasant Tukadoji Maharaj Nagpur University, Nagpur  
Scheme of Absorbtion of New course(C.B.S.) to Old course of Fifth Semester  
B. E. (Information Technology)

As per Old course scheme of RTM,  
Nagpur University

Sr. No	Sem	Subjects	Th/Pr
1	V	System Software	Th
2	V	Computer Graphics	Th
3	V	Computer Graphics	Pr
4	V	Principles of Management	Th
5	V	Information Theory and Data Communication	Th
6	V	Information Theory and Data Communication	Pr
7	V	Discrete and Integrated Circuits	Th
8	V	Discrete and Integrated Circuits	Pr
9	V	Object Oriented Methodologies	Th
10	V	Object Oriented Methodologies	Pr

As per New course(C.B.S.) scheme of RTM,  
Nagpur University

Subject Code	Subjects	Th/Pr
BEIT501T	System Programming	Th
BEIT504T	Computer Graphics	Th
BEIT504P	Computer Graphics	Pr
BEIT506T	Industrial Economics and Entrepreneurship Development	Th
BEIT502T	Design and Analysis of Algorithms	Th
BEIT503T	Software Engineering	Th
BEIT503P	Software Engineering	Pr
BEIT505T	Java Programming	Th
BEIT505P	Java Programming	Pr

**Note:** If any student has cleared any subject as mentioned in absorption scheme of relevent semester in previous semester of old course will be exempted for appearing in the examination for that subject

BEIT501T

SYSTEM PROGRAMMING  
(Theory Credit: 04)

Teaching Scheme:

Lecture: 3 Hours/week

Tutorial: 1 Hour/week

Examination Scheme:

Theory: T (U): 80 Marks T (I): 20 Marks

Duration of University Exam. : 03 Hours

UNIT I:

Introduction to System Software and IBM 360 Machine:

Evolution of components of programming system, Operating System, Overview, Functions and Facilities of, Goals of System software, Views of System Software, Virtual machine. General machine structure IBM 360/370, Machine Language Assembly language.

UNIT II:

Assembler:

Design of Pass-I and Pass-II Assemblers, Table Processing, Searching and Sorting, Problems based on symbol table, Base table and Literal table generation, Machine code generation and Searching and sorting.

UNIT III:

Macro Language and Macro Processor:

Macro instruction, Features of Macro facility, Implementation of 1-Pass, 2-Pass Macro processor, Macro calls within macro, macro definition within macros.

UNIT IV:

Loaders and Linkers:

Different Loading Schemes, Binders, Overlays, Linking loaders, Design of absolute loaders, Design of Direct Linking loaders.

UNIT V:

Compiler:

Phases of Compiler, Cross Compiler, Bootstrapping, Errors in each phases, Compiler writing tools, Lex and YACC, Databases used in Compilation process.

UNIT VI:

UNIX Device Drivers:

Introduction to Device drivers, Types of Device Drivers, Design issues in Device Drivers, Driver installation with example, character driver-A/D Converter, Block Driver-RAM Disk driver, Terminal Driver-The COM1 port driver

Text Books:

1. J. J. Donovan; System Programming; TMH, 2012
2. D.M. Dhamdhare; System Programming; THM; 2011
3. George Pajari; Eritting Unix Device Drivers; Pearson Education; 2011
4. O.G. Kakade; Principles of Compiler Design; Laxmi Pub. 2008

Reference Books:

1. Leland Beck, D. Manjula; System Software; An Introduction to System Programming; Pearson Education; 2013
2. Alfred Aho, J. Ullman; Principles of Compiler Design; Narosa Pub. 2010

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BEIT502T

DESIGN AND ANALYSIS OF ALGORITHMS

(Theory Credit: 05)

Teaching Scheme:

Lecture: 4 Hours/week

Tutorial: 1 Hour/week

Examination Scheme:

Theory: T (U): 80 Marks T (I): 20 Marks

Duration of University Exam. : 03 Hours

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UNIT I :

Mathematical foundation, summation of arithmetic and geometric series,  $\Sigma n$ ,  $\Sigma n^2$ , bounding summation using integrations, recurrence relations, solutions of recurrence relations using technique of characteristic equation, recursion tree method and master theorem, generating functions, Complexity calculation of various standard functions, principles of designing algorithms

UNIT II :

Asymptotic notations of analysis of algorithms, analyzing control structures, worst case, average case and best case analysis of insertion sort, selection sort and bubble sort, lower bound proof, amortized analysis, application of amortized analysis, Sorting networks, comparison networks, biotonic sorting network.

UNIT III :

Divide and conquer strategies: Binary search, quick sort, merge sort, heap sort, Strassen's matrix multiplication algorithm, min-max algorithm. Greedy Approach: Basic strategy, activity selection problem, application to job sequencing with deadlines problem, knapsack problem, optimal merge pattern, Huffman code, minimum cost spanning tree using Prim's and Kruskal's algorithm,

UNIT IV :

Dynamic Programming: Basic Strategy, Multistage graph (forward and backward approach), Longest Common Subsequence, matrix chain multiplication, Optimal Binary Search Tree, 0/1 Knapsack problems, Travelling Salesman problem, single source shortest path using Bellman-Ford algorithm, all pair shortest path using Floyd- Warshall algorithm.

UNIT V :

Basic Traversal and Search Techniques, breadth first search and depth first search, connected components. Backtracking: basic strategy, 4-Queen's problem, 8-Queen's problem, graph coloring, Hamiltonian cycles etc, Approximation algorithm and concepts based on approximation algorithms

UNIT VI :

NP-hard and NP-complete problems, basic concepts, non-deterministic algorithms, NP-hard and NP-complete, Cook's theorem, decision and optimization problems, polynomial reductions, graph based problems on NP Principle, Computational Geometry, Approximation algorithm.

Text Books:

1. "Introduction to Algorithms", Thirs Edition, Prentice Hall of India by Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, Clifford Stein.
2. "The Design and Analysis of Computer Algorithms", Pearson education by Alfred V. Aho, John E. Hopcraft, Jeffrey D. Ullman.

3. "Fundamentals of Computer Algorithms", Second Edition, University Press By Horowitz, Sahani, Rajsekharan.
4. "Fundamentals of Algorithms", Prentice Hall by Brassard, Bratley
5. "Design and Analysis of Algorithms", Pearson Education, IIInd Edition, Parag Dave, Himanshu Dave

Reference Books:

1. Computer Algorithms: Introduction to Design and analysis, 3rd Edition, By Sara Baase and A. V. Gelder Pearson Education.

BEIT503T

## SOFTWARE ENGINEERING

(Theory Credit: 04)

Teaching Scheme:

Lecture: 3 Hours/week

Tutorial: 1 Hour/week

Examination Scheme:

Theory: T (U): 80 Marks T (I): 20 Marks

Duration of University Exam. : 03 Hours

### UNIT I:

Basics: Introduction to Software Engineering, Software Myths, Software Engineering- A Layered Technology, Software Process Framework, Software Process Models: The Waterfall Model, Incremental Process Models, Evolutionary Process Models, Specialized Process Models, Agile Process Models

### UNIT II:

Measures Metrics and Indicator, Metrics for process & projects: Software measurement, metrics for software quality, metrics for small organization, Estimation: Software scope and Feasibility, Resources, Software project estimation, Decomposition Techniques, Empirical Estimation Models, Make-buy Decision, Project scheduling

### UNIT III:

System Engineering: Hierarchy, Business Process Engineering, Product Engineering, System Modeling, Requirements Engineering: Requirements Analysis, Analysis Modeling Approaches, Data Modeling, Object-Oriented Analysis, Scenario-Based Modeling, Flow-Oriented Modeling, Class-based Modeling, Behavioral Model, Metrics for Analysis Models

### UNIT IV:

Design Engineering Concepts, Design Model, Pattern-Based Software Design, Architectural Design, Mapping data flow into software architecture, Cohesion, Coupling, User interface analysis and Design, Metrics for Design Models

### UNIT V:

Unit Testing, Integration Testing, Validation Testing, System Testing, Art of Debugging, Software Testing Fundamentals, Black-Box Testing, White-Box Testing, Metrics for Source Code, Metrics for Testing & Maintenance

### UNIT VI:

Risk Management: Risk strategies, Software risks, Risk identification, Risk refinement, RMMM Quality Management: Quality Concepts, Software Quality Assurance, Software Reviews, Formal Technical Review, Software Reliability, Change Management: Software Configuration Management, SCM Repository, SCM Process, Reengineering: Software reengineering, Reverse Engineering, Restructuring, Forward Engineering

### Text Books:

1. Software Engineering-A Practitioner's Approach (Sixth Edition) by Roger Pressman (TMH)
2. Software Engineering (Ninth Edition)-Ian Sommerville (Pearson)
3. Software Engineering for students (4<sup>th</sup> Edition)- Douglas Bell(Pearson)

### Reference Books:

1. Schaum's Outline of Theory and Problems of Software Engineering by David Gustafson (TMH)
2. Software Engineering (Third Edition) by K. K. Aggarwal and Yogesh Singh (New age International Publishers)
3. Software Engineering, Theory and Practice(4<sup>th</sup> Edition)- Pfleeger, Atlee(Pearson)

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BEIT503P

SOFTWARE ENGINEERING  
(Practical Credit: 01)

Teaching Scheme:  
Practical: 2 Hours/week

Examination Scheme:  
Practical: P (U): 25 Marks P (I): 25 Marks  
Duration of University Exam. : 02 Hours

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Note:

1. Practicals are based on SOFTWARE ENGINEERING syllabus (subject code: BEIT503T)
2. Practicals are based on:
  - a) DFD
  - b) UML diagrams for software
  - c) Testing Tools
  - d) CASE Tools
3. Minimum ten practicals have to be performed
4. Do not include study experiments

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BEIT504T

## COMPUTER GRAPHICS

(Theory Credit: 05)

Teaching Scheme:

Lecture: 4 Hours/week

Tutorial: 1 Hour/week

Examination Scheme:

Theory: T (U): 80 Marks T (I): 20 Marks

Duration of University Exam. : 03 Hours

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### UNIT I:

Geometry and line generation: points, lines, planes, pixels and frames buffers, types of display devices and its architecture DDA and Bresenham's algorithms for line generation, Bresenham's algorithm for circle generation, aliasing, anti-aliasing and its techniques.

### UNIT II:

Graphics primitives: Display files, algorithms for polygon generation, polygon filling algorithms, NDC (normalized device co-ordinates), 2D transformations: scaling, rotation, translation, rotation about arbitrary point, reflections, shearing.

### UNIT III:

Segment tables: operations on segments, data structures for segments and display files, Windowing and clipping: window, viewport, viewing transformations, clipping, line and Polygon clipping.

### UNIT IV:

3D Graphics: 3D Transformation, parallel, perspective and isometric projections, 3D Transformations. Hidden surfaces and line removal: Painter's, Z-buffer, Warnock's, Back-face Removal algorithm

### UNIT V:

Curves and surfaces: Methods of interpolation, Bezier and B-splines, surface rendering methods: Gouraud Shading, Phong Shading, Constant Intensity Shading, Fast Shading.

### UNIT VI:

Color Models and Color Application: Properties of light, standard primaries, chromaticity Diagram, Intuitive colour concept RGB, YIQ CMY, HSK, colour models and their conversion, colour selection and applications. Animation: Design of Animation sequences, animation Function, Raster animation, animation Language, Key-Frame System, motion Specification.

### Text Books:

1. Procedural elements for computer graphics by David F. Rogers, Mc-Graw Hill.
2. Computer Graphics 'C' Version, Second Edition By Donald Hearn and M.Pauline Baker, Pearson publication
3. Mathematical elements for computer graphics by David Rogers and J. Alan Adams, Tata Mcgraw Hill Education Private Limited
4. Computer graphics principles and practice in C by Foley, Vandam, Feiner and Huges (Pearson)
5. Computer Graphics, Vikas publications, Neeta Jain
6. Principles of interactive computer graphics by Newman and Sproul.

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BEIT504P

COMPUTER GRAPHICS  
(Practical Credit: 01)

Teaching Scheme:  
Practical: 2 Hours/week

Examination Scheme:  
Practical: P (U): 25 Marks P (I): 25 Marks  
Duration of University Exam. : 02 Hours

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Note:

1. Practicals are based on COMPUTER GRAPHICS syllabus (subject code: BEIT504T)
2. There should be at the most two practicals per unit
3. Minimum ten practicals have to be performed
4. Do not include study experiments

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BEIT505T

## JAVA PROGRAMMING

(Theory Credit: 04)

Teaching Scheme:

Lecture: 3 Hours/week

Tutorial: 1 Hour/week

Examination Scheme:

Theory: T (U): 80 Marks T (I): 20 Marks

Duration of University Exam. : 03 Hours

### UNIT I:

Introduction to Java, Data types, Literals: Types of Literals, Operators, Control Statements: If, switch, do-while, while, for, enhanced for loop, Nested Loop, break, continue, return statements, Classes: Fundamentals of classes, Declaring objects, Assigning objects, Reference variables, Overloading methods, Constructors, this keyword, Wrapper classes, Using object as parameter, Argument passing, Command line arguments, returning object, static modifier, final modifier, Nested classes: inner classes, Garbage collection.

### UNIT II:

Arrays, Vectors and Generics, String Handling: String and StringBuffer class, String constructors, Data conversion using valueOf(), toString() methods, Methods for String Comparison, Searching string and modifying string.

### UNIT III:

Object class, Inheritance, Abstract classes and methods, Interfaces, Method Overriding, Packages: Package Fundamental, Access protection, Importing packages, Exception Handling: Fundamental Exception type: Checked, Unchecked and Uncaught Exceptions, throw and throws keywords, Creating user defined exceptions, Built-in Exceptions.

### UNIT IV:

Multithreading: Fundamentals, Thread Life Cycle, Ways of creating threads, Creating multiple threads, isAlive (), join (), Thread Synchronization, Thread priorities, Interthread communication, Methods for suspending, resuming and stopping threads.

### UNIT V:

I/O stream, Byte stream, Character stream, Pre-defined streams, Reading console input, Writing console output, PrintWriter class, Reading and Writing files, transient and volatile modifiers, instanceof, strictfp and native methods.

### UNIT VI:

Introduction to Swings, AWT as a origin of Swing, Key swing features, Components and container, Swing packages, Event handling, Creating swing applets, Controls: label and image icons, JTextField, Swing Buttons, Tabbed Panes, JScrollPane, JList, JComboBox, JTable.

### Text Books:

1. The Complete Reference (Seventh Edition) by Herbert Schildt, TATA McGRAW-HILL Publications

### Reference Books:

1. Sun Certified Java Programmer for Java 6 by Kathy Sierra.
2. The Java™ Programming Language (3<sup>rd</sup> Edition) by Arnold, Holmes, Gosling, Goteti
3. Core Java for Beginners by Rashmi Kanta Das (III Edition) Vikas Publication
4. Programming in Java (Second Edition) by Sachin Malhotra and Saurabh Choudhary, Oxford University Press

BEIT505P

JAVA PROGRAMMING  
(Practical Credit: 01)

Teaching Scheme:  
Practical: 2 Hours/week

Examination Scheme:  
Practical: P (U): 25 Marks P (I): 25 Marks  
Duration of University Exam. : 02 Hours

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Note:

1. Practicals are based on JAVA PROGRAMMING syllabus (subject code: BEIT505T)
2. There should be at the most two practicals per unit
3. Minimum ten practicals have to be performed
4. Do not include study experiments

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BEIT506T INDUSTRIAL ECONOMICS AND ENTREPRENEURSHIP DEVELOPMENT  
(Theory Credit: 03)

Teaching Scheme:

Lecture: 4 Hours/week

Tutorial: Nil

Examination Scheme:

Theory: T (U): 80 Marks T (I): 20 Marks

Duration of University Exam. : 03 Hours

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**Objective:**

Study of this subject provides an understanding of the scope of an industrial economics and entrepreneurship development, key areas of business development, sources of finance, project preparation, methods of taxation and tax benefits, significance of entrepreneurship and economic growth, application of engineering skills in entrepreneurial activities etc.

**UNIT I:**

Industrial economics, Types of Business structures, top and bottom line of the organization, economic analysis of business, economics of operations, economic prudence in business.

**UNIT II:**

Market structures- Monopoly, Oligopoly, and Monopolistic competition. Pricing strategies, business integration- forward backward integration, economies of scale, diseconomies of scale, liberalization, privatization and globalization. Business cycles, optimum size of firm.

**UNIT III:**

The functions of central bank and commercial banks, Foreign Direct Investment, Free trade vs. Protectionism, Capital formation, Inflation, Recession and stagnation, Inclusive growth, Public-Private partnership for development, Multiplier effect, Accelerator effect.

**UNIT IV:**

Entrepreneurship meaning, Major Motives Influencing an Entrepreneur, Factors Affecting Entrepreneurial Growth. Project Formulation, Product development, Market Survey and Research, Demand forecasting techniques, Techno Economic Feasibility Assessment – Preparation of Preliminary Project Reports – Project Appraisal – Sources of Information – Classification of Needs and Agencies.

**UNIT V:**

Need – Sources of Finance, Term Loans, Capital Structure, venture capital. Angel funding, Financial Institution, management of working Capital, Costing, Break Even Analysis, Network Analysis Techniques of PERT/CPM – Taxation – Direct, Indirect Taxes.

**UNIT VI:**

Sickness in small Business, Major problems faced by SSIs, Foreign Direct Investments and threat to SSI, Technical consultancy organizations, safeguard measures against variation in currency value, Government Policy for Small Scale Enterprises, tax holidays, and incentives to SSIs.

**TEXT BOOKS**

Industrial Economics. By, Ranjana Seth, Ane Book Pvt Ltd.

Modern Economic Theory By, K.K. Dewett. S.Chand.

Industrial Economics. By, Jagdish Sheth, Pearson Publication.

“Entrepreneurial Development” By, S.S.Khanka S.Chand & Co. Ltd. Ram Nagar New Delhi, 1999.

Hisrich R D and Peters M P, “Entrepreneurship” 5th Edition Tata McGraw-Hill, 2002.

Management of Entrepreneurship. By, N.V.R. Naidu, I.K. International Pvt Ltd.

Entrepreneurial Development. By, S.Anil Kumar. New Age International.

Small- Scale Industries and Entrepreneurship, By, Dr. Vasant Desai, Himalaya Publication.

**REFERENCE BOOKS:**

Business Economics. By, K.Rajgopalchar. Atalantic Publishers.

Microeconomics. By, Robert Pindyk

Business Economics. By, H.L. Ahuja,H. L. Ahuja,Louis Prof. De Broglie. S.Chand.

Rabindra N. Kanungo “Entrepreneurship and innovation”, Sage Publications, New Delhi, 1998.

Financing Small Scale Industries in India, By, K.C.Reddy.Himalaya Publication.

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