# Annexure-I



**w.e.f.2024-25**



**DIET23**

**B.Tech**

**COMPUTER SCIENCE & ENGINEERING**

**(B.Tech 2nd Year Syllabus)**

**Department of Computer Science & Engineering**

**(B.Tech CSE**

**Programme Accredited by**

**NBA)**



**DHANEKULA INSTITUTE OF ENGINEERING & TECHNOLOGY**

**(Approved by AICTE, Accredited by NBA, Affiliated to JNTUK, Kakinada)**

**Ganguru, Vijayawada**

**Andhra Pradesh-521 139, INDIA.**

[**www.diet.ac.in**](http://www.diet.ac.in/)

## DHANEKULA INSTITUTE OF ENGINEERING & TECHNOLOGY

**Department of Computer Science & Engineering**

## VISION – MISSION - PEOs

|  |  |
| --- | --- |
| **Institute Vision** | Pioneering Professional Education through Quality |
| **Institute Mission** | Providing Quality Education through state-of-art infrastructure, laboratories and committed staff.  Moulding Students as proficient, competent, and socially responsible engineering personnel with ingenious intellect.  Involving faculty members and students in research and development works for betterment of society. |
| **Department Vision** | To empower students of Computer Science & Engineering Department to be technologically adept, innovative, global citizens possessing human values. |
| **Department Mission** | Encourage students to become self-motivated and problem-solving individuals.  Prepare students for professional career with academic excellence and leadership skills.  Empower the rural youth with computer education.  Create Centre’s of excellence in Computer Science & Engineering. |
| **Program Educational Objectives(PEOs)** | Graduates of Computer Science & Engineering will:  **PEO1:** Excel in Professional career through knowledge in mathematics and engineering principles.  **PEO2:** Able to pursue higher education and research.  **PEO3:** Communicate effectively, recognize, and incorporate societal needs in their professional endeavors.  **PEO4:** Adapt to technological advancements by continuous learning. |

**DHANEKULA INSTITUTE OF ENGINEERING & TECHNOLOGY**

## Department of Computer Science & Engineering

**POs/PSOs**

## List Program Outcomes

|  |  |
| --- | --- |
| **1** | **Engineering Knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals and an engineering specialization to the solution of complex engineering  problems. |
| **2** | **Problem analysis**: Identify, formulate, review research literature, and analyze complex  engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences. |
| **3** | **Design/development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and  environmental considerations |
| **4** | **Conduct investigations of complex problems**: Use research-based knowledge and  research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions. |
| **5** | **Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex  engineering activities with an understanding of the limitations. |
| **6** | **The engineer and society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent  responsibilities relevant to the professional engineering practice. |
| **7** | **Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the  knowledge of, and need for sustainable development. |
| **8** | **Ethics**: Apply ethical principles and commit to professional ethics and responsibilities  and norms of the engineering practice. |
| **9** | **Individual and team work**: Function effectively as an individual, and as a member or  leader in diverse teams, and in multi disciplinary settings. |
| **10** | **Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give  and receive clear instructions. |
| **11** | **Project management and finance**: Demonstrate knowledge and understanding of the  engineering and management principles and apply these to one’s own work, as a member and leader in a team, to manage projects and in multidisciplinary environments. |
| **12** | **Life-long learning**: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change. |

**List Program Specific Outcomes**

**PSO1:** Have expertise in algorithms, networking, web applications and software engineering for efficient design of computer-based systems of varying complexity.

**PSO2:** Qualify in national international level competitive examinations for successful higher studies and employment.

**B.Tech – II Year I Semester**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **S.No.** | **Category** | **Title** | **L** | **T** | **P** | **Credits** |
| 1 | BS&H | Discrete Mathematics &  Graph Theory | 3 | 0 | 0 | 3 |
| 2 | BS&H | Universal human values – understanding harmony and  Ethical human conduct | 2 | 1 | 0 | 3 |
| 3 | Engineering Science | Digital Logic & Computer  Organization | 3 | 0 | 0 | 3 |
| 4 | Professional Core | Advanced Data Structures &  Algorithm Analysis | 3 | 0 | 0 | 3 |
| 5 | Professional Core | Object Oriented Programming  Through Java | 3 | 0 | 0 | 3 |
| 6 | Professional Core | Advanced Data Structures and  Algorithm Analysis Lab | 0 | 0 | 3 | 1.5 |
| 7 | Professional Core | Object Oriented Programming  Through Java Lab | 0 | 0 | 3 | 1.5 |
| 8 | Skill Enhancement  Course | Python Programming | 0 | 1 | 2 | 2 |
| 9 | Audit Course | Environmental Science | 2 | 0 | 0 | - |
| **Total** | | | **16** | **2** | **8** | **20** |

**B.Tech – II Year II Semester**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **S.No.** | **Category** | **Title** | **L** | **T** | **P** | **Credits** |
| 1 | Management Course- I | Managerial Economics and  Financial Analysis | 2 | 0 | 0 | 2 |
| 2 | Engineering Science/ Basic Science | Probability & Statistics | 3 | 0 | 0 | 3 |
| 3 | Professional Core | Operating Systems | 3 | 0 | 0 | 3 |
| 4 | Professional Core | Database Management Systems | 3 | 0 | 0 | 3 |
| 5 | Professional Core | Software Engineering | 2 | 1 | 0 | 3 |
| 6 | Professional Core | Operating Systems Lab | 0 | 0 | 3 | 1.5 |
| 7 | Professional Core | Database Management  Systems Lab | 0 | 0 | 3 | 1.5 |
| 8 | Skill Enhancement Course | Full Stack Development –I | 0 | 1 | 2 | 2 |
| 9 | BS&H | Design Thinking  &Innovation | 1 | 0 | 2 | 2 |
| **Total** | | | **14** | **2** | **10** | **21** |
| Mandatory Community Service Project Internship of 08 weeks duration during summer vacation | | | | | | |

# II-I Semester



**Regulation**

**D23**

**DISCRETE MATHEMATICS AND GRAPH THEORY**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Course Category: | **BS&H** | Credits: 3 | | | |
| Course Type: | **Theory** | Lecture-Tutorial-Practice: | 3 | 0 | 0 |
| Prerequisites | Mathematical Foundations of Computer Science, Background in linear algebra, data structures and algorithms. | Continuous Evaluation | 30M | | |
| Semester End Evaluation | 70M | | |
| Total Marks | 100M | | |

**Course Outcomes:**

|  |  |  |
| --- | --- | --- |
| After Successful Completion of course, the student will be able to: | | |
| CO No: | Course Outcome Description | K - Level |
| CO1 | Build skills in solving propositional logic | Applying |
| CO2 | Solve problems using sets, functions and relations | Applying |
| CO3 | Applying counting principles to solve problems involving Permutation and Combinations. Solve recurrence relations using substitution and generating functions | Applying |
| CO4 | Analyze the properties of Eulerian and Hamilton Graphs | Analyzing |
| CO5 | Examine the efficiency of algorithms of graphs in different scenarios | Analyzing |

Note: K-Level is defined From Blooms Taxonomy

Contribution of Course Outcomes mapping with POs & PSOs (**1**- Low, **2** – Moderate,**3** – High)

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **CO No.** | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** | **PSO1** | **PSO2** |
| CO1 | 3 | - | - | - | - | - | - | - | - | - | - | - | 3 | 3 |
| CO2 | 3 | - | - | - | - | - | - | - | - | - | - | - | 3 | 3 |
| CO3 | 3 | - | - | - | - | - | - | - | - | - | - | - | 3 | 3 |
| CO4 | - | 3 | - | - | - | - | - | - | - | - | - | - | 3 | 3 |
| CO5 | - | 3 | - | - | - | - | - | - | - | - | - | - | 3 | 3 |

**COURSE CONTENT:**

### UNIT-I: Mathematical Logic

### Propositional Calculus: Statements and Notations, Connectives, Well Formed Formulas, Truth Tables, Tautologies, Equivalence of Formulas, Duality Law, Tautological Implications, Normal Forms, Theory of Inference for Statement Calculus, Consistency of Premises, Indirect Method of Proof, Predicate Calculus: Predicates, Predicative Logic, Statement Functions, Variables and Quantifiers, Free and Bound Variables, Inference Theory for Predicate Calculus.

### UNIT-II: Set Theory

Sets: Operations on Sets, Principle of Inclusion-Exclusion, Relations: Properties, Operations, Partition and Covering, Transitive Closure, Equivalence, Compatibility and Partial Ordering, Hasse Diagrams, Functions: Bijective, Composition, Inverse, Permutation, and Recursive Functions, Lattice and its Properties.

### UNIT-III: Combinatorics and Recurrence Relations

### Basis of Counting, Permutations, Permutations with Repetitions, Circular and Restricted Permutations, Combinations, Restricted Combinations, Binomial and Multinomial Coefficients and Theorems.

### Recurrence Relations: Generating Functions, Function of Sequences, Partial Fractions, Calculating Coefficient of Generating Functions, Recurrence Relations, Formulation as Recurrence Relations, Solving Recurrence Relations by Substitution and Generating Functions, Method of Characteristic, Roots, Solving Inhomogeneous Recurrence Relations

### UNIT-IV: Graph Theory

### Basic Concepts, Graph Theory and its Applications, Subgraphs, Graph Representations: Adjacency and Incidence Matrices, Isomorphic Graphs, Paths and Circuits, Eulerian and Hamiltonian Graphs,

### UNIT-V: Multi Graphs

### Multigraphs, Bipartite and Planar Graphs, Euler’s Theorem, Graph Colouring and Covering, Chromatic Number, Spanning Trees, Prim’s and Kruskal’s Algorithms, BFS and DFS Spanning Trees.

### Text Books:

1. Discrete Mathematical Structures with Applications to Computer Science, J. P.

Tremblay and P. Manohar, Tata McGraw Hill, 2002

1. Elements of Discrete Mathematics-A Computer Oriented Approach, C. L.Liu and D.

P. Mohapatra, 3rd Edition, Tata McGraw Hill, 2011

1. Theory and Problems of Discrete Mathematics, Schaum’s Outline Series, Seymour Lipschutz and Marc Lars Lipson, 3rd Edition, McGraw Hill, 2007

### Reference Books:

1. Discrete Mathematics, S. K. Chakraborthy and B.K. Sarkar, Oxford, 2011.
2. Discrete Mathematics and its Applications with Combinatorics and Graph Theory, K. H. Rosen, 7th Edition (2012), Tata McGraw Hill.
3. Graph Theory with Applications to Engineering and Computer Science, NARSINGH DEO, DOVER PUBLICATIONS, INC. (2016).

### E-Resources:

1. [Discrete Mathematics - Course (nptel.ac.in)](https://onlinecourses.nptel.ac.in/noc22_cs123/preview)
2. [Graph Theory - Course (nptel.ac.in)](https://onlinecourses.nptel.ac.in/noc22_ma10/preview)
3. [Graph theory in Discrete Mathematics - javatpoint](https://www.javatpoint.com/graph-theory-in-discrete-mathematics)
4. [Discrete Mathematics Tutorial - GeeksforGeeks](https://www.geeksforgeeks.org/discrete-mathematics-tutorial/)
5. [DISCRETE MATHEMATICS AND GRAPH THEORY - PURNA CHANDRA BISWAL - Google Books](https://books.google.co.in/books?id=y2bkBQAAQBAJ&pg=PR7&source=gbs_selected_pages&cad=1#v=onepage&q&f=false)
6. [mth202.pdf (iitk.ac.in)](https://home.iitk.ac.in/%7Earlal/book/mth202.pdf)

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**Regulation**

**D23**

**UNIVERSIAL HUMAN VALUES - UNDERSTANDING HARMONY AND ETHICAL HUMAN CONDUCT**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Course Category: | **BS&H** | Credits: 3 | | | |
| Course Type: | **Theory** | Lecture-Tutorial-Practice: | 2 | 1 | 0 |
| Prerequisites | No Prerequisites | Continuous Evaluation | 30M | | |
| Semester End Evaluation | 70M | | |
| Total Marks | 100M | | |

**Course Outcomes:**

|  |  |  |
| --- | --- | --- |
| After Successful Completion of course, the student will be able to: | | |
| CO No: | Course Outcome Description | K - Level |
| CO1 | Explain the terms like Natural Acceptance, Happiness and Prosperity (L1, L2) | 2 |
| CO2 | Identify one’s self, and one’s surroundings (family, society nature) (L1, L2) | 3 |
| CO3 | Apply what they have learnt to their own self in different day-to-day settings in real life (L3) | 3 |
| CO4 | Relate human values with human relationship and human society. (L4) | 4 |
| CO5 | Justify the need for universal human values and harmonious existence (L5) | 5 |
| CO6 | Develop as socially and ecologically responsible engineers (L3, L6) | 6 |

Note: K-Level is defined From Blooms Taxonomy

Contribution of Course Outcomes mapping with POs & PSOs (**1**- Low, **2** – Moderate,**3** – High)

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **CO No.** | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** | **PSO1** | **PSO2** |
| CO1 | 2 | 3 | 2 | - | - | 2 | - | 3 | - | - | - | 3 | - | 3 |
| CO2 | 2 | 3 | 2 | - | - | 3 | - | 3 | - | - | - | 3 | - | 3 |
| CO3 | 2 | 2 | 3 | - | - | 3 | - | 3 | - | - | - | 3 | - | 3 |
| CO4 | 3 | 2 | 3 | - | - | 2 | 3 | 3 | - | - | - | 3 | - | 3 |
| CO5 | 2 | 2 | 2 | - | - | 2 | - | 3 | - | - | - | 3 | - | 3 |
| CO6 | 2 | 3 | 3 | - | - | 3 | - | 3 | 3 | - | - | 3 | - | 3 |

**COURSE CONTENT:**

**UNIT-I: Introduction to Value Education (6 lectures and 3 tutorials for practice session)** Lecture 1: Right Understanding, Relationship and Physical Facility (Holistic Development and the Role of Education)

Lecture 2: Understanding Value Education

Tutorial 1: Practice Session PS1 Sharing about Oneself

Lecture 3: self-exploration as the Process for Value Education

Lecture 4: Continuous Happiness and Prosperity – the Basic Human Aspirations

Tutorial 2: Practice Session PS2 Exploring Human Consciousness

Lecture 5: Happiness and Prosperity – Current Scenario

Lecture 6: Method to Fulfill the Basic Human Aspirations

Tutorial 3: Practice Session PS3 Exploring Natural Acceptance

**UNIT-II: Harmony in the Human Being (6 lectures and 3 tutorials for practice session)** Lecture 7: Understanding Human being as the Co-existence of the self and the body.

Lecture 8: Distinguishing between the Needs of the self and the body

Tutorial 4: Practice Session PS4 Exploring the difference of Needs of self and body.

Lecture 9: The body as an Instrument of the self

Lecture 10: Understanding Harmony in the self

Tutorial 5: Practice Session PS5 Exploring Sources of Imagination in the self

Lecture 11: Harmony of the self with the body

Lecture 12: Programme to ensure self-regulation and Health

Tutorial 6: Practice Session PS6 Exploring Harmony of self with the body .

**UNIT-III: Harmony in the Family and Society (6 lectures and 3 tutorials for practice session**)

Lecture 13: Harmony in the Family – the Basic Unit of Human Interaction

Lecture 14: 'Trust' – the Foundational Value in Relationship

Tutorial 7: Practice Session PS7 Exploring the Feeling of Trust

Lecture 15: 'Respect' – as the Right Evaluation

Tutorial 8: Practice Session PS8 Exploring the Feeling of Respect

Lecture 16: Other Feelings, Justice in Human-to-Human Relationship

Lecture 17: Understanding Harmony in the Society

Lecture 18: Vision for the Universal Human Order

Tutorial 9: Practice Session PS9 Exploring Systems to fulfil Human Goal

**UNIT-IV: Harmony in the Nature/Existence (4 lectures and 2 tutorials for practice session)** Lecture 19: Understanding Harmony in the Nature

Lecture 20: Interconnectedness, self-regulation and Mutual Fulfilment among the Four Orders of Nature

Tutorial 10: Practice Session PS10 Exploring the Four Orders of Nature

Lecture 21: Realizing Existence as Co-existence at All Levels

Lecture 22: The Holistic Perception of Harmony in Existence

Tutorial 11: Practice Session PS11 Exploring Co-existence in Existence.

**UNIT-V: Implications of the Holistic Understanding – a Look at Professional Ethics**

(6 lectures and 3 tutorials for practice session)

Lecture 23: Natural Acceptance of Human Values

Lecture 24: Definitiveness of (Ethical) Human Conduct

Tutorial 12: Practice Session PS12 Exploring Ethical Human Conduct

Lecture 25: A Basis for Humanistic Education, Humanistic Constitution and Universal Human Order

Lecture 26: Competence in Professional Ethics

Tutorial 13: Practice Session PS13 Exploring Humanistic Models in Education

Lecture 27: Holistic Technologies, Production Systems and Management Models-Typical Case Studies

Lecture 28: Strategies for Transition towards Value-based Life and Profession

Tutorial 14: Practice Session PS14 Exploring Steps of Transition towards Universal Human Order

**Practice Sessions for UNIT-I – Introduction to Value Education**

PS1 Sharing about Oneself

PS2 Exploring Human Consciousness

PS3 Exploring Natural Acceptance

**Practice Sessions for UNIT-II – Harmony in the Human Being**

PS4 Exploring the difference of Needs of self and body

PS5 Exploring Sources of Imagination in the self

PS6 Exploring Harmony of self with the body

**Practice Sessions for UNIT-III – Harmony in the Family and Society**

PS7 Exploring the Feeling of Trust

PS8 Exploring the Feeling of Respect

PS9 Exploring Systems to fulfil Human Goal Practice Sessions for

**Practice Sessions for UNIT-IV – Harmony in the Nature (Existence)**

PS10 Exploring the Four Orders of Nature

PS11 Exploring Co-existence in Existence Practice Sessions for

**Practice Sessions for UNIT-V – Implications of the Holistic Understanding – a Look at Professional Ethics**

PS12 Exploring Ethical Human Conduct

PS13 Exploring Humanistic Models in Education

PS14 Exploring Steps of Transition towards Universal Human Order

**Readings: Text Book and Teachers Manual**

1. The Textbook

R R Gaur, R Asthana, G P Bagaria, A Foundation Course in Human Values and Professional Ethics, 2nd Revised Edition, Excel Books, New Delhi, 2019. ISBN 978-93-87034-47-1

1. The Teacher’s Manual

R R Gaur, R Asthana, G P Bagaria,Teachers’ Manual for A Foundation Course in Human Values and Professional Ethics, 2nd Revised Edition, Excel Books, New Delhi, 2019. ISBN 978-93-87034-53-2

**Reference Books:**

1. JeevanVidya: EkParichaya, A Nagaraj, JeevanVidyaPrakashan, Amarkantak, 1999.
2. Human Values, A.N. Tripathi, New Age Intl. Publishers, New Delhi, 2004.

3. The Story of Stuff (Book).

4. The Story of My Experiments with Truth - by Mohandas Karamchand Gandhi

5. Small is Beautiful - E. F Schumacher.

6. Slow is Beautiful - Cecile Andrews

7. Economy of Permanence - J C Kumarappa

8. Bharat Mein Angreji Raj – PanditSunderlal

9. Rediscovering India - by Dharampal

10. Hind Swaraj or Indian Home Rule - by Mohandas K. Gandhi

11. India Wins Freedom - Maulana Abdul Kalam Azad

12. Vivekananda - Romain Rolland (English)

13. Gandhi - Romain Rolland (English)

**Online Resources:**

1. https://fdp-si.aicte-india.org/UHVII%20Class%20Notes%20&%20Handouts/UHV%

20Handout%201-Introduction%20to%20Value%20Education.pdf

2. https://fdp-si.aicte-india.org/UHVII%20Class%20Notes%20&%20Handouts/ UHV%20

Handout%202-Harmony%20in%20the%20Human%20Being.pdf

3. https://fdp-si.aicte-india.org/UHVII%20Class%20Notes%20&%20Handouts/

UHV%20Handout%203-Harmony%20in%20the%20Family.pdf

4. https://fdp-si.aicte-india.org/UHV%201%20Teaching%20Material/D3-

S2%20Respect%20 July%2023.pdf

5. https://fdp-si.aicte-india.org/UHVII%20Class%20Notes%20&%20Handouts/

UHV%20Handout%205-Harmony%20in%20the%20Nature%20and%20Existence.pdf

6. https://fdp-si.aicte-india.org/download/FDPTeachingMaterial/3-days%20FDPSI%

20UHV%20Teaching%20Material/Day%203%20Handouts/UHV%203D%20D3-

S2A%20Und%20Nature-Existence.pdf

7. https://fdp-si.aicteindia.org/UHV%20II%20Teaching%20Material/ UHV%20II%20

Lecture%2023-25%20Ethics%20v1.pdf

8. https://www.studocu.com/in/document/kiet-group-of-institutions/universal-humanvalues/

chapter-5-holistic-understanding-of-harmony-on-professional-ethics/62490385

https://onlinecourses.swayam2.ac.in/aic22\_ge23/preview

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**DIGITAL LOGIC & COMPUTER ORGANISATION**

**Regulation**

**D23**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Course Category: | **Engineering Science** | Credits: 3 | | | |
| Course Type: | **Theory** | Lecture-Tutorial-Practice: | 3 | 0 | 0 |
| Prerequisites | Basic knowledge of number systems and logic gates | Continuous Evaluation | 30M | | |
| Semester End Evaluation | 70M | | |
| Total Marks | 100M | | |

**Course Outcomes:**

|  |  |  |
| --- | --- | --- |
| After Successful Completion of course, the student will be able to: | | |
| CO No: | Course Outcome Description | K - Level |
| CO1 | Apply various number systems and minimization of logic functions and design of combinational circuits | Applying |
| CO2 | Build design of sequential logic circuits | Applying |
| CO3 | Apply the computer arithmetic operations and Processor organization | Applying |
| CO4 | Apply the knowledge of various types of memory to enhance system performance | Applying |
| CO5 | Apply the knowledge of various I/O interface techniques to design and implement efficient I/O operations | Applying |

Note: K-Level is defined From Blooms Taxonomy

Contribution of Course Outcomes mapping with POs & PSOs (**1**- Low, **2** – Moderate,**3** – High)

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **CO No.** | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** | **PSO1** | **PSO2** |
| CO1 | 3 | - | - | - | - | - | - | - | - | - | - | - | 3 | 3 |
| CO2 | 3 | - | - | - | - | - | - | - | - | - | - | - | 3 | 3 |
| CO3 | 3 | - | - | - | - | - | - | - | - | - | - | - | 3 | 3 |
| CO4 | 3 | - | - | - | - | - | - | - | - | - | - | - | 3 | 3 |
| CO5 | 3 | - | - | - | - | - | - | - | - | - | - | - | 3 | 3 |

**COURSE CONTENT:**

**UNIT-I:**

Data Representation: Binary Numbers, Fixed Point Representation. Floating Point Representation. Number base conversions, Octal and Hexadecimal Numbers, compliments, Signed binary numbers, Binary codes

Digital Logic Circuits-I: Basic Logic Functions, Logic gates, universal logic gates, **Boolean Algebra,** Minimization of Logic expressions, K-Map Simplification, Combinational Circuits- Decoders, Multiplexers

**UNIT-II:**

Digital Logic Circuits-II: Sequential Circuits, Flipflops, Binary counters, Registers, Shift Registers, Ripple counters. Basic Structure of Computers: Computer Types, Functional units, Basic operational concepts, Bus structures, Software, Performance, multiprocessors and multi computers, Computer Generations, Von- Neumann Architecture

**UNIT-III:**

Computer Arithmetic: Addition and Subtraction of Signed Numbers, Design of Fast Adders, Multiplication of Positive Numbers, Signed-operand Multiplication, Fast Multiplication, Integer Division, Floating-Point Numbers and Operations, Processor Organization: Fundamental Concepts, Execution of a Complete Instruction, Multiple-Bus Organization, Hardwired Control and Multi programmed Control

**UNIT-IV:**

The Memory Organization: Basic Concepts, Semiconductor RAM Memories, Read-Only Memories, Speed, Size and Cost, Cache Memories, Performance Considerations, Virtual Memories, Memory Management Requirements, Secondary Storage

**UNIT-V:**

Input / Output Organization: Accessing I/O Devices, Interrupts, Processor Examples, Direct Memory Access, Buses, Interface Circuits, Standard I/O Interfaces

**Text Books:**

1. Computer Organization, Carl Hamacher, ZvonkoVranesic, SafwatZaky, 6th edition, McGraw

Hill

2. Digital Design, 6th Edition, M. Morris Mano, Pearson Education (2018).

3. Computer Organization and Architecture, William Stallings, 11thEdition, Pearson (2019).

**Reference Books:**

1. Computer Systems Architecture, M.Moris Mano, 3rdEdition, Pearson (1993)
2. Computer Organization and Design, David A. Paterson, John L.Hennessy, Elsevier (2005)
3. Fundamentals of Logic Design, Roth, 5thEdition, Thomson (2006)

**E-Sources:**

1. Online Learning Resources: https://nptel.ac.in/courses/106/103/106103068/

Course

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Regulation

**D23**

**ADVANCED DATA STRUCTURES & ALGORITHM ANALYSIS**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Course Category: | **Professional Core** | Credits: 3 | | | |
| Course Type: | **Theory** / Tutorial / Practical | Lecture-Tutorial-Practice: | 3 | 0 | 0 |
| Prerequisites | Sound knowledge of basic  data structures and  implementations.  Basics of Mathematics and  Programming. | Continuous Evaluation | 30M | | |
| Semester End Evaluation | 70M | | |
| Total Marks | 100M | | |

**Course Outcomes:**

|  |  |  |
| --- | --- | --- |
| After Successful Completion of course, the student will be able to: | | |
| CO No: | Course Outcome Description | K - Level |
| CO1 | Illustrate AVL, B-Trees with insights into Algorithm Analysis with Asymptotic Notations | Applying |
| CO2 | Examine Heap Trees, Graphs and solve various applications using divide and conquer technique | Analyzing |
| CO3 | Analyze different applications using Greedy Method and Dynamic Programming | Analyzing |
| CO4 | Examine Backtracking, Branch and Bound to solve various problems | Analyzing |
| CO5 | Compare NP Hard and NP Complete Problems using different problems | Analyzing |

Note: K-Level is defined From Blooms Taxonomy

Contribution of Course Outcomes mapping with POs & PSOs (**1**- Low, **2** – Moderate,**3** – High)

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **CO No.** | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** | **PSO1** | **PSO2** |
| CO1 | 3 | - | - | - | - | - | - | - | - | - | - | - | 3 | 3 |
| CO2 | - | 3 | - | - | - | - | - | - | - | - | - | - | 3 | 3 |
| CO3 | - | 3 | - | - | - | - | - | - | - | - | - | - | 3 | 3 |
| CO4 | - | 3 | - | - | - | - | - | - | - | - | - | - | 3 | 3 |
| CO5 | - | 3 | - | - | - | - | - | - | - | - | - | - | 3 | 3 |

**COURSE CONTENT:**

**UNIT-I:**

Introduction to Algorithm Analysis, Space and Time Complexity analysis, Asymptotic Notations.(already studied in 1-2-Data Structures subject)

AVL Trees – Creation, Insertion, Deletion operations and Applications

B-Trees – Creation, Insertion, Deletion operations and Applications

**UNIT-II:**

Heap Trees (Priority Queues) – Min and Max Heaps, Operations and Applications

Graphs – Terminology, Representations, Basic Search and Traversals, Connected Components and Biconnected Components, applications

Divide and Conquer: The General Method, Quick Sort, Merge Sort, Strassen’s matrix multiplication, Convex Hull Notations.(involves only mathematical derivation no performance analysis)

**UNIT-III:**

Greedy Method: General Method, Job Sequencing with deadlines, Knapsack Problem, Minimum cost spanning trees, Single Source Shortest Paths

Dynamic Programming: General Method, All pairs shortest paths, Single Source Shortest Paths– General Weights (Bellman Ford Algorithm), Optimal Binary Search Trees, 0/1Knapsack, String Editing, Travelling Salesperson problem

**UNIT-IV:**

Backtracking: General Method, 8-Queens Problem, Sum of Subsets problem, Graph Coloring, 0/1 Knapsack Problem

Branch and Bound: The General Method, 0/1 Knapsack Problem, Travelling Salesperson problem

**UNIT-V:**

NP Hard and NP Complete Problems: Basic Concepts, Cook’s theorem NP Hard Graph Problems: Clique Decision Problem (CDP), Chromatic Number Decision Problem (CNDP), Traveling Salesperson Decision Problem (TSP)

NP Hard Scheduling Problems: Scheduling Identical Processors, Job Shop Scheduling (heavy to cover)

**Text Books:**

1. Fundamentals of Data Structures in C++, HorowitzEllis, SahniSartaj, MehtaDinesh,

2ndEdition, Universities Press, 2008.

1. Computer Algorithms in C++, Ellis Horowitz, SartajSahni, SanguthevarRajasekaran,

2nd Edition, University Press, 2008.

**Reference Books:**

1. Data Structures and program design in C, Robert Kruse, 2nd Edition, Pearson Education Asia, 2006
2. An introduction to Data Structures with applications, Trembley& Sorenson, McGrawHill, 2nd edition, 2017

**E-Resources/Digital Material:**

1. <https://www.tutorialspoint.com/advanced_data_structures/index.asp>
2. <http://peterindia.net/Algorithms.html>
3. Abdul Bari, Introduction to Algorithms (youtube.com)
4. Introduction to the NPTEL MOOC on Design and Analysis of Algorithms by Prof. MUKUND MADHAVAN, IIT MADRAS, [Design and Analysis of Algorithms](Design%20and%20Analysis%20of%20Algorithms)<https://archive.nptel.ac.in/courses/106/106/106106131/>

Course

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Regulation

**D23**

**OBJECT ORIENTED PROGRAMMING THROUGH JAVA**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Course Category: | **Professional Core** | Credits : 3 | | | |
| Course Type: | **Theory** / Tutorial / Practical | Lecture-Tutorial-Practice: | 3 | 0 | 0 |
| Prerequisites | Basic Programming | Continuous Evaluation | 30M | | |
| Semester End Evaluation | 70M | | |
| Total Marks | 100M | | |

**Course Outcomes:**

|  |  |  |
| --- | --- | --- |
| After Successful Completion of course, the student will be able to: | | |
| CO No: | Course Outcome Description | K - Level |
| CO1 | Apply object oriented concepts, control structures in Java. | Applying |
| CO2 | Applying Object oriented constructs such as various class hierarchies, Methods | Applying |
| CO3 | Applying concepts like arrays, inheritances, interfaces in java | Applying |
| CO4 | Applying packages and exception handling in java | Applying |
| CO5 | Apply Multi threading ,string methods and JDBC connections, Java FX in java | Applying |

Note: K-Level is defined From Blooms Taxonomy

Contribution of Course Outcomes mapping with POs & PSOs (**1**- Low, **2** – Moderate,**3** – High)

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **CO No.** | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** | **PSO1** | **PSO2** |
| CO1 | 3 | - | - | - | - | - | - | - | - | - | - | - | 3 | 3 |
| CO2 | 3 | - | - | - | - | - | - | - | - | - | - | - | 3 | 3 |
| CO3 | 3 | - | - | - | - | - | - | - | - | - | - | - | 3 | 3 |
| CO4 | 3 | - | - | - | - | - | - | - | - | - | - | - | 3 | 3 |
| CO5 | 3 | - | - | - | - | - | - | - | - | - | - | - | 3 | 3 |

**COURSE CONTENT:**

**UNIT-I: Object Oriented Programming**

Basic concepts, Principles,Program Structure in Java: Introduction, Writing Simple Java Programs, Elements or Tokens in Java Programs, Java Statements, Command Line Arguments, User Input to Programs, Escape Sequences Comments, Programming Style.

**Data Types**, Variables, and Operators :Introduction, Data Types in Java, Declaration of Variables, Data Types, Type Casting, Scope of Variable Identifier, Literal Constants, Symbolic Constants, Formatted Output with printf() Method, Static Variables and Methods, Attribute Final, Introduction to Operators, Precedence and Associativity of Operators, Assignment Operator ( = ), Basic Arithmetic Operators, Increment (++) and Decrement (- -) Operators, Ternary Operator, Relational Operators, Boolean Logical Operators, Bitwise Logical Operators.

**Control Statements**: Introduction, if Expression, Nested if Expressions, if–else Expressions, Ternary Operator?:, Switch Statement, Iteration Statements, while Expression, do–while Loop, for Loop, Nested for Loop, For–Each for Loop, Break Statement, Continue Statement.

**UNIT-II:**

**Classes and Objects:** Introduction,ClassDeclarationandModifiers,ClassMembers,Declaration of Class Objects, Assigning One Object to Another, Access Control for Class Members, Accessing Private Members of Class, Constructor Methods for Class, Overloaded Constructor Methods, Nested Classes, Final Class and Methods, Passing Arguments by Value and by Reference, Keyword this.

**Methods**: Introduction, Defining Methods, Overloaded Methods, Overloaded Constructor Methods, Class Objects as Parameters in Methods, Access Control, Recursive Methods, Nesting of Methods, Overriding Methods, Attributes Final and Static

**Java I/O and File**: Java I/O API, standard I/O streams, types, Byte streams, Character streams, Scanner class, Files in Java(Text Book 2)

**UNIT-III:**

**Arrays**: Introduction, Declaration and Initialization of Arrays, Storage of Array in Computer Memory, Accessing Elements of Arrays, **Operations on Array Elements**, Assigning Array to Another Array, Dynamic Change of Array Size, Sorting of Arrays, Search for Values in Arrays, Class Arrays, Two-dimensional Arrays, Arrays of Varying Lengths, Three- dimensional Arrays, **Arrays as Vectors.**

**Inheritance**: Introduction, Process of Inheritance, Types of Inheritances, Universal Super Class-Object Class, Inhibiting Inheritance of Class Using Final, Access Control and Inheritance, Multilevel Inheritance, Application of Keyword Super, Constructor Method and Inheritance, Method Overriding, Dynamic Method Dispatch, Abstract Classes, Interfaces and Inheritance. **Interfaces**: Introduction, Declaration of Interface, Implementation of Interface, Multiple Interfaces, Nested Interfaces, Inheritance of Interfaces, Default Methods in Interfaces, Static Methods in Interface, Functional Interfaces, Annotations.

**UNIT-IV:**

**Packages and Java Library**: Introduction, Defining Package, Importing Packages and Classes into Programs, Path and Class Path, Access Control, Packages in Java SE, Java.lang Package and its Classes, Class Object, Enumeration, class Math, Wrapper Classes, Auto-boxing and Auto-unboxing, Java util Classes and Interfaces, Formatter Class, Random Class, Time Package, Class Instant (java.time.Instant), Formatting for Date/Time in Java, **Temporal Adjusters Class, Temporal Adjusters Class.**

**Exception Handling**: Introduction, Hierarchy of Standard Exception Classes, Keywords throws and throw, try, catch, and finally Blocks, Multiple Catch Clauses, Class Throwable, Unchecked Exceptions, Checked Exception

**String Handling in Java:** Introduction, Interface Char Sequence, Class String, Methods for Extracting Characters from Strings, Comparison, Modifying, Searching; Class String Buffer, String Builder

**UNIT-V:**

**Multithreaded Programming**: Introduction, Need for Multiple Threads Multi threaded Programming for Multi-core Processor, Thread Class, Main Thread-Creation of New Threads, Thread States, Thread Priority Synchronization, Deadlock and Race Situations, Inter-thread Communication - Suspending, Resuming, and Stopping of Threads.

**Java Database Connectivity**: Introduction, JDBC Architecture, Installing MySQL and MySQL Connector/J, JDBC Environment Setup, Establishing JDBC Database Connections, Result Set Interface

**Java FX GUI**: Java FX Scene Builder, Java FX App Window Structure, displaying text and image, event handling, laying out nodes in scene graph, mouse events (Text Book 3)

**Text Books:**

1. JAVA One Step Ahead, Anitha Seth, B.L.Juneja, Oxford.- **2017**
2. Joy with JAVA, Fundamentals of Object Oriented Programming, Debasis Samanta, Monalisa Sarma, Cambridge, -**2023.**
3. JAVA 9 for Programmers, Paul Deitel, Harvey Deitel, 4th Edition, Pearson. **2014**

**Reference Books:**

1. The complete Reference Java, 11thedition, Herbert Schildt, TMH
2. Introduction to Java programming, 7th Edition, Y Daniel Liang, Pearson

**E-Resources/Digital Material:**

1. <https://nptel.ac.in/courses/106/105/106105191/>
2. https://infyspringboard.onwingspan.com/web/en/app/toc/lex\_auth\_012880464547618816347\_shared/overview

Course

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**Regulation**

**D23**

**ADVANCED DATA STRUCTURES & ALGORITHM ANALYSIS LAB**

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| --- | --- | --- | --- | --- | --- |
| Course Category: | **Professional Core** | Credits:1.5 | | | |
| Course Type: | Theory / Tutorial / **Practical** | Lecture-Tutorial-Practice: | 0 | 0 | 3 |
| Prerequisites | Knowledge of implementation of basic data structures with arrays and linked lists.  Basics of Mathematics and Programming. | Continuous Evaluation | 30M | | |
| Semester End Evaluation | 70M | | |
| Total Marks | 100M | | |

**Course Outcomes:**

|  |  |  |
| --- | --- | --- |
| After Successful Completion of course, the student will be able to: | | |
| CO No: | Course Outcome Description | K - Level |
| CO1 | Implement data structures like AVL Trees, B-Tree, Heap Tree and Graphs | Applying |
| CO2 | Solve problems using different algorithmic approaches like Divide and Conquer, Greedy method, Dynamic Programming and Backtracking | Applying |

Note: K-Level is defined From Blooms Taxonomy

Contribution of Course Outcomes mapping with POs & PSOs (**1**- Low, **2** – Moderate,**3** – High)

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **CO No.** | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** | **PSO1** | **PSO2** |
| CO1 | 3 | - | - | - | 3 | - | - | - | 3 | - | - | - | 3 | 3 |
| CO2 | 3 | - | - | - | 3 | - | - | - | 3 | - | - | - | 3 | 3 |

**COURSE CONTENT:**

1. Construct an AVL tree for a given set of elements which are stored in a file and implement insert and delete operation on the constructed tree. Write contents of tree into a new file using in-order.
2. Construct B-Tree an order of 5 with a set of 100 random elements stored in array. Implement searching, insertion and deletion operations.
3. Construct Min and Max Heap using arrays, delete any element and display the content of the Heap.
4. Implement BFT and DFT for given graph, when graph is represented by

a) Adjacency Matrix b) Adjacency Lists

1. Write a program for finding the biconnected components in a given graph.
2. Implement Quick sort and Merge sort and observe the execution time for various input sizes (Average, Worst and Best cases).
3. Compare the performance of Single Source Shortest Paths using Greedy method when the graph is represented by adjacency matrix and adjacency lists.
4. Implement Job Sequencing with deadlines using Greedy strategy.
5. Write a program to solve 0/1 Knapsack problem Using Dynamic Programming.
6. Implement N-Queens Problem Using Backtracking.
7. Use Backtracking strategy to solve 0/1 Knapsack problem.
8. Implement Travelling Salesperson problem using Branch and Bound approach.

**Text Books:**

1. Fundamentals of Data Structures in C++, HorowitzEllis, SahniSartaj, MehtaDinesh,

2ndEdition, Universities Press, 2008.

1. Computer Algorithms in C++, Ellis Horowitz, SartajSahni, SanguthevarRajasekaran,

2nd Edition, University Press, 2008.

**Reference Books:**

1. Data Structures and program design in C, Robert Kruse, 2nd Edition, Pearson Education Asia, 2006
2. An introduction to Data Structures with applications, Trembley & Sorenson, McGrawHill, 2nd edition, 2017

**E-Resources/Digital Material:**

1. <https://www.tutorialspoint.com/advanced_data_structures/index.asp>
2. <http://peterindia.net/Algorithms.html>
3. Abdul Bari, Introduction to Algorithms (youtube.com)
4. Introduction to the NPTEL MOOC on Design and Analysis of Algorithms by Prof. MUKUND MADHAVAN, IIT MADRAS, [Design and Analysis of Algorithms](Design%20and%20Analysis%20of%20Algorithms)<https://archive.nptel.ac.in/courses/106/106/106106131/>

**OBJECT ORIENTED PROGRAMMING THROUGH JAVA LAB**

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**Regulation**

**D23**

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| --- | --- | --- | --- | --- | --- |
| Course Category: | **PC** | Credits : 3 | | | |
| Course Type: | **Practical** | Lecture-Tutorial-Practice: | - | - | 3 |
| Prerequisites | Good programming knowledge | Continuous Evaluation | 30-M | | |
| Semester End Evaluation | 70-M | | |
| Total Marks | 100--M | | |

**Course Outcomes:**

|  |  |  |
| --- | --- | --- |
| After Successful Completion of course, the student will be able to: | | |
| CO No: | Course Outcome Description | K - Level |
| CO1 | Apply the basic of concepts of programming in java. | Applying |
| CO2 | Apply the basic of concepts of Operations, Expressions, Control-flow, and Strings. | Applying |
| CO3 | Analyze different keywords in java | Analyzing |
| CO4 | Analyze the concepts of inheritance in java. | Analyzing |
| CO5 | Analyze applications using Exception Handling, Multi threading, Applet, Event Handling packages in java. | Analyzing |

Note: K-Level is defined From Blooms Taxonomy

Contribution of Course Outcomes mapping with POs & PSOs (**1**- Low, **2** – Moderate,**3** – High)

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **CO No.** | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO1-** | **PO11** | **PO12** | **PSO1** | **PSO2** |
| CO1 | 3 | - | - | - | - | - | - | - | - | - | - | - | 3 | 3 |
| CO2 | 3 | - | - | - | - | - | - | - | - | - | - | - | 3 | 3 |
| CO3 | - | 3 | - | - | - | - | - | - | - | - | - | - | 3 | 3 |
| CO4 | - | 3 | - | - | - | - | - | - | - | - | - | - | 3 | 3 |
| CO5 | - | 3 | - | - | - | - | - | - | - | - | - | - | 3 | 3 |

**COURSE CONTENT:**

# Exercise - 1

# a) Write a JAVA program to display default value of all primitive data type of JAVA.

# b) Write a java program that display the roots of a quadratic equation ax2+bx=0. Calculate

# the discriminate D and basing on value of D, describe the nature of root.

# Exercise - 2

# a) Write a JAVA program to search for an element in a given list of elements using binary

# search Mechanism.

# b) Write a JAVA program to sort for an element in a given list of elements using bubble

# sort.

# c) Write a JAVA program using String Buffer to delete, remove character.

# Exercise - 3

# a) Write a JAVA program to implement class mechanism. Create a class, methods and

# invoke them inside main method.

# b) Write a JAVA program implement method overloading.

# c) Write a JAVA program to implement constructor.

# d) Write a JAVA program to implement constructor overloading.

# Exercise - 4

# a) Write a JAVA program to implement Single Inheritance.

# b) Write a JAVA program to implement multi level Inheritance.

# c) Write a JAVA program for abstract class to find areas of different shapes

# Exercise - 5

# a) Write a JAVA program give example for “super” keyword.

# b) Write a JAVA program to implement Interface. What kind of Inheritance can be

# achieved?

# c) Write a JAVA program that implements Runtime polymorphism

# Exercise - 6

# a) Write a JAVA program that describes exception handling mechanism.

# b) Write a JAVA program Illustrating Multiple catch clauses.

# c) Write a JAVA program for creation of Java Built-in Exceptions.

# d) Write a JAVA program for creation of User Defined Exception.

# Exercise - 7

# Write a JAVA program that creates threads by extending Thread class. First thread

# display “Good Morning “every 1 sec, the second thread displays “Hello “every 2 seconds and the third display “Welcome” every 3 seconds,(Repeat the same by implementing Runnable)

# b) Write a program illustrating is Alive and join ()

# c) Write a Program illustrating Daemon Threads.

# d) Write a JAVA program Producer Consumer Problem

# Exercise – 8

# a) Write a JAVA program that import and use the user defined packages.

# b) Without writing any code, build a GUI that display text in label and image in an Image

# View (use Java FX)

# c) Build a Tip Calculator app using several Java FX components and learn how to respond

# to user Interactions with the GUI

# Exercise – 9

# a) Write a java program that connects to a database using JDBC

# b) Write a java program to connect to a database using JDBC and insert values into it.

# c) Write a java program to connect to a database using JDBC and delete values from it.

Course

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**Regulation**

**D23**

**PYTHON PROGRAMMING**

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| --- | --- | --- | --- | --- | --- |
| Course Category: | **Skill Enhancement Course** | Credits :2 | | | |
| Course Type: | Theory / **Tutorial** / **Practical** | Lecture-Tutorial-Practice: | 0 | 1 | 2 |
| Prerequisites | Good programming knowledge | Continuous Evaluation | 30M | | |
| Semester End Evaluation | 70M | | |
| Total Marks | 100M | | |

**Course Outcomes:**

|  |  |  |
| --- | --- | --- |
| After Successful Completion of course ,the student will be able to: | | |
| CO No: | Course Outcome Description | K - Level |
| CO1 | **Apply** Python's fundamental components, **construct** control flow statements, **perform** input/output operations, **manage** exceptions, and **develop** well-structured, efficient, and robust Python programs. | Applying |
| CO2 | **Apply functions and their arguments, manage variable scope and lifetime, handle command line arguments, manipulate strings and lists using various operations and methods, and utilize built-in functions and commonly used modules to develop efficient Python programs.** | Applying |
| CO3 | **Apply built-in functions and methods on dictionaries, tuples, and sets, utilize tuples and sets for efficient data handling.** | Applying |
| CO4 | **Utilize file methods and modules to perform file operations, define and apply object-oriented programming principles by developing classes and objects, and implement encapsulation, inheritance, and polymorphism to construct robust and maintainable Python programs.** | Applying |
| CO5 | **Apply functional programming principles, work with JSON and XML data formats, utilize NumPy for numerical computations, and manipulate data efficiently using Pandas to perform data science tasks and analyses effectively.** | Applying |

Note: K-Level is defined From Blooms Taxonomy

Contribution of Course Outcomes mapping with POs & PSOs (**1**- Low, **2** – Moderate,**3** – High)

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **CO No.** | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** | **PSO1** | **PSO2** |
| CO1 | 3 | - | - | - | 3 | - | - | - | - | - | - | - | 3 | 3 |
| CO2 | 3 | - | - | - | 3 | - | - | - | - | - | - | - | 3 | 3 |
| CO3 | 3 | - | - | - | 3 | - | - | - | - | - | - | - | 3 | 3 |
| CO4 | 3 | - | - | - | 3 | - | - | - | - | - | - | - | 3 | 3 |
| CO5 | 3 | - | - | - | 3 | - | - | - | - | - | - | - | 3 | 3 |

**COURSE CONTENT:**

**UNIT-I:**

History of Python Programming Language, Thrust Areas of Python, Installing Anaconda Python Distribution, Installing and Using Jupyter Notebook.

Parts of Python Programming Language: Identifiers, Keywords, Statements and Expressions, Variables, Operators, Precedence and Associativity, Data Types, Indentation, Comments, Reading Input, Print Output, Type Conversions, the type () Function and Is Operator, Dynamic and Strongly Typed Language.

Control Flow Statements: if statement, if-else statement, if...elif…else, Nested if statement, while Loop, for Loop, continue and break Statements, Catching Exceptions Using try and except Statement.

**Sample Experiments:**

1. Write a program to find the largest element among three Numbers.

2. Write a Program to display all prime numbers within an interval

3. Write a program to swap two numbers without using a temporary variable.

4.Demonstrate the following Operators in Python with suitable examples.

i) Arithmetic Operators ii) Relational Operators iii) Assignment Operators iv) Logical Operators

v) Bit wise Operators vi) Ternary Operator vii) Membership Operators viii)Identity Operators

5. Write a program to add and multiply complex numbers

6. Write a program to print multiplication table of a given number.

**UNIT-II:**

Functions: Built-In Functions, Commonly Used Modules, Function Definition and Calling the function, return Statement and void Function, Scope and Lifetime of Variables, Default Parameters, Keyword Arguments, \*args and \*\*kwargs, Command Line Arguments.

Strings: Creating and Storing Strings, Basic String Operations, Accessing Characters in String by Index Number, String Slicing and Joining, String Methods, Formatting Strings.

Lists: Creating Lists, Basic List Operations, Indexing and Slicing in Lists, Built-In Functions Used on Lists, List Methods, del Statement.

**Sample Experiments:**

1. Write a program to define a function with multiple return values.

2. Write a program to define a function using default arguments.

3. Write a program to find the length of the string without using any library functions.

4. Write a program to check if the substring is present in a given string or not.

5. Write a program to perform the given operations on a list:

i. additionii. Insertioniii. slicing

6. Write a program to perform any 5 built-in functions by taking any list.

**UNIT-III:**

Dictionaries: Creating Dictionary, Accessing and Modifying key: value Pairs in Dictionaries, Built-In Functions Used on Dictionaries, Dictionary Methods, del Statement.

Tuples and Sets: Creating Tuples, Basic Tuple Operations, tuple () Function, Indexing and Slicing in Tuples, Built-In Functions Used on Tuples, Relation between Tuples and Lists, Relation between Tuples and Dictionaries, Usingzip () Function, Sets, Set Methods, Frozen set.

**Sample Experiments:**

1. Write a program to create tuples (name, age, address, college) for at least two members and concatenate the tuples and print the concatenated tuples.
2. Write a program to count the number of vowels in a string (No control flow allowed)
3. Write a program to check if a given key exists in a dictionary or not.
4. Write a program to add a new key-value pair to an existing dictionary.
5. Write a program to sum all the items in a given dictionary.

**UNIT-IV:**

Files: Types of Files, Creating and Reading Text Data, File Methods to Read and Write Data, Reading and Writing Binary Files, Pickle Module, Reading and Writing CSV Files, Pythonos and os.path Modules.

Object-Oriented Programming: Classes and Objects, Creating Classes in Python, Creating Objects in Python, Constructor Method, Classes with Multiple Objects, Class Attributes Vs Data Attributes, Encapsulation, Inheritance, Polymorphism.

**Sample Experiments:**

1. Write a program to sort words in a file and put them in another file. The output file should have only lower-case words, so any upper-case words from source must belowered.
2. Python program to print each line of a file in reverse order.
3. Python program to compute the number of characters, words and lines in a file.
4. Write a program to create, display, append, insert and reverse the order of the items in the array.
5. Write a program to add, transpose and multiply two matrices.
6. Write a Python program to create a class that represents a shape. Include methods to calculate its area and perimeter. Implement subclasses for different shapes like circle, triangle, and square.

**UNIT-V:**

Introduction to Data Science: Functional Programming, JSON and XML in Python, NumPywith Python, Pandas.

**Sample Experiments:**

1. Python program to check whether a JSON string contains complex object or not.
2. Python Program to demonstrate NumPy arrays creation using array () function.
3. Python program to demonstrate use of ndim, shape, size, dtype.
4. Python program to demonstrate basic slicing, integer and Boolean indexing.
5. Python program to find min, max, sum, cumulative sum of array
6. Create a dictionary with at least five keys and each key represent value as a list where this list contains at least ten values and convert this dictionary as a pandas data frame and explore the data through the data frame as follows:
   1. Apply head () function to the pandas data frame
   2. Perform various data selection operations on Data Frame
7. Select any two columns from the above data frame, and observe the change in one attribute with respect to other attribute with scatter and plot operations in matplotlib

**Text Books:**

1. Lambert, Kenneth A., and Martin Osborne. Fundamentals of PYTHON. Cengage, 2023.
2. Kurama, Vamsi. Python Programming: A Modern Approach. Pearson Education India, 2017.

**Reference Books:**

1. Gowrishankar, S., and A. Veena. Introduction to Python programming. Chapman and Hall/CRC, 2018.
2. Python Programming, S Sridhar, J Indumathi, V M Hariharan, 2ndEdition, Pearson,2024
3. Liang, Y. Daniel. Introduction to programming using Python. Pearson, 2013.

**E-Resources/Digital Material:**

1. https://www.coursera.org/learn/python-for-applied-data-science-ai
2. <https://www.coursera.org/learn/python?specialization=python#syllabus>

**Regulation**

**D23**

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**ENVIRONMENTAL SCIENCE**

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| --- | --- | --- | --- | --- | --- |
| Course Category: | **Audit Course** | Credits: - | | | |
| Course Type: | **Theory** | Lecture-Tutorial-Practice: | 2 | 0 | 0 |
| Prerequisites | Science | Continuous Evaluation | 30M | | |
| Semester End Evaluation | - | | |
| Total Marks | - | | |

**Course Outcomes:**

|  |  |  |
| --- | --- | --- |
| After Successful Completion of course, the student will be able to: | | |
| CO No: | Course Outcome Description | K - Level |
| CO1 | Identify the multidisciplinary nature of environmental studies and various renewable and non-renewable resources. | Identifying |
| CO2 | Understand flow and bio-geo-chemical cycles and ecological pyramids. | Understanding |
| CO3 | Understand various causes of pollution and solid waste management and related preventive measures. | Understanding |
| CO4 | Understand rainwater harvesting, watershed management, ozone layer depletion and waste land reclamation | Understanding |
| CO5 | Predict population explosion and understand the value education, and welfare programs. | Predicting |

Note: K-Level is defined From Blooms Taxonomy

Contribution of Course Outcomes mapping with POs & PSOs (**1**- Low, **2** – Moderate,**3** – High)

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **CO No.** | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** | **PSO1** | **PSO2** |
| CO1 | 3 | - | - | - | - | - | - | - | - | - | - | - | 3 | 3 |
| CO2 | 3 | - | - | - | - | - | - | - | - | - | - | - | 3 | 3 |
| CO3 | 3 | - | - | - | - | - | - | - | - | - | - | - | 3 | 3 |
| CO4 | - | 3 | - | - | - | - | - | - | - | - | - | - | 3 | 3 |
| CO5 | - | 3 | - | - | - | - | - | - | - | - | - | - | 3 | 3 |

**COURSE CONTENT:**

**UNIT-I:**

Multidisciplinary Nature Of Environmental Studies: Definition, Scope and Importance Need for Public Awareness. Natural Resources: Renewable and non-renewable resources – Natural resources and associated problems – Forest resources – Use and over – exploitation, deforestation, case studies – Timber extraction – Mining, dams and other effects on forest and tribal people – Water resources – Use and over utilization of surface and ground water – Floods, drought, conflicts over water, dams – benefits and problems–Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies–Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies.–Energy resources:

# UNIT-II:

Ecosystems: Concept to fan ecosystem.–Structure and function of an ecosystem–Producers, consumers and decomposers – Energy flow in the ecosystem – Ecological succession – Food chains, food webs and ecological pyramids–Introduction, types, characteristic features, structure and function of the following ecosystem:

a. Forest ecosystem.

b. Grassl and ecosystem

c. Desert ecosystem

d. Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries) Biodiversity

And Its Conservation: Introduction Definition: genetic, species and ecosystem diversity–Bio-geographical classification of India–Value of biodiversity: consumptive use, Productive use, social, ethical, aesthetic and option values – Biodiversity at global, National and local levels – India as a mega-diversity nation – Hot-sports of biodiversity – Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts– Endangered and endemic species of India –Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity, bio-geo-chemical cycles

# UNIT–III:

Environmental Pollution: Definition, Cause, effects and control measures of:

a. Air Pollution.

b. Water pollution

c. Soil pollution

d. Marine pollution

e. Noise pollution

f. Thermal pollution

g. Nuclear hazards

Solid Waste Management: Causes, effects and control measures of urban and industrial wastes – Role of an individual in prevention of pollution – Pollution case studies – Disaster management: floods, earthquake, cyclone and landslides.

# UNIT–IV:

Social Issues and the Environment: From Unsustainable to Sustainable development– Urban problems related to energy – Water conservation, rain water harvesting, watershed management –Resettlement and rehabilitation of people; its problems and concerns. Case studies – Environmental ethics: Issues and possible solutions–Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Case Studies – Wastel and reclamation. – Consumerism and waste products. – Environment Protection Act. – Air (Prevention and Control of Pollution) Act. –Water (Prevention and control of Pollution) Act–Wild life Protection Act–Forest Conservation Act–Issues involved in enforcement of environment allegislation–Public awareness.

# UNIT–V:

Human Population And The Environment: Population growth, variation among nations. Population explosion – Family Welfare Programmes. – Environment and human health – Human Rights – Value Education–HIV/AIDS–Women and Child Welfare–Role of information Technology in Environment and human health–Case studies.

Field Work: Visit to a local area to document environmental assets River/ forest grassland/ hill/ mountain – Visit to a local polluted site-Urban/Rural/Industrial/Agricultural Study of common plants, insects, and birds–river, hills lopes, etc..

### Text Books:

1. Text book of Environmental Studies for Undergraduate Courses Erach Bharucha for University Grants Commission, Universities Press..
2. Palani swamy, “Environmental Studies”, Pearson education .
3. S.AzeemUnnisa, “Environmental Studies” Academic Publishing Company
4. K.RaghavanNambiar,“Text book of Environmental Studies for Undergraduate Courses as per UGC model syllabus”, Scitech Publications (India), Pvt.Ltd

### Reference Books:

1. DeekshaDaveandE.SaiBabaReddy,“TextbookofEnvironmentalScience”,Cengage Publications
2. M.AnjiReddy,“TextbookofEnvironmentalSciencesandTechnology”,BSPublication
3. J.P.Sharma, Comprehensive Environmental studies, Laxmi publications
4. J.GlynnHenryandGaryW.Heinke,“EnvironmentalSciencesandEngineering”,PrenticeHallofIndiaPrivatelimited
5. G.R.Chatwal,“ATextBookofEnvironmentalStudies”HimalayaPublishingHouse
6. GilbertM.MastersandWendellP.Ela,“IntroductiontoEnvironmentalEngineeringand Science, Prentice Hall of India Private limited

### E-Resources:

1. <https://onlinecourses.nptel.ac.in/noc23_hs155/preview>
2. <https://archive.nptel.ac.in/courses/120/108/120108004/>
3. <https://onlinecourses.nptel.ac.in/noc24_ge19/preview>
4. <https://onlinecourses.swayam2.ac.in/cec19_bt03/preview>
5. <https://www.classcentral.com/course/swayam-environmental-science-184135>

# II-II Semester

**Regulation**

**D23**

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**MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Course Category: | **Management Course- I** | Credits: 2 | | | |
| Course Type: | **Theory** | Lecture-Tutorial-Practice: | 2 | 0 | 0 |
| Prerequisites | Basic microeconomics, fundamental financial and management accounting principles. | Continuous Evaluation | 30M | | |
| Semester End Evaluation | 70M | | |
| Total Marks | 100M | | |

**Course Outcomes:**

|  |  |  |
| --- | --- | --- |
| After Successful Completion of the course, the student will be able to: | | |
| CO No: | Course Outcome Description | K - Level |
| CO1 | Understanding the concept of managerial economics, Demand function, and different demand forecasting methods. | 2 |
| CO2 | Discuss the concepts of production function, economies of scale, optimum size of the firm, and cost & break-even analysis. | 2 |
| CO3 | Describe market structure and pricing under varied market conditions, Classify the types of business organizations and business cycles. | 2 |
| CO4 | Evaluate the projects by applying tools and techniques of capital budgeting to accept or reject the new projects in business. | 3 |
| CO5 | Prepare financial statements for analysis by using accounting tools | 3 |

Note: K-Level is defined From Blooms Taxonomy

Contribution of Course Outcomes mapping with POs & PSOs (**1**- Low, **2** – Moderate,**3** – High)

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **CO No.** | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** | **PSO1** | **PSO2** |
| CO1 | - | - | - | - | - | - | - | 3 | 3 | 3 | 3 | - | - | - |
| CO2 | - | - | - | - | - | - | - | 3 | 3 | 3 | 3 | - | - | - |
| CO3 | - | - | - | - | - | - | - | 3 | 3 | 3 | 3 | - | - | - |
| CO4 | - | - | - | - | - | - | - | 3 | 3 | 3 | 3 | - | - | - |
| CO5 | - | - | - | - | - | - | - | 3 | 3 | 3 | 3 | - | - | - |

**COURSE CONTENT:**

### UNIT-I: Managerial Economics

Introduction – Nature, meaning, significance, functions, and advantages. Demand-Concept, Function, Law of Demand - Demand Elasticity- Types – Measurement. Demand Forecasting- Factors governing Forecasting, Methods. Managerial Economics and Financial Accounting and Management.

### UNIT-II: Production and Cost Analysis

Introduction – Nature, meaning, significance, functions, and advantages. Production Function– Least-cost combination– Short run and long run Production Function- Isoquants and Isocosts, MRTS -Cobb-Douglas Production Function - Laws of Returns - Internal and External Economies of scale, Cost & Break-Even Analysis - Cost concepts and Cost behavior- Break-Even Analysis (BEA) -Determination of Break Even Point (Simple Problems)-Managerial significance and limitations of Break-Even Analysis.

### UNIT-III: Business Organizations and Markets

Introduction–Nature, meaning, significance, functions and advantages. Forms of Business Organizations- Sole Proprietary - Partnership - Joint Stock Companies - Public Sector Enterprises. Types of Markets - Perfect and Imperfect Competition - Features of Perfect Competition Monopoly Monopolistic Competition–Oligopoly-Price-Output Determination-Pricing Methods and Strategies

### UNIT-IV: Capital Budgeting

### Introduction – Nature, meaning, significance, functions and advantages. Types of Working Capital, Components, Sources of Short-term and Long-term Capital, Estimating Working capital requirements. Capital Budgeting–Features, Proposals, Methods, and Evaluation. Projects– Pay Back Method, Accounting Rate of Return(ARR) Net Present Value(NPV)Internal Rate Return(IRR) Method (sample problems)

### UNIT-V: Financial Accounting and Analysis

### Introduction – Nature, meaning, significance, functions, and advantages. Concepts and Conventions-Double-Entry Book Keeping, Journal, Ledger, Trial Balance-Final Accounts (Trading Account, Profit and Loss Account, and Balance Sheet with simple adjustments).Financial Analysis-Analysis and Interpretation of Liquidity Ratios, Activity Ratios, Capital Structure Ratios and Profitability.

### Text Books:

1. Varshney & Maheswari: Managerial Economics, Sultan Chand,2013.

### Reference Books:

1. Managerial Economics: Principles and Worldwide Applications, 9E (Adaptation) by Dominick Salvatore and Siddhartha Rastogi.
2. Managerial Economics: Principles and Worldwide Applications by Dominick Salvatore.

### E-Resources:

1. <https://nptel.ac.in/courses/110101005>

**Websites:**

* <https://www.geeksforgeeks.org/principles-and-types-of-managerial-economics/>
* <https://www.tutorialspoint.com/managerial_economics/index.htm>

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**Regulation**

**D23**

**PROBABILITY AND STATISTICS**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Course Category: | **Professional Core** | Credits: 3 | | | |
| Course Type: | **Theory** | Lecture-Tutorial-Practice: | 3 | 0 | 0 |
| Prerequisites | Basic knowledge on Definition of probability and Graphs | Continuous Evaluation | 30M | | |
| Semester End Evaluation | 70M | | |
| Total Marks | 100M | | |

**Course Outcomes:**

|  |  |  |
| --- | --- | --- |
| After Successful Completion of course, the student will be able to: | | |
| CO No: | Course Outcome Description | K - Level |
| CO1 | Classify the concepts of data science and its importance | 2 |
| CO2 | Interpret the association of characteristics and through correlation and regression tools | 4 |
| CO3 | Apply discrete and continuous probability distributions | 3 |
| CO4 | Design the components of a classical hypothesis test | 6 |
| CO5 | Infer the statistical inferential methods based on small and large sampling tests | 4 |

Note: K-Level is defined From Blooms Taxonomy

Contribution of Course Outcomes mapping with POs & PSOs (**1**- Low, **2** – Moderate,**3** – High)

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **CO No.** | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** | **PSO1** | **PSO2** |
| CO1 | 3 | - | - | - | - | - | - | - | - | - | - | 3 | - | - |
| CO2 | 3 | 3 | - | - | - | - | - | - | - | - | - | 3 | - | 3 |
| CO3 | 3 | - | - | - | - | - | - | - | - | - | - | 3 | - | 3 |
| CO4 | 3 |  | - | - | - | - | - | - | - | - | - | 3 | - | - |
| CO5 | 3 | 3 | - | - | - | - | - | - | - | - | - | 3 | - | 3 |

**COURSE CONTENT:**

### UNIT-I: Descriptive statistics and methods for data science

### Data science – Statistics Introduction – Population vs Sample –Collection of data – primary and secondary data – Type of variable: dependent and independent Categorical and Continuous variables – Data visualization – Measures of Central tendency – Measures of Variability – Skewness – Kurtosis.

### UNIT-II: Correlation and Regression

Correlation – Correlation coefficient – Rank correlation.

### Linear Regression: Straight line – Multiple Linear Regression - Regression coefficients and

### properties – Curvilinear Regression: Parabola – Exponential – Power curves.

### UNIT-III: Probability and Distributions

Probability– Conditional probability and Baye’s theorem – Random variables – Discrete and Continuous random variables – Distribution functions – Probability mass function, Probability density function and Cumulative distribution functions – Mathematical Expectation and Variance – Binomial, Poisson, Uniform and Normal distributions.

### UNIT-IV: Sampling Theory

Introduction –Population and Samples – Sampling distribution of Means and Variance (definition only)– Point and Interval estimations – Maximum error of estimate – Central limit theorem (without proof) – Estimation using t, and F-distributions.

### UNIT-V: Tests of Hypothesis

Introduction – Hypothesis – Null and Alternative Hypothesis – Type I and Type II errors – Level of significance – One tail and two-tail tests –Test of significance for large samples and Small Samples: Single and difference means – Single and two proportions – Student’s t test, F-test , -test

### Text Books:

1. **Miller and Freund’s**, Probability and Statistics for Engineers,7/e, Pearson, 2008.
2. **S. C. Gupta and V.K. Kapoor**, Fundamentals of Mathematical Statistics, 11/e, Sultan Chand & Sons Publications, 2012.

### Reference Books:

1. **Shron L. Myers, Keying Ye, Ronald E Walpole,** Probability and Statistics Engineers and the Scientists,8th Edition, Pearson 2007.
2. **Jay l. Devore,** Probability and Statistics for Engineering and the Sciences, 8th Edition, Cengage.
3. **Sheldon M. Ross**, Introduction to probability and statistics Engineers and the Scientists, 4th Edition, Academic Foundation, 2011.

### Johannes Ledolter and Robert V. Hogg, Applied statistics for Engineers and Physical Scientists, 3rd Edition, Pearson, 2010

### E-Resources:

1. [Probability and Statistics - Course (nptel.ac.in)](https://onlinecourses.nptel.ac.in/noc22_cs123/preview)
2. https://www.coursera.org/browse/data-science/probability-and-statistics

**Websites:**

1. <https://www.bing.com/pros/search?q=Statistics>
2. <https://www.khanacademy.org/math/statistics-probability>
3. https://ocw.mit.edu/courses/18-05-introduction-to-probability-and-statistics-spring-2022/

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**Regulation**

**D23**

**OPERATING SYSTEMS**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Course Category: | **Professional Core** | Credits : 3 | | | |
| Course Type: | **Theory** | Lecture-Tutorial-Practice: | 3 | 0 | 0 |
| Prerequisites | Understanding of basics of Computer Organization | Continuous Evaluation | 30M | | |
| Semester End Evaluation | 70M | | |
| Total Marks | 100M | | |

**Course Outcomes:**

|  |  |  |
| --- | --- | --- |
| After Successful Completion of course, the student will be able to: | | |
| CO No: | Course Outcome Description | K - Level |
| CO1 | Define the functional aspects and implementation methods of different modules in a general purpose operating system. | Understanding |
| CO2 | Apply scheduling algorithms, multithreaded programming and inter-process communication through examples. | Applying |
| CO3 | Identify deadlock detection , recovery, prevention and avoidance algorithms | Applying |
| CO4 | Solve various memory management strategies such as paging and segmentation, virtual memory, swapping and page replacement algorithms. | Applying |
| CO5 | List various security measures and system protection techniques. | Applying |

Note: K-Level is defined From Blooms Taxonomy

Contribution of Course Outcomes mapping with POs & PSOs (**1**- Low, **2** – Moderate, **3** – High)

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **CO No.** | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** | **PSO1** | **PSO2** |
| CO1 | - | - | - | - | - | - | - | - | - | - | - | - | 3 | 3 |
| CO2 | 3 | - | - | - | - | - | - | - | - | - | - | - | 3 | 3 |
| CO3 | 3 | - | - | - | - | - | - | - | - | - | - | - | 3 | 3 |
| CO4 | 3 | - | - | - | - | - | - | - | - | - | - | - | 3 | 3 |
| CO5 | 3 | - | - | - | - | - | - | - | - | - | - | - | 3 | 3 |

**COURSE CONTENT:**

**UNIT-I:**

Operating Systems Overview: Introduction, Operating system functions, Operating systems operations, Computing environments, Free and Open-Source Operating Systems System Structures: Operating System Services, User and Operating-System Interface, system calls, Types of System Calls, system programs, Operating system Design and Implementation, Operating system structure, Building and Booting an Operating System, Operating system debugging.

**UNIT-II:**

Processes: Process Concept, Process scheduling, Operations on processes, Inter-process communication.

Threads and Concurrency: Multithreading models, Thread libraries, Threading issues.

CPU Scheduling: Basic concepts, Scheduling levels, Pre-emptive versus Non Pre-emptive scheduling,  Scheduling criteria, Scheduling algorithms, Multiple Processor Scheduling.

**UNIT-III:**

Synchronization Tools: The Critical Section Problem, Peterson’s Solution, Mutex Locks, Semaphores, Monitors, Classic problems of Synchronization.

Deadlocks: system Model, Deadlock characterization, Methods for handling Deadlocks, Deadlock prevention, Deadlock avoidance, Deadlock detection, Recovery from Deadlock.

**UNIT-IV:**

Memory-Management Strategies: Introduction, Contiguous memory allocation, Paging, Structure of the Page Table, Swapping.

Virtual Memory Management: Introduction, Demand paging, Copy-on-write, Page replacement, Allocation of frames, Thrashing Storage Management: Overview of Mass Storage Structure, HDD Scheduling.

**UNIT-V:**

File System: File System Interface: File concept, Access methods, Directory Structure; File system Implementation: File-system structure, File-system Operations, Directory implementation, Allocation method, Free space management;

File-System Internals: File-System Mounting, Partitions and Mounting, File Sharing.

Protection: Goals of protection, Principles of protection, Protection Rings, Domain of protection, Access matrix.

**Text Books:**

1. Operating System Concepts, Silberschatz A, Galvin P B, Gagne G, 10th Edition, Wiley, 2018.
2. Modern Operating Systems, Tanenbaum A S, 4th Edition, Pearson , 2016

**Reference Books:**

1. Operating Systems -Internals and Design Principles, Stallings W, 9th edition, Pearson, 2018
2. Operating Systems: A Concept Based Approach, D.M Dhamdhere, 3rd Edition, McGraw- Hill, 2013

**E-Resources/Digital Material:**

1. https://nptel.ac.in/courses/106/106/106106144/
2. http://peterindia.net/OperatingSystems.html

**Database Management Systems**

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**Regulation**

**D23**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Course Category: | **Professional Core** | Credits: 3 | | | |
| Course Type: | **Theory** | Lecture-Tutorial-Practice: | 3 | 0 | 0 |
| Prerequisites | Understanding of data concepts like data types, structures and relationships | Continuous Evaluation | 30M | | |
| Semester End Evaluation | 70M | | |
| Total Marks | 100M | | |

**Course Outcomes:**

|  |  |  |
| --- | --- | --- |
| After Successful Completion of course, the student will be able to: | | |
| CO No: | Course Outcome Description | K - Level |
| CO1 | Apply knowledge of database system structures and environments to analyze real world scenarios | Applying |
| CO2 | Apply ER model for database design | Applying |
| CO3 | Make use of SQL queries on relational database to create, maintain and manipulate a relational database. | Applying |
| CO4 | Analyze different normalization techniques for effective database design. | Analyzing |
| CO5 | Analyze transaction management and indexing techniques for a database. | Analyzing |

Note: K-Level is defined From Blooms Taxonomy

Contribution of Course Outcomes mapping with POs & PSOs (**1**- Low, **2** – Moderate,**3** – High)

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **CO No.** | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** | **PSO1** | **PSO2** |
| CO1 | 3 | - | - | - | - | - | - | - | - | - | - | - | 3 | 3 |
| CO2 | 3 | - | - | - | - | - | - | - | - | - | - | - | 3 | 3 |
| CO3 | 3 | - | - | - | - | - | - | - | - | - | - | - | 3 | 3 |
| CO4 | - | 3 | - | - | - | - | - | - | - | - | - | - | 3 | 3 |
| CO5 | - | 3 | - | - | - | - | - | - | - | - | - | - | 3 | 3 |

**COURSE CONTENT:**

### UNIT-I:

### Introduction: Database system, Characteristics (Database Vs File System), Database Users, Advantages of Database systems, Database applications. Brief introduction of different Data Models; Concepts of Schema, Instance and data independence; Three tier schema architecture for data independence; Database system structure, environment, Centralized and Client Server architecture for the database.

### UNIT-II:

### Entity Relationship Model & Relational Model: Introduction, Representation of entities, attributes, entity set, relationship, relationship set, constraints, sub classes, super class, inheritance, specialization, generalization, aggregation using ER Diagrams. Relational Model: Introduction to relational model, concepts of domain, attribute, tuple, relation, importance of null values, constraints (Domain, Key constraints, integrity constraints) and their importance, Relational Algebra, Relational Calculus.

### UNIT-III:

### BASIC SQL: Simple Database schema, data types, table definitions (create, alter), different DML operations (insert, delete, update).

SQL: Basic SQL querying (select and project) using where clause, arithmetic & logical operations, SQL functions (Date and Time, Numeric, String conversion). Creating tables with relationship, implementation of key and integrity constraints, nested queries, sub queries, grouping, aggregation, ordering, implementation of different types of joins, view (updatable and non-updatable), relational set operations, Triggers.

### UNIT-IV:

Schema Refinement (Normalization): Purpose of Normalization or schema refinement, concept of functional dependency, normal forms based on functional dependency Lossless join and dependency preserving decomposition, (1NF, 2NF and 3 NF), concept of surrogate key, Boyce-Codd normal form (BCNF), MVD, Fourth normal form(4NF), Fifth Normal Form(5NF).

### UNIT-V:

### Transaction Concept: Transaction State, ACID properties, Concurrent Executions, Serializability, Recoverability, Implementation of Isolation, Testing for Serializability, lock based, time stamp based, optimistic, concurrency protocols, Deadlocks, Failure Classification, Storage, Recovery and Atomicity, Recovery algorithm.

### Introduction to Indexing Techniques: B+ Trees, operations on B+Trees, Hash Based Indexing

### Text Books:

1. Database Management Systems, 3rd edition, Raghurama Krishnan, Johannes Gehrke, TMH, 2003
2. Database System Concepts,7th edition, Silberschatz, Korth, Sudarsan, TMH,2019

### Reference Books:

1. Introduction to Database Systems, 8thedition, C J Date, Pearson,2006.
2. Database Management System, 7th edition, Ramez Elmasri, Shamkant B. Navathe, Pearson, 2017.
3. Database Principles Fundamentals of Design Implementation and Management, Corlos Coronel, Steven Morris, Peter Robb, Cengage Learning, 10th edition, 2013.

### E-Resources:

1. https://nptel.ac.in/courses/106/105/106105175/
2. <https://infyspringboard.onwingspan.com/web/en/app/toc/lex_auth_01275806667282022456_shared/overview>
3. <http://www.c4learn.com/>
4. <https://www.geeksforgeeks.org/dbms/>
5. <https://onlinecourses.nptel.ac.in/noc22_cs91/preview>
6. <https://www.tutorialspoint.com/dbms/index.htm>

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**Regulation**

**D23**

**SOFTWARE ENGINEERING**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Course Category: | **Professional Core** | Credits : 3 | | | |
| Course Type: | **Theory** | Lecture-Tutorial-Practice: | 3 | 0 | 0 |
| Prerequisites | Basic knowledge of algorithms, data analysis and software | Continuous Evaluation | 30M | | |
| Semester End Evaluation | 70M | | |
| Total Marks | 100M | | |

**Course Outcomes:**

|  |  |  |
| --- | --- | --- |
| After Successful Completion of course, the student will be able to: | | |
| CO No: | Course Outcome Description | K - Level |
| CO1 | Understand phases of software development and conventional software methods | Understanding |
| CO2 | Utilize Empirical estimation techniques like COCOMO, Halstead’s software science for project management and implement various specifications | Applying |
| CO3 | Construct various software designs and cost models | Applying |
| CO4 | Develop skills to design, implement, and execute test cases at various levels with quality management | Applying |
| CO5 | Implement software maintenance, reuse approaches and make use of CASE Tools | Applying |

Note: K-Level is defined From Blooms Taxonomy

Contribution of Course Outcomes mapping with POs & PSOs (**1**- Low, **2** – Moderate, **3** – High)

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **CO No.** | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** | **PSO1** | **PSO2** |
| CO1 | - | - | - | - | - | - | - | - | - | - | - | - | 3 | 3 |
| CO2 | 3 | - | - | - | - | - | - | - | - | - | - | - | 3 | 3 |
| CO3 | 3 | - | - | - | - | - | - | - | - | - | - | - | 3 | 3 |
| CO4 | 3 | - | - | - | - | - | - | - | - | - | - | - | 3 | 3 |
| CO5 | 3 | - | - | - | - | - | - | - | - | - | - | - | 3 | 3 |

**COURSE CONTENT:**

**UNIT-I:**

**Introduction:** Evolution, Software development projects, Exploratory style of software developments, Emergence of software engineering, Notable changes in software development practices, Computer system engineering.

**Software Life Cycle Models:** Basic concepts, Water fall model and its extensions, Rapid application development, Agile development model, Spiral model.

**UNIT-II:**

**Software Project Management:** Software project management complexities, Responsibilities of a software project manager, Metrics for project size estimation, Project estimation techniques, Empirical Estimation techniques, COCOMO, Halstead’s software science, risk management.

**Requirements Analysis And Specification:** Requirements gathering and analysis, Software Requirements Specification(SRS), Formal system specification, Axiomatic specification, Algebraic specification, Executable specification and 4GL.

**UNIT-III:**

**Software Design:** Overview of the design process, How to characterize a good software design ?Layered arrangement of modules, Cohesion and Coupling, approaches to software design.

**Agility:** Agility and the Cost of Change, Agile Process, Extreme Programming (XP), Other Agile Process Models, Tool Set for the Agile Process(TextBook2)

**Function-Oriented Software Design:** Overview of SA/SD methodology, Structured analysis, Developing the DFD model of a system, Structured design, Detailed design, and Design Review.

**User Interface Design:** Characteristics of a good user interface, Basic concepts, Types of use rinterfaces, Fundamentals of component-based GUI development, and user interface design methodology.

**Basic concepts of OOAD and UML**

**UNIT-IV:**

**Coding And Testing:** Coding, Code review, Software documentation, Testing, Black-box testing, White-Box testing, Debugging, Program analysis tools, Integration testing**,** Testing object-oriented programs, Smoke testing, and Some general issues associated with testing.

**Software Reliability And Quality Management:** Software reliability. Statistical testing, Software quality, Software quality management system, ISO9000.SEI Capability maturity model. Few other important quality standards, and Six Sigma**.**

**UNIT-V:**

**Computer-Aided Software Engineering (CASE):** CASE and its scope, CASE environment, CASE support in the software life cycle, other characteristics of CASE tools, Towards second generation CASE Tool, and Architecture of a CASE Environment.

**Software Maintenance:** Characteristics of software maintenance, Software reverse engineering, Software maintenance process models and Estimation of maintenance cost.

**Software Reuse:** reuse-definition, introduction, reason behind no reuse so far, Basic issues in any reuse program, Are use approach, and Reuse at organization level.

**Text Books:**

1. FundamentalsofSoftwareEngineering,RajibMall,5thEdition,PHI, 2018.
2. SoftwareEngineeringApractitioner’sApproach,RogerS.Pressman,9thEdition,Mc-GrawHillInternationalEdition, 2010.

**Reference Books:**

1. SoftwareEngineering,IanSommerville,10thEdition,Pearson, 2011.
2. Software Engineering, Principles and Practices,DeepakJain,OxfordUniversityPress,2008.

**E-Resources/Digital Material:**

1. https://nptel.ac.in/courses/106/105/106105182/
2. https://infyspringboard.onwingspan.com/web/en/app/toc/lex\_auth\_01260589506387148827\_shared/overview
3. https://infyspringboard.onwingspan.com/web/en/app/toc/lex\_auth\_013382690411003904735\_shared/overview

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**Regulation**

**D23**

# OPERATING SYSTEMS LAB

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Course Category: | **Professional Core** | Credits : 1.5 | | | |
| Course Type: | **Practical** | Lecture-Tutorial-Practice: | 0 | 0 | 3 |
| Prerequisites | Practical | Continuous Evaluation |  | | |
| Semester End Evaluation |  | | |
| Total Marks |  | | |

**Course Outcomes:**

|  |  |  |
| --- | --- | --- |
| After Successful Completion of course, the student will be able to: | | |
| CO No: | Course Outcome Description | K - Level |
| CO1 | Make use of Linux environment for Unix utilities and perform basic shell and file access control. | Applying |
| CO2 | Solve various CPU Scheduling, deadlocks and page replacement algorithms. | Applying |
| CO3 | Apply concepts of Inter process communication and Pthreads in operating systems. | Applying |

Note: K-Level is defined From Blooms Taxonomy

Contribution of Course Outcomes mapping with POs & PSOs (**1**- Low, **2** – Moderate, **3** – High)

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **CO No.** | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** | **PSO1** | **PSO2** |
| CO1 | - | 3 | - | - | 3 | - | - | - | - | - | - | 3 | 3 | 3 |
| CO2 | - | 3 | - | - | 3 | - | - | - | - | - | - | 3 | 3 | 3 |
| CO3 | - | 3 | - | - | 3 | - | - | - | - | - | - | 3 | 3 | 3 |

**COURSE CONTENT:**

1. Practicing of Basic UNIX Commands.

2. Write programs using the following UNIX operating system calls fork, exec, getpid,

exit, wait, close, stat, opendir and readdir

3. Simulate UNIX commands like cp, ls, grep, etc.,

4. Simulate the following CPU scheduling algorithms

a) FCFS b) SJF c) Priority d) Round Robin

5. Control the number of ports opened by the operating system with

a) Semaphore b) Monitors.

6. Write a program to illustrate concurrent execution of threads using pthreads library.

7. Write a program to solve producer-consumer problem using Semaphores.

8. Implement the following memory allocation methods for fixed partition

a) First fit b) Worst fit c) Best fit

9. Simulate the following page replacement algorithms a) FIFO b) LRU c) LFU

10. Simulate Paging Technique of memory management.

11. Implement Bankers Algorithm for Dead Lock avoidance and prevention

12. Simulate the following file allocation strategies a) Sequential b) Indexed c) Linked

13. Download and install nachos operating system and experiment with it

**Reference Books:**

1. Operating System Concepts, Silberschatz A, Galvin P B, Gagne G, 10th Edition,

Wiley, 2018.

1. Modern Operating Systems, Tanenbaum A S, 4th Edition, Pearson, 2016
2. Operating Systems -Internals and Design Principles, Stallings W, 9th edition, Pearson, 2018
3. Operating Systems: A Concept Based Approach, D.M Dhamdhere, 3rd Edition, McGraw- Hill, 2013

**Online Learning Resources:**

1. <https://www.cse.iitb.ac.in/~mythili/os/>
2. <http://peterindia.net/OperatingSystems.html>
3. [www.cs.washington.edu/~tom/nachos](http://www.cs.washington.edu/~tom/nachos)

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**Regulation**

**D23**

# DATABASE MANAGEMENT SYSTEMS LAB

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Course Category: | **Professional Core** | Credits :1.5 | | | |
| Course Type: | **Practical** | Lecture-Tutorial-Practice: | 0 | 0 | 3 |
| Prerequisites | Understanding of data concepts like data types, structures and relationships | Continuous Evaluation | 30M | | |
| Semester End Evaluation | 70M | | |
| Total Marks | 100M | | |

**Course Outcomes:**

|  |  |  |
| --- | --- | --- |
| After Successful Completion of course, the student will be able to: | | |
| CO No: | Course Outcome Description | K - Level |
| CO1 | Analyze various SQL queries to perform operations on database | Analyzing |
| CO2 | Examine PL/SQL programs for procedures, functions, cursors and triggers. | Analyzing |
| CO3 | Inspect different indexing techniques on a table and JDBC concept. | Analyzing |

Note: K-Level is defined From Blooms Taxonomy

Contribution of Course Outcomes mapping with POs & PSOs (**1**- Low, **2** – Moderate,**3** – High)

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **CO No.** | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** | **PSO1** | **PSO2** |
| CO1 | - | 3 | - | - | 3 | - | - | - | - | - | - | 3 | 3 | 3 |
| CO2 | - | 3 | - | - | 3 | - | - | - | - | - | - | 3 | 3 | 3 |
| CO3 | - | 3 | - | - | 3 | - | - | - | - | - | - | 3 | 3 | 3 |

**COURSE CONTENT:**

**Exercise 1:** Creation, altering and dropping of tables and inserting rows into a table (use constraints while creating tables) examples using SELECT command.

**Exercise 2:** Queries (along with sub Queries) using ANY, ALL, IN, EXISTS, NOTEXISTS, UNION, INTERSET, Constraints. Example:- Select the roll number and name of the student who secured fourth rank in the class.

**Exercise 3:** Queries using Aggregate functions (COUNT, SUM, AVG, MAX and MIN), GROUP BY, HAVING and Creation and dropping of Views.

**Exercise 4:** Queries using Conversion functions (to\_char, to\_number and to\_date), string functions (Concatenation, lpad, rpad, ltrim,rtrim, lower, upper, initcap, length, substr and instr), date functions (Sysdate, next\_day, add\_months, last\_day, months\_between, least, greatest, trunc, round, to\_char, to\_date)

**Exercise 5:** i. Create a simple PL/SQL program which includes declaration section, executable section and exception –Handling section (Ex. Student marks can be selected from the table and printed for those who secured first class and an exception can be raised if no records were found)

ii. Insert data into student table and use COMMIT, ROLLBACK and SAVEPOINT in PL/SQL block.

**Exercise 6:** Develop a program that includes the features NESTED IF, CASE and CASE expression. The program can be extended using the NULLIF and COALESCE functions.

**Exercise 7:** Program development using WHILE LOOPS, numeric FOR LOOPS, nested loops using ERROR Handling, BUILT–IN Exceptions, USE defined Exceptions, RAISE- APPLICATION ERROR.

**Exercise 8:** Programs development using creation of procedures, passing parameters IN and OUT of PROCEDURES.

**Exercise 9:** Program development using creation of stored functions, invoke functions in SQL Statements and write complex functions.

**Exercise 10:** Develop programs using features parameters in a CURSOR, FOR UPDATE CURSOR, WHERE CURRENT of clause and CURSOR variables.

**Exercise 11:**

Develop Programs using BEFORE and AFTER Triggers, Row and Statement Triggers and INSTEAD OF Triggers

**Exercise 12:**

Create a table and perform the search operation on table using indexing and non-indexing techniques.

**Exercise 13:** Write a Java program that connects to a database, insert and delete values using JDBC

**Exercise 14:** Write a Java program to connect to a database using JDBC and insert values into it

**Exercise 15:** Write a Java program to connect to a database using JDBC and delete values from it

**Text Books:**

1. Oracle: The Complete Reference by Oracle Press,12c,2013.
2. Nilesh Shah, "Database Systems Using Oracle”,2nd edition PHI, 2007
3. Rick F Vander Lans, “Introduction to SQL”, Fourth Edition, Pearson Education, 2007

**Reference Books:**

1. The Complete Reference MYSQL, Vikram Vaswani, McGraw-HillEducation,1st Edition,2017.
2. Fundamentals of Database Systems, RamezElmasri, ShamkantB. Navathe, Seventh edition, Pearson,2015.

**E-Resources/Digital Material:**

1. Prof Arnab Bhattacharya IIT Kanpur, SQL Introduction <https://nptel.ac.in/courses/106104135/10>
2. Prof Arnab Bhattacharya IIT Kanpur SQL: Updates, Joins, Views and Triggers <https://nptel.ac.in/courses/106104135/11>
3. Geoff Allix and Graeme Malcolm: Microsoft , Querying with Transact-SQL (edX) <https://www.mooc-list.com/course/querying-transact-sql-edx>

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**Regulation**

**D23**

**Full Stack Development –I**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Course Category: | **Skill Enhancement Course** | Credits: 2 | | | |
| Course Type: | **Theory** | Lecture-Tutorial-Practice: | 0 | 1 | 2 |
| Prerequisites | knowledge of basic web programming | Continuous Evaluation | 30M | | |
| Semester End Evaluation | 70M | | |
| Total Marks | 100M | | |

**Course Outcomes:**

|  |  |  |
| --- | --- | --- |
| After Successful Completion of course, the student will be able to: | | |
| CO No: | Course Outcome Description | K - Level |
| CO1 | Applying the basics of full stack web development | Applying |
| CO2 | Develop responsive web pages using HTML and CSS | Applying |
| CO3 | Implement client-side scripting using JavaScript and Build interactive web pages using Node.JS | Applying |

Note: K-Level is defined From Blooms Taxonomy

Contribution of Course Outcomes mapping with POs & PSOs (**1**- Low, **2** – Moderate,**3** – High)

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **CO No.** | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** | **PSO1** | **PSO2** |
| CO1 | 3 | - | - | - | - | - | - | - | - | - | - | - | 3 | 3 |
| CO2 | 3 | - | - | - | - | - | - | - | - | - | - | - | 3 | 3 |
| CO3 | 3 | - | - | - | - | - | - | - | - | - | - | - | 3 | 3 |

**COURSE CONTENT:**

**Experiments covering the Topics:**

* Lists, Links and Images
* HTML Tables, Forms and Frames
* HTML 5 and Cascading Style Sheets, Types of CSS
* Selector forms
* CSS with Color, Background, Font, Text and CSS Box Model
* Applying JavaScript - internal and external, I/O, Type Conversion
* JavaScript Conditional Statements and Loops, Pre-defined and User-defined Objects
* JavaScript Functions and Events
* Node.js

**Sample Experiments:**

**1. Lists, Links and Images**

a. Write a HTML program, to explain the working of lists.

Note: It should have an ordered list, unordered list, nested lists and ordered list in an unordered

list and definition lists.

b. Write a HTML program, to explain the working of hyperlinks using <a> tag and href, target

Attributes.

c. Create a HTML document that has your image and your friend’s image with a specific height and

width. Also when clicked on the images it should navigate to their respective profiles.

d. Write a HTML program, in such a way that, rather than placing large images on a page, the

preferred technique is to use thumbnails by setting the height and width parameters to something

like to 100\*100 pixels. Each thumbnail image is also a link to a full sized version of the image. Create an image gallery using this technique

**2. HTML Tables, Forms and Frames**

a. Write a HTML program, to explain the working of tables. (use tags: <table>, <tr>, <th>, <td>

and attributes: border, rowspan, colspan).

b. Write a HTML program, to explain the working of tables by preparing a timetable. (Note: Use

<caption> tag to set the caption to the table & also use cell spacing, cell padding, border,

rowspan, colspan etc.).

c. Write a HTML program, to explain the working of forms by designing Registration form. (Note:

Include text field, password field, number field, date of birth field, checkboxes, radio buttons, list

boxes using <select>&<option> tags, <text area> and two buttons ie: submit and reset. Use tables

to provide a better view).

d. Write a HTML program, to explain the working of frames, such that page is to be divided into 3

parts on either direction. (Note: first frame  image, second frame  paragraph, third frame 

hyperlink. And also make sure of using “no frame” attribute such that frames to be fixed).

**3. HTML 5 and Cascading Style Sheets, Types of CSS**

a. Write a HTML program, that makes use of <article>, <aside>, <figure>, <figcaption>,

<footer>, <header>, <main>, <nav>, <section>, <div>, <span> tags.

b. Write a HTML program, to embed audio and video into HTML web page.

c. Write a program to apply different types (or levels of styles or style specification formats) –

inline, internal, external styles to HTML elements. (identify selector, property and value).

**4. Selector forms**

a. Write a program to apply different types of selector forms

i. Simple selector (element, id, class, group, universal)

ii. Combinator selector (descendant, child, adjacent sibling, general sibling)

iii.Pseudo-class selector

iv. Pseudo-element selector

v. Attribute selector

**5. CSS with Color, Background, Font, Text and CSS Box Model**

a. Write a program to demonstrate the various ways you can reference a color in CSS.

b. Write a CSS rule that places a background image halfway down the page, tilting it

horizontally. The image should remain in place when the user scrolls up or down.

c. Write a program using the following terms related to CSS font and text:

i. font-size ii. font-weight iii. font-style

iv. text-decoration v. text-transformation vi. text-alignment

d. Write a program, to explain the importance of CSS Box model using

i. Content ii. Border iii. Margin iv. padding

**6. Applying JavaScript - internal and external, I/O, Type Conversion**

a. Write a program to embed internal and external JavaScript in a web page.

b. Write a program to explain the different ways for displaying output.

c. Write a program to explain the different ways for taking input.

d. Create a webpage which uses prompt dialogue box to ask a voter for his name and age. Display

the information in table format along with either the voter can vote or not

**7. Java Script Pre-defined and User-defined Objects**

a. Write a program using document object properties and methods.

b. Write a program using window object properties and methods.

c. Write a program using array object properties and methods.

d. Write a program using math object properties and methods.

e. Write a program using string object properties and methods.

f. Write a program using regex object properties and methods.

g. Write a program using date object properties and methods.

h. Write a program to explain user-defined object by using properties, methods, accessors,

constructors and display.

**8. Java Script Conditional Statements and Loops**

a. Write a program which asks the user to enter three integers, obtains the numbers from the

user and outputs HTML text that displays the larger number followed by the words

“LARGER NUMBER” in an information message dialog. If the numbers are equal, output

HTML text as “EQUAL NUMBERS”.

b. Write a program to display week days using switch case.

c. Write a program to print 1 to 10 numbers using for, while and do-while loops.

d. Write aprogram to print data in object using for-in, for-each and for-of loops

e. Develop a program to determine whether a given number is an ‘ARMSTRONG

NUMBER’ or not. [Eg: 153 is an Armstrong number, since sum of the cube of the digits is

equal to the number i.e.,13 + 53+ 33 = 153]

f. Write a program to display the denomination of the amount deposited in the bank in terms

of 100’s, 50’s, 20’s, 10’s, 5’s, 2’s & 1’s. (Eg: If deposited amount is Rs.163, the output

should be 1-100’s, 1-50’s, 1- 10’s, 1-2’s & 1-1’s)

**9. Java Script Functions and Events**

a. Design a appropriate function should be called to display

i. Factorial of that number

ii. Fibonacci series up to that number

iii. Prime numbers up to that number

iv. Is it palindrome or not

b. Design a HTML having a text box and four buttons named Factorial, Fibonacci, Prime,

and Palindrome. When a button is pressed an appropriate function should be called to

display

i. Factorial of that number

ii. Fibonacci series up to that number

iii. Prime numbers up to that number

iv. Is it palindrome or not

c. Write a program to validate the following fields in a registration page

i. Name (start with alphabet and followed by alphanumeric and the length should

not be less than 6 characters)

ii. Mobile (only numbers and length 10 digits)

iii. E-mail (should contain format like xxxxxxx@xxxxxx.xxx)

**Text Books:**

1. Programming the World Wide Web, 7th Edition, Robet W Sebesta, Pearson, 2013.

2. Web Programming with HTML5, CSS and JavaScript, John Dean, Jones & Bartlett

Learning, 2019 (Chapters 1-11).

3. Pro MERN Stack: Full Stack Web App Development with Mongo, Express, React, and

Node, Vasan Subramanian, 2nd edition, APress, O’Reilly, 2017.

**Web Links:**

1. https://www.w3schools.com/html

2. https://www.w3schools.com/css

3. https://www.w3schools.com/js/

4. https://www.w3schools.com/nodejs

**Regulation**

**D23**

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**DESIGN THINKING & INNOVATION**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Course Category: | **BS&H** | Credits: 2 | | | |
| Course Type: | **Theory** | Lecture-Tutorial-Practice: | 1 | 0 | 2 |
| Prerequisites | Innovative, Logical thinking and Generating Ideas | Continuous Evaluation | 30M | | |
| Semester End Evaluation | 70M | | |
| Total Marks | 100M | | |

**Course Outcomes:**

|  |  |  |
| --- | --- | --- |
| After Successful Completion of course, the student will be able to: | | |
| CO No: | Course Outcome Description | K - Level |
| CO1 | Apply design principles to create compositions using basic design elements | Applying |
| CO2 | Implement the Design Thinking process to drive inventions and solve problems in various sectors | Applying |
| CO3 | Analyze the impact of creativity and innovation on organizational success | Analyzing |
| CO4 | Evaluate the importance of modeling in the product design process. | Evaluating |
| CO5 | Design, develop and test business models and prototypes | Design |

Note: K-Level is defined From Blooms Taxonomy

Contribution of Course Outcomes mapping with POs & PSOs (**1**- Low, **2** – Moderate,**3** – High)

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **CO No.** | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** | **PSO1** | **PSO2** |
| CO1 | 3 | - | - | - | - | - | - | - | - | - | - | - | 3 | 3 |
| CO2 | 3 | - | - | - | - | - | - | - | 3 | 3 | - | - | 3 | 3 |
| CO3 | - | 3 | - | - | - | - | - | - | 3 | 3 | - | - | 3 | 3 |
| CO4 | - | - | - | 3 | - | - | - | - | 3 | 3 | - | - | 3 | 3 |
| CO5 | - | - | 3 | - | - | - | - | - | 3 | 3 | - | - | 3 | 3 |

**COURSE CONTENT:**

### UNIT-I:

Introduction to Design Thinking: Introduction to elements and principles of Design, basics of design-dot, line, shape, form as fundamental design components. Principles of design. Introduction to design thinking, history of Design Thinking, New materials in Industry.

### UNIT-II: Design Thinking Process

Design thinking process (empathize, analyze, idea & prototype), implementing the process in driving inventions, design thinking in social innovations. Tools of design thinking - person, costumer, journey map, brainstorming, product development

Activity: Every student presents their idea in three minutes, Every student can present design process in the form of flow diagram or flow chart etc. Every student should explain about product development.

### UNIT-III: Innovation

Art of innovation, Difference between innovation and creativity, role of creativity and innovation in organizations. Creativity to Innovation. Teams for innovation, Measuring the impact and value of creativity.

Activity: Debate on innovation and creativity, Flow and planning from idea to innovation,

### Debate on value-based innovation.

### UNIT-IV: Product Design

Problem formation, introduction to product design, Product strategies, Product value, Product planning, product specifications. Innovation towards product design Case studies.

Activity: Importance of modeling, how to set specifications, Explaining their own product design.

### UNIT-V: Design Thinking in Business Process

Design Thinking applied in Business & Strategic Innovation, Design Thinking principles that redefine business – Business challenges: Growth, Predictability, Change, Maintaining Relevance, Extreme competition, Standardization. Design thinking to meet corporate needs. Design thinking for Startups. Defining and testing Business Models and Business Cases. Developing & testing prototypes.

Activity: How to market our own product, about maintenance, Reliability and plan for startup.

### Text Books:

1. Tim Brown, Change by design, 1/e, Harper Bollins, 2009.
2. Idris Mootee, Design Thinking for Strategic Innovation, 1/e, Adams Media, 2014.

### Reference Books:

1. David Lee, Design Thinking in the Classroom, Ulysses press, 2018.
2. Shrrutin N Shetty, Design the Future, 1/e, Norton Press, 2018.
3. William lidwell, Kritinaholden, &Jill butter, Universal principles of design, 2/e,Rockport Publishers, 2010.
4. Chesbrough.H, The era of open innovation, 2003.

### E-Resources:

1. <https://nptel.ac.in/courses/110/106/110106124/>
2. <https://nptel.ac.in/courses/109/104/109104109/>
3. <https://swayam.gov.in/nd1_noc19_mg60/preview>
4. <https://onlinecourses.nptel.ac.in/noc22_de16/preview>
5. <https://onlinecourses.swayam2.ac.in/aic23_ge17/preview>