

Lingaya's Vidyapeeth

Deemed-to-be-University u/s 3 of UGC Act 1956, Government of India

NAAC ACCREDITED

Approved by MHRD / AICTE / PCI / BCI / COA / NCTE

Nachauli, Jasana Road, Faridabad- 121002 (Haryana)

Website: www.lingayasvidyapeeth.edu.in | Ph: 0129-2598200-05

COURSE PLAN & COURSE DATA SHEET

| | |
|---|---|
| PROGRAM: BCA | DEGREE:3yrs |
| COURSE: Design & analysis of algorithm | SEMESTER: 4 th sem CREDITS: 4 credit |
| COURSE CODE: BCA-204 REGULATION: | COURSE TYPE: CORE /ELECTIVE / BREADTH/ S&H-Core |
| COURSE AREA/DOMAIN: Computer science | CONTACT HOURS: 3+1 (Tutorial) hours/Week.3+1=4 |
| CORRESPONDING LAB COURSE CODE (IF ANY): | LAB COURSE NAME (IF ANY): |

PROGRAM EDUCATIONAL OBJECTIVES:

SYLLABUS:

| UNIT | DETAILS | HOURS |
|-------------|--|-------|
| I | MATHEMATICAL PRELIMINARIES: Role of algorithm in computing; mathematical preliminaries; review of growth functions; solution of difference equations; analysis in terms of space and time complexity. | 11 |
| II | SORTING: Insertion sort; merge sort; heap sort; quick sort; radix sort, bucket sort, bubble sort, selection sort. | 11 |
| III | ADVANCED DATA STRUCTURES: Stack; queue; linked list; binary search trees; red black trees. | 11 |
| IV | DYNAMIC PROGRAMMING AND GREEDY ALGORITHM: Matrix multiplications; longest common subsequence, Huffman coding; task scheduling problem. | 11 |
| V | ELEMENTARY GRAPH ALGORITHM AND MINIMUM SPANNING TREE: Representation of graph; breadth-first search; depth first search; topological sort; strongly connected components, Growing a minimum spanning tree; Kruskal & Prims algorithms. | 11 |
| VI | | |
| VII | | |
| VIII | | |
| TOTAL HOURS | | 55 |

| | | | |
|--|---------------------------|------------------------------|--|
| Teacher Centric Approach | | | |
| TC1: Chalk and Talk, Blended learning | TC2: PPT, | TC3: Video Lectures | TC4: |
| Learner Centric Approach: | | | |
| LC1: Assignment. | LC2: Mini project. | LC3: Quiz/Class test. | LC 4: Seminar on recent trends. |
| LC5: Group Task. | LC6: Others | | |

DETAILED SESSION PLAN

| Lecture session/ Number | Topics to be covered | CO addressed | Teacher Centric Approach | Learner Centric Approach | References | Relevance with POs and PSOs |
|-------------------------|-------------------------------------|--------------|--------------------------|--------------------------|-------------|-----------------------------|
| 1 | Intoduction of basic algorithm | | TC1, TC2 | LC1,LC2,LC3 | T1/R1/W1 | |
| 2 | MATHEMATICAL PRELIMINARIES | | TC1 | LC1,LC3 | T1/R1/W1 | |
| 3 | MATHEMATICAL PRELIMINARIES | | TC1 | LC1,LC3 | T1/T2/R1/W1 | |
| 4 | Role of algorithm in computing | | TC1,TC2 | LC1,LC3 | T1/T2/R1/W1 | |
| 5 | Role of algorithm in computing | | TC1,TC2 | LC1,LC3 | T1/T2/R1/W1 | |
| 6 | mathematical preliminaries | | TC1,TC2 | LC1,LC3 | T1/T2/R1/W1 | |
| 7 | review of growth functions | | TC1,TC2 | LC1,LC3 | T1/T2/R1/W1 | |
| 8 | review of growth functions | | TC1 | LC1,LC3 | T1/T2/R1/W1 | |
| 9 | solution of difference | | TC1 | LC1,LC3 | T1/T2/R1/W1 | |
| 10 | solution of difference | | TC1,TC2 | LC1,LC3 | T1/T2/R1/W1 | |
| 11 | analysis in terms of space and time | | TC1 | LC1,LC3 | T1/T2/R1/W1 | |
| 12 | analysis in terms of space and time | | TC1 | LC1,LC3 | T1/T2/R1/W1 | |
| 13 | SORTING | | TC1 | LC1,LC3 | T1/T2/R1/W1 | |
| 14 | Insertion sort | | TC1 | LC1,LC3 | T1/T2/R1/W1 | |
| 15 | Insertion sort | | TC1 | LC1,LC3 | T1/T2/R1/W1 | |
| 16 | merge sort | | TC1 | LC1,LC3 | T1/T2/R1/W1 | |

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| | | | | |
|----|-------------------------------|---------|---------|-------------|
| 17 | heap sort | TC1 | LC1,LC3 | T1/T2/R1/W1 |
| 18 | quick sort | TC1,TC2 | LC1,LC3 | T1/T2/R1/W1 |
| 19 | radix sort | TC1 | LC1,LC3 | T1/T2/R1/W1 |
| 20 | bucket sort | TC1 | LC1,LC3 | T1/T2/R1/W1 |
| 21 | bubble sort | TC1 | LC1,LC3 | T1/T2/R1/W1 |
| 22 | selection sort. | TC1,TC2 | LC1,LC3 | T1/T2/R1/W1 |
| 23 | selection sort. | TC1,TC2 | LC1,LC3 | T1/T2/R1/W1 |
| 24 | ADVANCED DATA STRUCTURES | TC1,TC2 | LC1,LC3 | T1/T2/R1/W1 |
| 25 | Stack | TC1 | LC1,LC3 | T1/T2/R1/W1 |
| 26 | Queue | TC1,TC2 | LC1,LC3 | T1/T2/R1/W1 |
| 27 | linked list | TC1 | LC1,LC3 | T1/T2/R1/W1 |
| 28 | linked list | TC1 | LC1,LC3 | T1/T2/R1/W1 |
| 29 | binary search trees | TC1,TC2 | LC1,LC3 | T1/T2/R1/W1 |
| 30 | binary search trees | TC1,TC2 | LC1,LC3 | T1/T2/R1/W1 |
| 31 | red black trees | TC1 | LC1,LC3 | T1/T2/R1/W1 |
| 32 | red black trees | TC1,TC2 | LC1,LC3 | T1/T2/R1/W1 |
| 33 | red black trees | TC1,TC2 | LC1,LC3 | T1/T2/R1/W1 |
| 34 | DYNAMIC PROGRAMMING | TC1 | LC1,LC3 | T1/T2/R1/W1 |
| 35 | DYNAMIC PROGRAMMING | TC1 | LC1,LC3 | T1/T2/R1/W1 |
| 36 | Matrix multiplications | TC1,TC2 | LC1,LC3 | T1/T2/R1/W1 |
| 37 | longest common subsequence | TC1,TC2 | LC1,LC3 | T1/T2/R1/W1 |
| 38 | longest common subsequence | TC1,TC2 | LC1,LC3 | T1/T2/R1/W1 |
| 39 | Huffman coding | TC1 | LC1,LC3 | T1/T2/R1/W1 |
| 40 | Huffman coding | TC1 | LC1,LC3 | T1/T2/R1/W1 |
| 41 | task scheduling problem | TC1 | LC1,LC3 | T1/T2/R1/W1 |
| 42 | task scheduling problem | TC1,TC2 | LC1,LC3 | T1/T2/R1/W1 |

| | | | | | |
|----|-------------------------------|--|---------|---------|-------------|
| 43 | ELEMENTARY GRAPH | | TC1,TC2 | LC1,LC3 | T1/T2/R1/W1 |
| 44 | MINIMUM SPANNING TREE | | TC1 | LC1,LC3 | T1/T2/R1/W1 |
| 45 | Representation of graph | | TC1 | LC1,LC3 | T1/T2/R1/W1 |
| 46 | breadth-first search | | TC1 | LC1,LC3 | T1/T2/R1/W1 |
| 47 | depth first search | | TC1,TC2 | LC1,LC3 | T1/T2/R1/W1 |
| 48 | topological sort | | TC1 | LC1,LC3 | T1/T2/R1/W1 |
| 49 | strongly connected components | | TC1 | LC1,LC3 | T1/T2/R1/W1 |
| 50 | Growing a minimum spanning | | TC1 | LC1,LC3 | T1/T2/R1/W1 |
| 51 | Kruskal & Prims algorithms | | TC1,TC2 | LC1,LC3 | T1/T2/R1/W1 |
| 52 | Kruskal & Prims algorithms | | TC1 | LC1,LC3 | T1/T2/R1/W1 |
| 53 | Doubt session | | TC1 | LC1,LC3 | T1/T2/R1/W1 |
| 54 | Doubt session | | TC1 | LC1,LC3 | T1/T2/R1/W1 |
| 55 | Doubt session | | TC1,TC2 | LC1,LC3 | T1/T2/R1/W1 |

TEXT/REFERENCE BOOKS:

| T/R | BOOK TITLE/AUTHORS/PUBLICATION |
|-----|---|
| 1 | Cormen Thomas H., Leiserson Charles E. and Rivest Ronald L., "Introduction to Algorithms", Tata McGraw Hill, 1990 |
| 2 | V. Aho, J. E. Hopcroft, J. D. Ullman, "The Design and Analysis of Computer Algorithms", Addison Wesley, 1998. |
| 3 | Ellis Horowitz and Sartaz Sahani, "Computer Algorithms", Galgotia Publications, 1999. |
| 4 | E. Knuth, "The Art of Computer Programming", 2nd Ed., Addison Wesley, 1998 |
| 5 | |

WEB SOURCE REFERENCES (W):

| | |
|---|--|
| 1 | Design and Analysis of Algorithms - GeeksforGeeks |
| 2 | DAA Tutorial Design and Analysis of Algorithms Tutorial - javatpoint |
| 3 | Design and Analysis of Algorithms Tutorial (tutorialspoint.com) |
| 4 | |
| 5 | |
| 6 | |
| 7 | |

COURSE PRE-REQUISITES:

| C.CODE | COURSE NAME | DESCRIPTION | SEM |
|---------|-------------------------|---|---------------------|
| BCA-102 | Data Structures using C | Knowledge of fundamentals of basic computer programming for implementing algorithms | 1 st sem |
| | | | |

COURSE OBJECTIVES:

| | |
|---|--|
| 1 | To relay the theoretical and practical aspects of design of algorithms |
| 2 | |
| 3 | |
| 4 | |

COURSE OUTCOMES:

| S.NO | DESCRIPTION | PO(1..12) MAPPING | PSO(1..3) MAPPING |
|--------|---|--------------------------|----------------------|
| Cxxx.1 | Define the basic concepts of algorithms and analyze the performance of algorithms | PO1,PO2,PO3,PO4,PO9,PO11 | PSO1,PSO2 |
| Cxxx.2 | Discuss various algorithm design techniques for developing algorithms | PO1,PO2,PO3,PO9,PO11 | PSO1,PSO2 |
| Cxxx.3 | Discuss various searching, sorting and graph traversal algorithms. | PO1,PO8,PO9,PO10 | PSO2,PO3 |
| Cxxx.4 | Understand NP completeness and identify different NP complete problems | PO2,PO3,PO4,PO8 | PSO1,PSO2 |
| Cxxx.5 | Discuss various advanced topics on algorithms. | PO1,PO2,PO3,PO10 | PSO1,PSO2 |

COURSE OVERALL PO/PSO MAPPING:

COURSE OUTCOMES VS POs MAPPING (DETAILED; HIGH:3; MEDIUM:2; LOW:1):

| S.NO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|--------|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|------|------|
| Cxxx.1 | 2 | 1 | 2 | 2 | 1 | - | - | - | - | - | - | - | 2 | - | 1 |
| Cxxx.2 | 2 | 2 | 1 | 2 | 2 | - | - | - | - | - | - | 1 | 2 | - | 1 |
| Cxxx.3 | 2 | 1 | 2 | 1 | 2 | - | - | - | - | - | - | 1 | 1 | - | 1 |
| Cxxx.4 | 1 | 2 | 1 | 2 | 2 | - | - | - | - | - | - | 1 | 2 | - | 1 |
| Cxxx.5 | 2 | 2 | 2 | 1 | 2 | - | - | - | - | - | - | 1 | 2 | - | 1 |
| Cxxx* | | | | | | | | | | | | | | | |

* For Entire Course, PO & PSO Mapping

POs & PSO REFERENCE:

| | | | | | |
|-----|-----------------------|------|------------------------------|------|-------|
| PO1 | Engineering Knowledge | PO7 | Environment & Sustainability | PSO1 | |
| PO2 | Problem Analysis | PO8 | Ethics | PSO2 | |
| PO3 | Design & Development | PO9 | Individual & Team Work | PSO3 | |
| PO4 | Investigations | PO10 | Communication Skills | | |
| PO5 | Modern Tools | PO11 | Project Mgt. & Finance | | |
| PO6 | Engineer & Society | PO12 | Life Long Learning | | |

COs VS POs MAPPING JUSTIFICATION:

| S.NO | PO/PSO MAPPED | LEVEL OF MAPPING | JUSTIFICATION |
|--------|---------------|------------------|---------------|
| Cxxx.1 | | | |
| Cxxx.2 | | | |
| Cxxx.3 | | | |
| Cxxx.4 | | | |
| Cxxx.5 | | | |
| Cxxx* | | | |

GAPS IN THE SYLLABUS - TO MEET INDUSTRY/PROFESSION REQUIREMENTS, POs & PSOs:

| SNO | DESCRIPTION | PROPOSED ACTIONS |
|-----|-------------|------------------|
| 1 | | |
| 2 | | |
| 3 | | |
| 4 | | |
| 5 | | |

PROPOSED ACTIONS: TOPICS BEYOND SYLLABUS/ASSIGNMENT/INDUSTRY VISIT/GUEST LECTURER/NPTEL ETC

TOPICS BEYOND SYLLABUS/ADVANCED TOPICS/DESIGN:

| | |
|---|--|
| 1 | |
| 2 | |
| 3 | |
| 4 | |
| 5 | |
| 6 | |
| 7 | |

DELIVERY/INSTRUCTIONAL METHODOLOGIES:

| | | | |
|---|---|---|---------------------------------------|
| <input type="checkbox"/> CHALK & TALK | <input type="checkbox"/> STUD. ASSIGNMENT | <input type="checkbox"/> WEB RESOURCES | <input type="checkbox"/> NPTEL/OTHERS |
| <input type="checkbox"/> LCD/SMART BOARDS | <input type="checkbox"/> STUD. SEMINARS | <input type="checkbox"/> ADD-ON COURSES | <input type="checkbox"/> WEBNIARS |

ASSESSMENT METHODOLOGIES-DIRECT

| | | | |
|--|---|--|--|
| <input type="checkbox"/> ASSIGNMENTS | <input type="checkbox"/> STUD. SEMINARS | <input type="checkbox"/> TESTS/MODEL EXAMS | <input type="checkbox"/> UNIV. EXAMINATION |
| <input type="checkbox"/> STUD. LAB PRACTICES | <input type="checkbox"/> STUD. VIVA | <input type="checkbox"/> MINI/MAJOR PROJECTS | <input type="checkbox"/> CERTIFICATIONS |
| <input type="checkbox"/> ADD-ON COURSES | <input type="checkbox"/> OTHERS | | |

ASSESSMENT METHODOLOGIES-INDIRECT

Head Office: P-2, Kh. No. 30, Saiduljaab, Near Saket Metro Station, M.B. Road, New Delhi-110030 | Ph.: 011-40719000

Admnn. Office Vijaywada: 1st Floor, Sai Odyssey, Opp. Executive Club, Gurunanak Nagar Road, NH-5, Vijaywada-520008

www.lingayasgroup.org

"Par Excellence With Human Touch"



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| | |
|--|--|
| <input type="checkbox"/> ASSESSMENT OF COURSE OUTCOMES (BY FEEDBACK, ONCE) | <input type="checkbox"/> STUDENT FEEDBACK ON FACULTY (TWICE) |
| <input type="checkbox"/> ASSESSMENT OF MINI/MAJOR PROJECTS BY EXT. EXPERTS | <input type="checkbox"/> OTHERS |

INNOVATIONS IN TEACHING/LEARNING/EVALUATION PROCESSES:

- 1.
- 2.
- 3.
- 4.
- 5.

Ms.Shivani Gupta

**Prepared by
(Faculty)**

Dr.Ritu Sindhu

**Approved by
(HOD)**

Additionally, the details to be compiled separately by the Departmental Coordinator for the entire Department.