

Department of Master of Computer Applications

Academic Year 2023-24

First and Second Semester MCA Scheme & Syllabus

> Batch: 2023-25 Credits: 100

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NEW HORIZON COLLEGE OF ENGINEERING

VISION

To emerge as an institute of eminence in the fields of engineering, technology and management in serving the industry and the nation by empowering students with a high degree of technical, managerial and practical competence.

MISSION

To strengthen the theoretical, practical and ethical dimensions of the learning process by fostering a culture of research and innovation among faculty members and students.

To encourage long-term interaction between the academia and industry through their involvement in the design of curriculum and its hands-on implementation.

To strengthen and mould students in professional, ethical, social and environmental dimensions by encouraging participation in cocurricular and extracurricular activities.

QUALITY POLICY

To provide educational services of the highest quality both curricular and co-curricular to enable students integrate skills and serve the industry and society equally well at global level.

VALUES

- Academic Freedom
- Integrity
- Inclusiveness
- Innovation
- Professionalism
- Social Responsibility

DEPARTMENT OF

MASTER OF COMPUTER APPLICATIONS

VISION

To emerge as a department of eminence in the field of Computer Applications in serving the Information Technology Industry and the nation by empowering students with a high degree of technical, managerial and practical competence.

MISSION

To strengthen the theoretical, practical and ethical aspects of the learning while inculcating a culture of research, innovation and practical applications amongst faculty and students.

To encourage long-term interactions between the department and the IT Industry through rich involvement of the Industry in the design of the curriculum and its hands-on implementation.

To strengthen and mould students in professional, ethical, social and environmental dimensions by encouraging participation in cocurricular and extracurricular activities.

QUALITY POLICY

To provide services of the highest quality both curricular and cocurricular, so that our students can integrate their skills and serve the industry and society equally well at the global level.

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)

- **PEO1** Excel in the field of Computer Applications and contribute to academia, industry and research.
- **PEO2** Deliver software solutions that are socially relevant and adapt quickly to emerging technologies.
- **PEO3** Demonstrate professional behavior by understanding ethical and communication skills to engage in lifelong learning.

PROGRAMME OUTCOMES (POs)

- **PO1 Computational Knowledge:** Apply computing knowledge, mathematical knowledge and domain knowledge to create and develop new models for real world applications.
- **PO2 Problem Analysis:** Identify, formulate, review research literature and analyze complex problems using principles of mathematics, computing sciences and relevant domains.
- **PO3 Design / Development of Solutions:** Design, implement, test and maintain solutions for systems, components or processes that meet specific needs with consideration for public health safety, societal and environmental issues.
- **PO4 Conduct investigations of complex Computing problems:** Use Research–based knowledge to analyze and interpret data to obtain viable conclusions.
- **P05 Modern Tool Usage:** Use modern tools, techniques and skills to solve complex and critical computing problems with an understanding of their limitations.
- **PO6 Professional Ethics:** Understand and apply ethical principles, cyber regulations and commit to professional computing practice and responsibilities.
- **P07** Life-long Learning: Recognize the importance of selflearning for continual development as a computing professional.
- **PO8 Project management and finance:** Demonstrate the management principles for managing projects as an individual, as a member and as a leader in a team under multidisciplinary environments.
- **PO9 Communication Efficacy:** Recognize the importance of communication within the computing community and the society at large.
- **PO10** Societal and Environmental Concern: Understand and assess the local and global influence of software solutions and responsibilities related to professional computing practice.
- **PO11 Individual and Team Work:** Deliver effectively as an individual and as a member or leader in diverse teams and in multidisciplinary environments.
- **PO12 Innovation and Entrepreneurship:** Adopt standardized computer application practices with innovative ideas to succeed as an employee or an entrepreneur.

PROGRAM SPECIFIC OUTCOMES (PSOs)

PSO1

Acquire skills on computing technologies to analyze, design and develop industry-oriented real-time applications.

PSO2

Inculcate technical communication skills and ethics with professional practices to strengthen the research-gap, career growth and employability.

PEO to Mission Statement Mapping Correlation: 3- High, 2-Medium, 1-Low

| Mission Statements | PEO1 | PEO2 | PEO3 |
|---|------|------|------|
| To strengthen the theoretical, practical and ethical aspects of the learning while inculcating a culture of research, innovation and practical applications amongst faculty and students. | 3 | 3 | 3 |
| To encourage long-term interactions between the department and the IT Industry through rich involvement of the Industry in the design of the curriculum and its hands-on implementation. | 3 | 2 | 3 |
| To strengthen and mould students in professional, ethical, social and environmental dimensions by encouraging participation in co curricular and extracurricular activities. | 3 | 3 | 3 |

| PO's | P01 | P02 | P03 | P04 | PO5 | P06 | P07 | P08 | P009 | P010 | P011 | P012 |
|------|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|
| PEO1 | 3 | 3 | 3 | 3 | 3 | 2 | 1 | 3 | 2 | 2 | 3 | 3 |
| PEO2 | 3 | 3 | 3 | 2 | 3 | 2 | 1 | 3 | 2 | 3 | 3 | 3 |
| PEO3 | 2 | 2 | 3 | 2 | 2 | 3 | 3 | 2 | 2 | 3 | 2 | 2 |

Mapping of POs to PEOs

Correlation: 3- High, 2-Medium, 1-Low



The Trust is a Recipient of Prestigious Rajyotsava State Award 2012 Conferred by the Government of Karnataka. Awarded Outstanding Technical Education Institiute in Karnataka.

DEPARTMENT OF MASTER OF COMPUTER APPLICATIONS MCA DEGREE CURRICULUM – COURSE CREDIT STRUCTURE ACADEMIC YEAR 2023-2024: - NEP BATCH SEMESTER I TO IV

| SEMESTER | TER CORE ELF | | MINI PROJECT / PROJECT WORK | SEMINAR | TOTAL CREDITS |
|----------------------|--------------|-----|---|---------|------------------|
| Ι | 25 | 0 | 0 | 0 | 25 |
| II | 17 | 6 | 2 | 0 | 25 |
| III | 9 | 6 | 8 | 2 | 25 |
| IV | 0 | 6 | 17 | 2 | 25 |
| TOTAL | 51 | 18 | 27 | 4 | 100 |
| % of Distribution | 51% | 18% | 27% | 4% | 100% |



DEPARTMENT OF MASTER OF COMPUTER APPLICATIONS SCHEME OF FIRST SEMESTER MCA PROGRAM AY 2023-24 NEP BATCH

| | | CONDED | | | DI | CRE STRI | EDIT BUTI | ON | | DURS EORY) | | MARK | S |
|-------------|--|----------------|--|---------|--------|-------------|--------------|---------|---------------------|---------------------------|-----|------|-------|
| S N O | BOARD / COURSE | COURSE CODE | COURSE | URSE Og | L | Т | Р | S | OVERAL CREDITS | CONTACT HC WEEKLY (THI | CIE | SEE | TOTAL |
| 1 | AS/BSC | 22MATC11 | COMPUTATIONAL MATHEMATICS | MCA | 3 | 1 | 0 | 0 | 4 | 5 | 50 | 50 | 100 |
| 2 | MCA/PCC | 22MCA12 | PROGRAMMING WITH JAVA | MCA | 4 | 0 | 0 | 0 | 4 | 4 | 50 | 50 | 100 |
| 3 | MCA/PCC | 22MCA13 | OPERATING SYSTEM WITH LINUX PROGRAMMING | MCA | 4 | 0 | 0 | 0 | 4 | 4 | 50 | 50 | 100 |
| 4 | MCA/IPCC | 22MCA14 | SOFTWARE ENGINEERING AND TESTING | MCA | 2 | 0 | 1 | 0 | 3 | 4 | 50 | 50 | 100 |
| 5 | MCA/IPCC | 22MCA15 | COMPUTER NETWORKS | MCA | 3 | 0 | 1 | 0 | 4 | 5 | 50 | 50 | 100 |
| 6 | MCA/PCCL | 22MCAL16 | JAVA LAB | MCA | 0 | 0 | 1.5 | 0 | 1.5 | 3 | 50 | 50 | 100 |
| 7 | MCA/PCCL | 22MCAL17 | LINUX PROGRAMMING LAB | MCA | 0 | 0 | 1.5 | 0 | 1.5 | 3 | 50 | 50 | 100 |
| 8 | MCA/MCC | 22MCA18 | RESEARCH METHODOLOGY AND IPR | MCA | 2 | 0 | 0 | 0 | 2 | 2 | 50 | 50 | 100 |
| 9 | LS/AEC | 22HSSC19 | LIFE SKILLS FOR PROFESSIONALS -1 | MCA | 1 | 0 | 0 | 0 | 1 | 2 | 50 | 50 | 100 |
| 10 | MCA/BC | 22MCA110 | PROGRAMMING LOGIC AND DESIGN* | MCA | 0 | - | - | 0 | - | 3 | 50 | 50 | 100 |
| | | | | 19 | 1 | 5 | 0 | 25 | 32 | 450 | 450 | 900 | |
| L - | L -Lecture (1 hour), T- Tutorial/Skill Development Activities (2 hours), P-Practical (2 hours), S-Self Study (hours – Nil) *Mandatory non-credit Bridge Course only for non-computer science students | | | | | | | | | | | | |
| | *Selected online courses will be given as per BOS recommendation. *PCC- Professional Core. IPCC-Integrated Professional Core Courses (No SEE for lab component only CIE), MCC- Mandatory Credit Course, AEC– Ability Enhancement Course. | | | | | | | | | | | | |
| | | *BoS rec | ommended two certif | fied o | online | course | s is off | ered in | 4 th sem | ester | | | |

DEPARTMENT OF MASTER OF COMPUTER APPLICATIONS SCHEME OF SECOND SEMESTER MCA PROGRAM AY 2023-24 NEP BATCH

| | | | | | DIS | CRE STRI | EDIT BUTI | ON | | IRS IRY) | MARKS | | | |
|---------|--|----------------|---|-------|--------|-------------|--------------|---------------------|---------------------------|-----------------------------|-------|-----|-------|--|
| S NO | BOARD/ COURSE | COURSE CODE | COURSE | BOS | L | Т | Р | S | OVERALL CREDITS | CONTACT HOU WEEKLY (THEO | CIE | SEE | TOTAL | |
| 1 | MCA/PCC | 22MCA21 | DATA STRUCTURES USING C++ | MCA | 3 | 0 | 0 | 0 | 3 | 3 | 50 | 50 | 100 | |
| 2 | MCA/PCC | 22MCA22 | ADVANCED JAVA AND ENTERPRISE ARCHITECTURE | MCA | 3 | 0 | 0 | 0 | 3 | 3 | 50 | 50 | 100 | |
| 3 | MCA/PCC | 22MCA23 | DESIGN AND ANALYSIS OF ALGORITHMS | MCA | 2 | 1 | 0 | 0 | 3 | 4 | 50 | 50 | 100 | |
| 4 | MCA/IPCC | 22MCA24 | DATABASE MANAGEMENT SYSTEMS | MCA | 3 | 0 | 1 | 0 | 4 | 5 | 50 | 50 | 100 | |
| 5 | MCA/PEC | 22MCA25X | PROFESSIONAL ELECTIVES-1 | MCA | 2 | 1 | 0 | 0 | 3 | 4 | 50 | 50 | 100 | |
| 6 | MCA/PEC | 22MCA26X | PROFESSIONAL ELECTIVES-2 | MCA | 2 | 1 | 0 | 0 | 3 | 4 | 50 | 50 | 100 | |
| 7 | MCA/PCCL | 22MCAL27 | DATA STRUCTURES AND ALGORITHMS LAB | MCA | 0 | 0 | 1.5 | 0 | 1.5 | 3 | 50 | 50 | 100 | |
| 8 | MCA/PCCL | 22MCAL28 | ADVANCED JAVA LAB | MCA | 0 | 0 | 1.5 | 0 | 1.5 | 3 | 50 | 50 | 100 | |
| 9 | MCA/MP | 22MCAL29 | MINI PROJECT USING JAVA AND DBMS | MCA | 0 | 0 | 2 | 0 | 2 | - | 50 | 50 | 100 | |
| 10 | LS/AEC | 22HSSC210 | LIFE SKILLS FOR PROFESSIONALS -2 | MCA | 1 | 0 | 0 | 0 | 1 | 2 | 50 | 50 | 100 | |
| | | | TOTAL | | 16 | 3 | 6 | 0 | 25 | 31 | 500 | 500 | 1000 | |
| L -I | L -Lecture (1 hour), T- Tutorial/ Skill Development Activities (2 hours), P-Practical (2 hours), S-Self Study (hours – Nil) *Selected online courses MCA/PCC will be given as per BOS recommendation. *PCC- Professional core. IPCC- Integrated Professional Core Courses (No SEE for lab component only CIE), | | | | | | | | | | | | | |
| | | *BoS recom | mended two certified | onlin | e cour | ses is | offere | d in 4 ^t | ^h seme | ster | | | | |

| | PROFESSIONAL ELECTIVES-1 (BUSINESS ANALYTICS TRACK) | | | | | | | | | | | | |
|------|---|---|-----|---|-----------|-------|---|---|--|--|--|--|--|
| SNO | COURSE | COURSE | BOS | | C DIST | TOTAL | | | | | | | |
| 5110 | CODE | | 200 | L | Т | Р | S | | | | | | |
| 1 | 22MCA251 | DATA WAREHOUSING AND DATA MINING | MCA | 2 | 1 | 0 | 0 | 3 | | | | | |
| 2 | 22MCA252 | ROBOTIC PROCESS AUTOMATION | MCA | 2 | 1 | 0 | 0 | 3 | | | | | |
| 3 | 22MCA253 | SOCIAL MEDIA ANALYTICS | MCA | 2 | 1 | 0 | 0 | 3 | | | | | |
| 4 | 22MCA254 | BUSINESS INTELLIGENCE AND DATA ANALYTICS | MCA | 2 | 1 | 0 | 0 | 3 | | | | | |
| 5 | 22MCA255 | SEARCH ENGINE OPTIMIZATION | MCA | 2 | 1 | 0 | 0 | 3 | | | | | |

| | PROFESSIONAL ELECTIVES-2 (NETWORK SECURITY TRACK) | | | | | | | | | | | | |
|-----|---|--------------------------------------|-----|---|-----------|-------|---|---|--|--|--|--|--|
| SNO | COURSE | COURSE | BOS | | C DIST | TOTAL | | | | | | | |
| | CODE | | | L | Т | Р | S | - | | | | | |
| 1 | 22MCA261 | CYBER SECURITY AND CYBER LAW | МСА | 2 | 1 | 0 | 0 | 3 | | | | | |
| 2 | 22MCA262 | DIGITAL FORENSICS | МСА | 2 | 1 | 0 | 0 | 3 | | | | | |
| 3 | 22MCA263 | CRYPTOGRAPHY AND NETWORK SECURITY | МСА | 2 | 1 | 0 | 0 | 3 | | | | | |
| 4 | 22MCA264 | INFORMATION RETRIEVAL | MCA | 2 | 1 | 0 | 0 | 3 | | | | | |
| 5 | 22MCA265 | WEB APPLICATION SECURITY | МСА | 2 | 1 | 0 | 0 | 3 | | | | | |

FIRST SEMESTER MCA SYLLABUS (2023-24)

NHCE/MCA/2023-24

| COMPUTATIONAL MATHEMATICS | | | | | | | | | | | | | | |
|--|---|------------------------------|-------------------------------------|----------------------|--------------------------------|-------------------|---------------------------|--------------------|--------------------|------------------|---------------------|------------------|-------------|------------------|
| Course Code | 22M | IATC1 | 1 | | | | | CIE | Marks | ; | | 50 | | |
| L:T:P:S | 3:1: | 0:0 | | | | | | SEE | Mark | s | | 50 | | |
| Hrs / Week | 5 | | | | | | | Tot | al Mar | ks | | 100 | | |
| Credits | 04 | | | | | | | Exa | m Hou | rs | | 03 | | |
| Course outcom | es: | | | | | | | | | | | | | |
| At the end of the | e cour | se, the | studen | t will b | e able | to: | | | | | | | | |
| 22MATC11.1 | Form | nulate, | solve, | apply, | and int | erpret | prope | rties of | linear | systen | 1S. | | | |
| 22MATC11.2 Formulate physical problems as Partial Differential Equations and solve. | | | | | | | | | | | | | | |
| 22MATC11.3 Apply numerical methods to obtain approximate solutions to mathematical problems. | | | | | | | | | | | | | | |
| 22MATC11.4 | 22MATC11.4 Identify solution methods for the optimization problems studied and Apply Evolutionary Computation Methods to find solutions to complex problems. | | | | | | | | | | | | | |
| 22MATC11.5 Learn to present clear mathematical arguments. | | | | | | | | | | | | | | |
| Mapping of Course Outcomes to Program Outcomes and Program Specific Outcomes: | | | | | | | | | | | | | | |
| | P01 | P02 | P03 | P04 | P05 | P06 | P07 | P08 | P09 | P010 | P011 | P012 | PS01 | PSO2 |
| 22MATC11.1 | 3 | 2 | 2 | - | 1 | - | - | - | - | - | 1 | - | - | 3 |
| 22MATC11.2 | 3 | 2 | 2 | - | 1 | - | - | - | - | - | 1 | - | - | 3 |
| 22MATC11.3 | 3 | 2 | 2 | - | 1 | - | - | - | - | - | 1 | - | - | 3 |
| 22MATC11.4 | 3 | 2 | 2 | 2 | 1 | - | - | - | - | - | 1 | - | - | 3 |
| 22MATC11.5 | 3 | 3 2 2 1 1 1 - 3 | | | | | | | | | | | 3 | |
| MODULE-1MATHEMATICAL FOUNDATIONS22MATC11.19 Hours | | | | | | | | | | | | | | |
| Integration- Def Divergence and exponential and | finite i Curl | ntegra proble ratic fo | e, Quoti tion, In ems. Morms. | adefinit latrices | e, Char ce integ s: Inve | gration rse of | and Ap and In a mat | tegrati rix, Ei | on by gen va | parts. lues a | Vector nd Eig | Calcul en Vec | us: Gra | dient, latrix |
| Text Book | Text | Book | 1:1,2 | Text E | 300k 3: | 4 Text | t Book | 3:2 | | 0.014 | | | | |
| MODULE-2 | ORL | | Y DIFI | EREN | TIAL I | QUAT | TONS | 1 1 | | 22M | ATC11 | 2 | <u>9 H</u> | ours |
| First-order diffe | erentia | al equ | ations: | Varial | ble Sep | barable | e meth | od, Ex stant | act an | d Line | ar diff | erentia | il equa | tions. |
| function and n | gilei | lar In | togral | | | Sin (a | $(11 \ (011)$ | Stallt | tuennt ⊥b) ar | ients: | rmung An | g COM Dartial | Diffor | it-ary |
| Fountions: Solut | tion of | f PDF h | u direc | UI ⊾€⊿ tinteσ | ax, ration | and hy | the me | thod c | ruj ai of senai | ration (| ∥ II. I of varia | hles | Differ | ential |
| Text Book | Text | Book | 1:3.4 | ,e mees | ration | unu by | | , inou c | n sepu | ution | JI VUIIC | 101031 | | |
| MODULE-3 | NUN | IERIC | AL AL | GORIT | HMS | | | | | 22M | ATC11 | 3 | 9 H | ours |
| Roots of Nonlin | ear eq | uation | s – Bise | ection, | Newto | n's, Ite | ration | metho | ods. N | umeric | al Integ | gration | - Trap | ezium |
| Rule, Simpson's | Rule. | Compı | itation | al Linea | ar Alge | bra: Sy | stem o | f Linea | ır equa | tions, (| Gauss e | limina | tion. | |
| Text Book | Text | Book | 1: 5, 6, | 7 Text | : Book | 2:2,8 | | | | | | | | |
| MODULE-4 | MA | ГНЕМ | ATICA | L OPT | IMIZA | TION | | | | 22M | ATC11 | 4 | 9 H | ours |
| Optimization- Formation of Linear Programming Problem, Simplex Methods, Finding maximum and | | | | | | | | | | | | | | |
| minimum value | s of fu | nction | of two | variab | les and | Gradi | ent-bas | sed me | thods. | | | | | |
| Text Book | Text | BOOK | 1:13, | 14 Text | t Book | 2:12 | | | | 2214 | | | | |
| MUDULE-5 | 1510 | LETT | IIU MO | UDELS | onmol . | liatrik | tions | Data ! | Modell | | AILII imple ! | | 9 H | ours |
| Method of Least | יבווס יוע יבווסי | r Expoi | nential | | ormar (| 11511101 | itions. | Data I | viouell | ing - 3 | mpie I | medii d | nu var | iance, |
| Text Book | Text | Book | 1:15. | 16 | | | | | | | | | | |

| CIE Assessment Pattern(50 Marks – Theory) | | | | | | | | | | | | |
|---|------------|----------|-------|----|--|--|--|--|--|--|--|--|
| | | N | | | | | | | | | | |
| F | RBT Levels | Test (s) | MCQ's | | | | | | | | | |
| | | 25 | 15 | 10 | | | | | | | | |
| L1 | Remember | 5 | 5 | - | | | | | | | | |
| L2 | Understand | 5 | 5 | - | | | | | | | | |
| L3 | Apply | 10 | 5 | 10 | | | | | | | | |
| L4 | Analyze | 2.5 | - | - | | | | | | | | |
| L5 | Evaluate | 2.5 | - | - | | | | | | | | |
| L6 | Create | - | - | - | | | | | | | | |

SEE Assessment Pattern(50 Marks – Theory)

| | RBT Levels | Exam Marks Distribution (50) |
|----|-------------------|---------------------------------|
| L1 | Remember | 10 |
| L2 | Understand | 10 |
| L3 | Apply | 20 |
| L4 | Analyze | 5 |
| L5 | Evaluate | 5 |
| L6 | Create | |

Suggested Learning Resources:

Text Books:

- 1) Xin-She Yang, Introduction to Computational Mathematics, World Scientific Publishing Co. Pte. Ltd., Second Edition, 2015, ISBN: 978-9814635776.
- 2) B.S.Grewal, Numerical Methods in Engineering and Science, Khanna Publishers, 11th Edition, 2013, ISBN: 978-81-7409-248-9.
- 3) David C. Lay, Steven R. Lay and Judi J. McDonald, Linear Algebra and its Applications, Pearson Education Limited, Fifth Edition, 2016, ISBN: 978-0321982384.

Reference Books:

- 1) G.I.; V.P. Dymnikov Marchuk, Problems of Computational Mathematics and Mathematical Modelling, MIR Publishers, First Edition, 1985, ISBN: 978-0828533744.
- 2) S. S. Rao, Engineering Optimization: Theory and Practice, John Wiley & Sons, Fourth Edition, 2009, ISBN: 978-0-470-18352-6.
- 3) M. K. Jain, S. R. K. Iyengar and R. K. Jain, Numerical Methods for Scientific and Engineering Computation, New Age International (P) Limited, Fifth Edition, 2007, ISBN: 8122420012.
- 4) S. M. Ross, Stochastic Processes, Wiley Publishers, Second Edition, 1995, ISBN: 978-0-471-12062-9
- 5) Xin-She Yang, Optimization Techniques and Applications with examples, John Wiley & Sons, First Edition, 2018, ISBN: 9781119490548.

Web links and Video Lectures (e-Resources): MODULE-1:

- https://youtu.be/5yfh5cf4-0w
- https://youtu.be/6WUjbJEeJwM
- https://youtu.be/Jt5R-Tm8cV8
- https://byjus.com/maths/differential-calculus/

MODULE-2:

- https://www.britannica.com/science/mathematics
- https://youtu.be/O3ahEHAX-KU
- https://youtu.be/HKvP2ESjJbA

MODULE-3:

- https://youtu.be/zadUB3NwFtQ
- https://youtu.be/LHsPJ2bQX1U

MODULE-4:

- https://youtu.be/xrGVe6gMRyk
- https://youtu.be/9YKLXFqCy6E

• https://youtu.be/Hg38kfK5w4E

MODULE-5:

https://youtu.be/c06FZ2Yq9rk https://youtu.be/P8hT5nDai6A Activity-Based Learning (Suggested Activities in Class)/ Practical Based learning:

- Activity on Problem solving ٠
 - Group Based Practices Excise •

| PROGRAMMING WITH JAVA | | | | | | | | | | | | | | |
|---|------------------|-------------------|------------------|--------------|------------|--------------|-------------------|----------------|------------------|-------------------|---------------------|-------------------|-------------------|----------------|
| Course Code | 22M | CA12 | | | | | CIE | Mark | S | ! | 50 | | | |
| L:T:P:S | 4:0:0 |):0 | | | | | SEE | Mark | s | ! | 50 | | | |
| Hrs / Week | 4 | | | | | | Tot | al Ma | rks | | 100 | | | |
| Credits | 04 | | | | | | Exa | m Ho | urs | (| 03 | | | |
| Course outcom | es: | | | | | | | | | | | | | |
| At the end of the | e cours | se, the | stude | nt will | be abl | e to: | | | | | | | | |
| 22MCA12.1 | Unde | erstan | d basio | : Java l | angua | ge syn | tax an | d sem | antics | to wri | te Java | progr | ams. | |
| 22MCA12.2 | Anal conc | yze th epts. | ie imp | ortan | ce of | metho | d ove | rloadi | ng, re | cursio | n And | l strin | g han | dling |
| 22MCA12.3 Exemplify the usage of Inheritance, Interfaces and Packages for Programming. | | | | | | | | | | | | | | |
| 22MCA12.4 | Appl | y Mult | ithrea | ding a | nd exc | eption | hand | ling co | ncepts | s in co | ncurre | ent pro | gramı | ning. |
| 22MCA12.5 Implement generic class, collection framework, java applet and swing for real world applications. | | | | | | | | | | | | | | |
| Mapping of Course Outcomes to Program Outcomes and Program Specific Outcomes: | | | | | | | | | | | | | | |
| | P01 | PO2 | PO3 | P04 | P05 | P06 | P07 | P08 | P09 | P010 | P011 | P012 | PSO1 | PSO2 |
| 22MCA12.1 | 3 | 3 | 2 | - | 3 | - | 1 | - | 1 | - | - | 2 | 3 | - |
| 22MCA12.2 | 3 | 3 | - 3 | - | 2 | _ | 2 | _ | 1 | _ | _ | 2 | 3 | |
| 22MCA12.2 | 2 | 2 | 2 | | 2 | | 1 | | - | 2 | | 1 | 2 | |
| 22MCA12.3 | 3 | 2 | 2 | | 2 | _ | 2 | _ | 1 | 2 | | 3 | 3 | |
| 22MCA12.5 | 3 | 2 | 1 | 2 | 2 | - | - | _ | 1 | 1 | _ | 1 | 3 | _ |
| MODULE-1 | OVE | | W OF | IAVA | 5 | | | | 22MC | A12.1 | | 9 | Hour | S |
| The Java Langua | age. Tl | ie Kev | Attril | butes o | of Obie | ect-Ori | ented | Progr | ammir | ıg. The | e Iava | Develo | opmen | t Kit. |
| A First simple p | rograi Librar | n. Dat ies Tay | a type | s, Vari | iables | and op | oerato: | rs: Th | e Java er Loc | Keywo | ords, Io Variabl | dentifi es Th | ers in | Java, |
| Lifetime of Varia | ables. | operat | ors Us | sing Ca | e ryp | erator | Prece | dence | Expre | essions | s. Inpu | t chara | acters | from |
| the Keyword, if | staten | nent. I | Vested | ifs. if- | else-if | Ladd | er. Swi | itch St | ateme | nt. Ne | sted s | witch s | statem | ients. |
| for Loop, Enha | nced f | or Loc | op, Wł | nile Lo | op, do | o-while | Loop | o, Use | break | , Úse | contin | ue Ne | sted L | loops |
| Introducing cla | sses: | Class | fundaı | mental | ls, dec | laring | objec | ts, Re | ferenc | e Var | iables | and A | Assign | ment |
| ,introducing me | ethods | , cons | tructo | rs, the | e this | keywc | ord, ga | rbage | collect | tion, th | e fina | lize() | metho | od. |
| Text Book | Text E | Book 1 | : 1, 2, 3 | 3, 4, 5 | Text | Book 2 | : 2, 3, | 4, 5, 6 | , 7, 8 | | | | | |
| MODULE-2 | ARR/ | AVS ST | ring | HAN | DLIN | . | | | 22MC | A12.2 | | 9 | Hour | S |
| Arrays String Ha | andlin | g: The | String | g Const | ructor | s, Stri | ng met | thods | and op | eratio | ns, Str | ing Bu | iffer ai | nd its |
| methods, String | g Build | er and | l its m | ethod | s. Met | hods a | nd cla | sses: | Overlo | ading | metho | ods, us | ing ob | ojects |
| as parameters, | , argu | iment | passi | ing, re | eturnii | ng ob | jects, | recur | sion, | introc | lucing | acce | SS CO | ntrol, |
| Arguments | static | , intro | Jaucin | ig fina | ai, ne | stea | and I | nner | classe | es, vai | rargs- | varia | ible-Le | engtn |
| Text Book | Tovt I | Rook 1 | .36 | 13 To | vt Roc | 1-2.0 | | | | | | | | |
| MODULE-3 | INHE | RITAI | VCF | 1510 | AL DUU | K 2.) | | | 22MC | A12 3 | | 9 | Hour | c |
| Basics of Inher | itance | using | | r cre | ating : | a mult | ilevel | hiera | rchy o | ronstri | ictors | and i | nherit | ance |
| method overrid | ing. dy | namic | meth | od disi | natch. | using | abstra | ct clas | ses. us | sing fir | al wit | h inhe | ritanc | e. the |
| object class. In | iterfac | es and | d Pacl | kages: | Creat | ing ar | n Inte | rface. | Imple | menti | ng an | Inter | face. 1 | Using |
| Interface Refer | ence, l | mpler | nentin | ig Mul | tiple I | nterfa | ces, N | ested | Interf | aces. I | Packag | ge Fun | dame | ntals, |
| Packages and M | ember | Acces | s, Imp | orting | , Packa | ages, Ir | nterfac | es. | | | | | | |
| Self-study / Create an interactive application which demonstrates the different types of | | | | | | | | | | | | | | |
| Case Study / Inheritance. | | | | | | | | | | | | | | |
| Applications | | | | | | | | | | | | | | |
| Text Book | Text l | Book 1 | l, 2: 8, | 9 | | | | 1 | | | | | | |
| MODULE-4 | EXCE | PTIO | N HA | <u>NDLIN</u> | IG | | | | 22MC | A12.4 | | 9 | Hour | S |
| Exception-Hand | lling fu | indam | entals | , Exce | eption | types, | Unca | ught | Excep | tions, | Using o'o Bu | g try ilt i∽ | and o | tions |
| Creation of Ex | ciause | s, nes | ubelae | y stat | Chair | s, uir ad | ow, th Event | nows, tione | Hair | y, JaVa ng Evo | as DU ontion | iit-iii 16 Mii | except ltithro | uulis, adad |
| Programming 7 | Ceput The Iau | vii S va Thru | abulas Pad ma | ndel M | ultith | readin | ылсері g fjind | amen | tals Tl | ig Exc ie Thr | epuol ead Cl | ass an | d Run | nable |
| i i ogranning: I | ine jav | aime | au ill | Juel, M | iaiaiai | cauill | 5 iunu | amen | tais, H | | cau u | ass all | u null | able |

| Synch | Interface, The Main thread, Creating Multiple Threads, Thread Priorities, synchronization, using Synchronization Methods, The Synchronized Statement, Thread Communication using notify(), | | | | | | | | | | | | | |
|--|--|--|---|--|---|---|--|--|--|--|--|--|--|--|
| wait() | and notify A | All(). | | | | | | | | | | | | |
| Self-s | study / | • Create an | interactive multithr | eading a | pplication using va | arious methods of | | | | | | | | |
| Case | Study / | Thread cla | SS. | | | | | | | | | | | |
| Appli | cations | Develop ar | n interactive applica | tion whic | ch uses user-define | ed exceptions. | | | | | | | | |
| Text | t Book T | ext Book 1: 10, | 11 | | | | | | | | | | | |
| MOD | ULE-5 G | ENERICS AND | COLLECTION OVE | RVIEW | 22MCA12.5 | 9 Hours | | | | | | | | |
| What | are Generi | cs? A simple (| Generics Example, G | eneric Me | ethods, Generic Cor | nstructors, Generic | | | | | | | | |
| classe | s The Collec | tion Interfaces | . Introducing Java A | WT & SW | ing: AWT basics, Co | Omponents, Event- | | | | | | | | |
| Deleg | Button, Choice, List, Menu, Text Field and Text Area. The swing fundamentals, Components and | | | | | | | | | | | | | |
| Button, Choice, List, Menu, Text Field and Text Area. The swing fundamentals, Components and containers, Layout managers, A first simple swing Example, Exploring Swing Controls and Event | | | | | | | | | | | | | | |
| containers, Layout managers, A first simple swing Example, Exploring Swing Controls and Event Handling. | | | | | | | | | | | | | | |
| Handling. Text Book Text Book 1: 12, 15, 19, 20, 26 | | | | | | | | | | | | | | |
| CIE A | Text Book Text Book 1: 12, 15, 19, 20, 26 CIE Assessment Pattern(50 Marks - Theory) | | | | | | | | | | | | | |
| | | Marks Di | stribution | | | | | | | | | | | |
| DDD | | T () | Oualitative | 14001 | | | | | | | | | | |
| RBT | Levels | Test (s) | Assessment (s) | MCQ's | | | | | | | | | | |
| | | 25 | 15 | 10 | | | | | | | | | | |
| L1 | Remembe | er 5 | 3 | 2 | | | | | | | | | | |
| L2 | Understa | nd 5 | 4 | 2 | | | | | | | | | | |
| L3 | Apply | 10 | 4 | 3 | | | | | | | | | | |
| L4 | Analyze | 5 | 4 | 3 | | | | | | | | | | |
| L5 | Evaluate | - | - | - | | | | | | | | | | |
| L6 | Create | - | - | - | | | | | | | | | | |
| SEE A | ssessment | Pattern(50 Ma | <u>rks – Theo</u> ry) | | | | | | | | | | | |
| RBT | Levels | Exam | Marks | | | | | | | | | | | |
| IND I | | | | | | | | | | | | | | |
| | - | Distribut | tion (50) | | | | | | | | | | | |
| L1 | Remembe | Distribut er 1 | tion (50) 0 | | | | | | | | | | | |
| L1 L2 | Remember Understar | Distributer 1 nd 1 | tion (50) 0 0 | | | | | | | | | | | |
| L1 L2 L3 | Remember Understan Apply | Distributer 1 nd 1 2 | tion (50) 0 0 0 | | | | | | | | | | | |
| L1 L2 L3 L4 | Remember Understan Apply Analyze | Distribut | tion (50) 0 0 0 0 | | | | | | | | | | | |
| L1 L2 L3 L4 L5 | Remember Understan Apply Analyze Evaluate | Distribut er 1 nd 1 2 1 1 | tion (50) 0 0 0 0 0 | | | | | | | | | | | |
| L1 L2 L3 L4 L5 L6 | Remember Understan Apply Analyze Evaluate Create | Distribut er 11 nd 12 2 11 | tion (50) 0 0 0 0 | | | | | | | | | | | |
| L1 L2 L3 L4 L5 L6 Sugge | Remember Understan Apply Analyze Evaluate Create | Distributer 11 nd 11 22 11 | tion (50) 0 0 0 0 | | | | | | | | | | | |
| L1 L2 L3 L4 L5 L6 Sugge Text1 | Remember Understan Apply Analyze Evaluate Create ested Learn Books: Harbert Sch | Distribut | tion (50) 0 0 0 0 0 | 1th Editi | on Tata McCraw Hi | 11 2020 | | | | | | | | |
| L1 L2 L3 L4 L5 L6 Sugge Text1 1) 2) | RememberUnderstandApplyAnalyzeEvaluateCreateested LearningBooks:Herbert SchE Balaguruge | Distribut er 1 nd 1 2 1 1 - - - - - - - - - - - - - | tion (50) 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 | 1th Editio | on, Tata McGraw Hi | ll, 2020. Hill 2019 | | | | | | | | |
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| OPERATING SYSTEM WITH LINUX PROGRAMMING | | | | | | | | | | | | | | | |
|---|--|---|---|--|--|---|--|---|--|--|---|--|---|--|--|
| Course Code | 22M | CA13 | | | | | | CIE | Marks | 5 | 50 | | | | |
| L:T:P:S | 4:0:0 | 0:0 | | | | | | SEE | Mark | s | 50 | | | | |
| Hrs / Week | 4 | | | | | | | Tot | al Mar | ks | 100 | | | | |
| Credits | 04 | | | | | | | Exa | Exam Hours 03 | | | | | | |
| Course outco | mes: | | | | | | | | | | | | | | |
| At the end of t | ne cou | rse, th | e stude | ent wil | l be ab | le to: | | | | | | | | | |
| 22MCA13.1 | Unde | erstan | d the b | asics a | nd ess | entials | of ope | erating | systen | n. | | | | | |
| 22MCA13.2 | Appl | y the o | concep | ts of Li | nux to | solve | compu | ting pi | oblem | s. | | | | | |
| 22MCA13.3 | Impl | ement | advan | ce she | ll prog | rammi | ng con | cepts. | | | | | | | |
| 22MCA13.4 | Deve | elop in | teracti | ve scri | pts usi | ng reg | ular ex | pressi | ons in | simple | and ad | lvance | d filter | s. | |
| 22MCA13.5 | Anal | yze th | e differ | ent m | emory | allocat | tion str | rategie | s. | | | | | | |
| Mapping of Course Outcomes to Program Outcomes and Program Specific Outcomes: | | | | | | | | | | | | | | | |
| P01 P02 P03 P04 P05 P06 P07 P08 P09 P010 P011 P012 PS01 PS02 | | | | | | | | | | | | | PSO2 | | |
| 22MCA13.1 | - | - | - | - | - | - | 1 | - | - | - | - | - | 2 | - | |
| 22MCA13.2 | - | - | - | - | 1 | - | 1 | - | - | - | 1 | - | 2 | - | |
| 22MCA13.3 | 3 | 3 | 3 | 3 | 3 | 1 | 1 | - | - | - | 2 | - | 2 | - | |
| 22MCA13.4 | 3 | 3 | 3 | 1 | 3 | 1 | 1 | - | - | - | - | 1 | 2 | - | |
| 22MCA13.5 | 3 | 3 | - | 1 | 3 | 1 | 1 | - | - | - | - | - | 2 | - | |
| MODULE-1 | INT | RODU | CTION | I TO O | PERA | TING | SYST | EM | 22 | MCA1 | 3.1 | 9 | Hour | s | |
| Calls, System I Scheduling Cr Deadlock Prev Text Book MODULE-2 Introduction, A lock, stty, scri filename? The absolute patha Attributes: ls, changing own file attributes: Self-study / Case Study / Applications | Progra iteria ention Text INTI Archite pt, cle pares Is –l, ership hard Insta | ms Pr and S <u>, Dead</u> Book RODU ecture, ar, un nt-chil for a d ls -d, and g link, s allatio | ocess 1 Schedu lock Av 1: 1.1- CTION Exper ame, d d rela comma , File I roup u symbol n of VN | Manag ling al voidan 1.8, 2.1 N TO L ience t late, ca tionshi and, cd Permis ising c ic link, MWare | ement lgorith <u>ce, Dea</u> -2.4, 3 <u>INUX</u> the Lin al, cale ip, pw l, relati sions, hown a find. e and F | - Proce ms. D adlock .1-3.5, ux Env endar, I d – th ive pat chmoo & chgr Red Ha | ess Str eadloc <u>Detect</u> 5.1-5.3 vironm bc, ech ne Hor ch nam d, Dire p, file t Linu | ucture k and <u>ion an</u> 3, 8.1-8 ent, Ba no. Lin ne dir ees (.& ectory modifi | , Proce Starva <u>d Reco</u> 3.9 22 asic Co ux File ectory,), mk Permis ication | ess stat ation- very fr MCA1 mmane Syste , absol dir, rm ssions, and ac | es, Tyj Princij <u>om De</u> <u>3.2</u> ds – pa m- Th ute pa ndir, cp Umas ccess t | pes of ples of <u>adlock</u> 9 usswd, e file, uthnam b, rm, r k, file imes, t | Schedu f Dead Mour who, w what's es – u nv, cat owner ouch, n | llers, llock, s , tty, in a using . File rship, more | |
| I EXT BOOK | Text | BOOK | 1: 20. CTION | 1, 1ext | . ВООК Тиг (| <u>2:1,5</u> | | | | | | | | | |
| MODULE-3 | PRO | GRAN | | | THE 3 | nell | | | 22 | MCA1 | 3.3 | 9 | Hour | S | |
| Introduction to Shell Scripting, Shell Variables, Shell Scripts, Read, Positional Parameters, command line arguments, exit status of a command, the logical operators && and , exit, if, test and [], case conditions, expr, sleep and wait, while, until, for loop. Shell Programming: Assigning values to positional parameters using set, IFS variable, shift, here document, let, redirection, export, conditional parameter substitution, shell functions, eval, exec, set -x, trap.The Process in Linux: Shell process, ps, running jobs in background (& and nohup), introduction to signals, nice, at and batch, cron, time commands.Text BookText Book 2: 20, 21MODULE-4SIMPLE FILTERSQ2MCA13.49 HoursMore, wc, od, pr, cmp, diff, comm, head, tail, cut, paste, sort, tr, uniq, spell and ispell commands. Filters Using Regular Expression: Filters using regular expressions: grep and sed, usage of *, . , ^, \$, lin addressing, context addressing, editing text, substitution, types of regular expressions- IRE & TRE.Awk- Advanced Filters: Simple awk filtering, BEGIN and END sections, built-in variables, arrays, functions, evented free descenters. | | | | | | | | | | | | | | | |

| Self-s | tudy / | Devel | oping new u | ıtilities usi | ng existir | ng utilities in | n Linux. | | | | | | |
|---------|---|--|--------------|-------------------|------------------|-----------------|-----------------------|------------------|--|--|--|--|--|
| Case S | Study / | | | | | | | | | | | | |
| Applic | cations | | | | | | | | | | | | |
| Text | Book | Text E | 300k 3: 1, 2 | | | | | | | | | | |
| MOD | ULE-5 | MEM | ORY MANA | GEMENT | | | 22MCA13.5 | 9 Hours | | | | | |
| Swapp | ing, Con | tiguous | Memory A | Allocation, | Paging, | Segmentatio | on, Virtual Memory, I | Page Replacement | | | | | |
| Algorit | thms- Fii | ns- First In First Out, Least Recently Used, Optimal Page Replacement Algorithm. Secondary | | | | | | | | | | | |
| Storag | Storage - Disk Structure, Disk Scheduling, Disk Management. | | | | | | | | | | | | |
| Text B | Text Book Text Book 3: 9.1-9.5, 10.1- 10.5, 11.8, 12.2,12.3, 13.1, 13.3 | | | | | | | | | | | | |
| CIE As | sessmer | nt Patte | ern(50 Mar | ·ks – Theo | ory) | | | | | | | | |
| | | | Ι | Marks Dis | tributior | 1 | | | | | | | |
| R | BT Leve | ls | Test (s) | Qualit Assessm | ative ent (s) | Quizzes | | | | | | | |
| | | | 25 | 15 | 5 | 10 | | | | | | | |
| L1 | Remen | nber | 5 | 3 | | 3 | | | | | | | |
| L2 | Unders | stand | 10 | 4 | | 3 | | | | | | | |
| L3 | Apply | | 5 | 4 | | 2 | | | | | | | |
| L4 | Analyz | е | 5 | 4 | | 2 | | | | | | | |
| L5 | Evalua | te | - | - | | - | | | | | | | |
| L6 | Create | | - | - | | - | | | | | | | |
| SEE As | ssessme | nt Patt | ern(50 Ma | rks – Theo | orv) | | | | | | | | |
| D | BTIOVO |]c | Exam N | Marks | | | | | | | | | |
| | | 15 | Distribut | ion (50) | | | | | | | | | |
| L1 | Remen | nber | 1 | 0 | | | | | | | | | |
| L2 | Unders | stand | 1 | 0 | | | | | | | | | |
| L3 | Apply | | 2 | 0 | | | | | | | | | |
| L4 | Analyz | е | 1 | 0 | | | | | | | | | |
| L5 | Evalua | te | | • |] | | | | | | | | |
| L6 | Create | | | |] | | | | | | | | |
| Sugge | sted Lea | rning | Resources: | | - | | | | | | | | |

Text Books:

- 1) Abraham Silberschatz, Peter Baer Galvin, Greg Gagne, Operating System Principles 10th Edition, John Wiley & Sons Inc., 2021.
- 2) John Smith, Mastering Linux: A Comprehensive Guide to Linux Administration and Beyond– Tech. Publications Inc., 2023.
- 3) Arnold Robbins, Effective Awk Programming, O'Reilly Media Inc., 2015.

Reference Books:

- 1) Barrett, Daniel J. Efficient Linux at the Command Line. " O'Reilly Media, Inc.", 2022.
- 2) Miller, Scott Alan. Linux Administration Best Practices. Packt Publishing, 2022.
- 3) Linux: The Complete Reference, Sixth Edition, 1 July 2017, Richard Petersen, Mc Graw Hill. Web links and Video Lectures (e-Resources):

web links and video Lectures (e-Resources):

- https://nptel.ac.in/courses/117106113
- https://onlinecourses.nptel.ac.in/noc21_cs72

Activity-Based Learning (Suggested Activities in Class)/ Practical Based learning:

- Team Activity- To compare performance of various process management and memory management algorithms.
- Hands-on: Development of new utilities in Linux using existing commands and utilities.

| | SOFTWARE ENGINEERING AND TESTING | | | | | | | | | | | | | | |
|---|---|--|---------------------------------|--------------------|------------------|--------------|---------|----------|------------|----------|-----------|---------------------|----------------|-----------|--|
| Course Code | 22M(| CA14 | | | | | | CIE N | Marks | | 50 | | | | |
| L:T:P:S | 2:0:1 | :0 | | | | | | SEE | Marks | 5 | 50 | | | | |
| Hrs / Week | 4 | | | | | | | Tota | l Mar | ks | 100 | | | | |
| Credits | 03 | | | | | | | Exan | n Hou | rs | 03 | | | | |
| Course outcon | nes: | | | | | | | | | | | | | | |
| At the end of the | ne cour | se, the | e stude | nt will | be abl | e to: | | | | | | | | | |
| 22MCA14.1 | Unde | rstand | the ba | asics of | f Softw | are En | gineer | ing and | l proc | ess mo | dels fo | r softv | vare | | |
| 22MCA14.2 | Archi | tect ar | n. nd desi | σn a se | oftwar | e annli | cation | hased (| n the | requir | rement | .c | | | |
| 22MCA14 3 | Descr | ihe th | e agile | frame | work | and the | | iated m | odels | to ach | ieve so | oftware | tilsun e | v | |
| 221001111.5 | Acqui | cquire knowledge on the basics of software testing and the process of software | | | | | | | | | | | | | |
| 22MCA14.4 | auton | utomation. Demonstrate the use of Selenium IDE and programming using Selenium Web Driver. | | | | | | | | | | | | | |
| 22MCA14.5 | CA14.5 Demonstrate the use of Selenium IDE and programming using Selenium Web Driver. | | | | | | | | | | | | | | |
| Mapping of Course Outcomes to Program Outcomes and Program Specific Outcomes: | | | | | | | | | | | | | | | |
| | P01 | P02 | P03 | P04 | P05 | P06 | P07 | P08 | P09 | P010 | P011 | P012 | PSO1 | PSO2 | |
| 22MCA14.1 | 2 | 2 | 1 | - | - | - | 2 | - | - | 2 | - | - | 3 | 2 | |
| 22MCA14.2 | 2 | 2 | 1 | - | - | - | 2 | - | - | 2 | - | - | 3 | 2 | |
| 22MCA14.3 | 2 | 2 | 1 | - | - | - | 2 | - | - | 2 | - | - | 3 | 2 | |
| 22MCA14.4 | 2 | 2 | 1 | - | - | - | 2 | - | - | 2 | - | - | 3 | 2 | |
| 22MCA14.5 | 2 | 2 | 1 | - | - | - | 2 | - | - | 2 | - | - | 3 | 2 | |
| MODULE-1 | INTR ENGI | NEER | TION ING | TO S | SOFTV | VARE | | | 2 | 2MCA | 14.1 | 8 | 8 Hou | 'S | |
| The Nature of | Softwa | are, the | e uniq | ue nat | ure of | Web A | Apps, S | Softwar | e Eng | ineerir | ıg, the | Softw | are Pro | ocess, | |
| Software Engin | neering | g Pract | tice, S | oftwar | e Mytł | ıs, Soft | ware | Develo | pmen | t Life (| Cycle. | Proces | s Mod | els: A | |
| Generic Proces | s Mode | el, Proo | cess As | ssessm | ient an | d Impr | oveme | ent, Pre | script | ive Pro | ocess N | lodels | , Specia | alized | |
| Process Model | s, the l | Jnified | l Proce | ess, Pe | rsonal | and To | eam Pi | rocess l | Model | s, Proc | cess Te | chnolo | ogy, Pr | oduct | |
| and Process. | | | | | | | | | | | | | | | |
| Self-study / | HAN | DS ON | l: | | | | | | <u> </u> | | | | | | |
| Lase Study / | | De De | signin | g and I | Record | ling tes | t cases | s using | Seleni | um ID. | E. | | | | |
| Applications | Tout | De De | $\frac{\text{signin}}{1, 1, 2}$ | g and I | | ing tes | t suite | s using | Selen | ium ID | DE. | | | | |
| Text DOOK | Iext | DOUK . | 1: 1, 2 ANDU | | DEOU | 1, 2 IDEM | ENITC | ANI | | | | 1 | | | |
| MODULE-2 | MAP | PING | TO D | ESIGN | KEQU | IKEN | EIN I S | ANI | 2 | 2MCA | 14.2 | 8 | 8 Hou | 'S | |
| Requirements | Engine | ering, | Establ | lishing | the gr | oundw | vork, E | liciting | Requi | remen | nts, Dev | /elopir | ng use o | cases, | |
| Building the | require | ements | s mod | lel, Ne | egotiat | ing Re | equirer | nents, | Valid | ating | Requir | ement | s, Soft | ware | |
| Requirements | Specif | icatior | ı, Cas | e Stud | ly. Des | sign Co | oncept | s: Desi | ign w | ithin t | the co | ntext | of soft | tware | |
| engineering, th | ie Desi | gn Pro | ocess, | Design | Conce | epts, ai | nd the | Design | Mode | el Case | e Study | for D | esign c | of any | |
| Application Pro | ject. | | | | | | | | | | | | | | |
| Case Study / | ΠΑΝ | DS UN | l: -allatic | n of C | aloniur | n Woh | Duimor | | | | | | | | |
| Applications | • | 11150 | omati | $\frac{110130}{2}$ | arom t | | into a | wohno | G 0 | | | | | | |
| Text Book | Text | Book ' | $1 \cdot 3 = 5$ | 6 Tev | t Book | - 2. 3 | iiit0 a | webpa | ge. | | | | | | |
| Text Dook | AGII | E DEV | VELOI | PMEN' | T AND | | JTY | | | | | | | | |
| MODULE-3 | CON | CEPT: | S | | | Quin | | | 2 | 2MCA | 14.3 | 8 | 8 Hou | 'S | |
| What is Agility | , Agile | and th | e Cost | of Cha | nge, W | /hat is | an Agi | le Proce | ess , A | gility I | Princip | les , Tł | ne Polit | tics of | |
| Agile Develop | ment , | Huma | in fact | ors, l | Extrem | ie Prog | gramm | ing, Ot | her A | gile P | rocess | Mode | ls, Ada | ptive | |
| Software Deve | lopmer | nt Scri | um, DS | SDM, C | rystal, | FDD, L | SD, Ag | gile Moo | deling | , Agile | e Unifie | ed Proc | cess - A | Tool | |
| Set for the Agi | le Proc | cess – | Case S | study. | Quality | y Conc | epts: V | Vhat is | Quali | ty, Sof | tware | Qualit | y, Achi | eving | |
| Software Qual | Ity, Ele | ements | S 01 S | oftwai | re Qua | uity As | ssuran | ce, Sta | tistica | I Soft | ware (| luality | Assur | ance, | |
| Sonware Kella | Soliware Reliability, The ISO 9000 Quality Standards, The SQA Plan. | | | | | | | | | | | | | | |
| Self-study / | HAN | 72 ON: | • autom | ation | aroaro | m to to | ot wh | thora | tost as | co haa | nance | d or fo | ilad | | |
| Case Study / | • | All A n | autoill | m to r | progra pad th | ni iu ie | ante of | an eve | est Ca | and r | rinting | u UI Id. 5 the c | ncu. Ontent | s on | |
| Applications | • | the | seleni | ium ou | tput co | onsole | using i | xl. | | սոս բ | /11111112 | 5 une e | oncill | 5 011 | |

| Text | t Book | Text E | look 1: 12 T | 'ext Book 3: 1, 2 | | | | | | | | | | |
|---------------|-------------|---------------------|---|---|-----------------|---------|-------------------|-------------------|--|--|--|--|--|--|
| MOD | ULE-4 | INTR | ODUCTION | TO SOFTWARE | E TESTING AN | ND | 22MCA14.4 | 8 Hours | | | | | | |
| Introd | duction ar | SOFT | WARE AUT | TOMATION | Objectives Se | oftwa | ro Tosting Life | Cuclo (STIC) Tost | | | | | | |
| Plann | ing Manu | ia Tunc ial Test | ing formats | Software Autom | ation Fundan | nental | le resulig Life | nation Design and | | | | | | |
| Archit | tecture for | r Autor | nation, Chal | lenges in Automa | tion. | | | | | | | | | |
| Self- | study / | HAN | DS ON: | | | | | | | | | | | |
| Case | Study / | • | Program | to count the total | l number of hy | perli | nk objects prese | ent on a webpage. | | | | | | |
| Appli | ications | • | Program | to count the total | l number of ite | ems in | a list (or) a coi | mbo box. | | | | | | |
| Text | t Book | Text l | Fext Book 1: 9 Text Book 3: 3 Text Book 4: 1, 2, 3 | | | | | | | | | | | |
| MOD | DULE-5 | SELE | NIUM IDE . | AND SELENIUM | WEB DRIVER | R | 22MCA14.5 | 8 Hours | | | | | | |
| Seleni | ium IDE i | nstalla | tion, Record | ing and running | test cases usir | ng Sel | enium IDE, Sele | enium Commands. | | | | | | |
| Seleni | ium Web | Driver | : Introducti | on to Web Driver | r, Architecture | e, Inst | allation of Sele | nium Web Driver, | | | | | | |
| Case S | Study – Ap | oply tes | sting concep | ts using Open Sou | arce tools. | | | | | | | | | |
| 0.16 | . 1 / | HAN | DS ON: | | , | , | c · · | | | | | | | |
| Self- | study / | • | Program | to switch betwee | en web pages a | and p | erforming certa | iin actions using | | | | | | |
| Lase Appli | Study / | | | ved browser. | mata tha war | | ion nore of a | | | | | | | |
| Appi | Ications | • | A test p | program to auto | mate the reg | istrat | ion page of a | ny e-commerce | | | | | | |
| Tev | t Book | Toyt | Rook 2: 1 2 | 2 | | | | | | | | | | |
| CIEA | coccmor | t Datt | $\frac{500K 2.1, 2}{000000000000000000000000000000000000$ | yks – Theory) | | | | | | | | | | |
| | 55C55111C1 | | | <u>KS – Theoryj</u> Marks Distributi | on | | | | | | | | | |
| F | RBT Leve | ls | Test (s) | Assessment | Lab CIE | | | | | | | | | |
| - | | | 25 | 5 | 20 | | | | | | | | | |
| L1 | Remen | ıber | 5 | 2 | - | | | | | | | | | |
| L2 | Unders | tand | 10 | 3 | - | | | | | | | | | |
| L3 | Apply | | 5 | - | 20 | | | | | | | | | |
| L4 | Analyz | е | 5 | - | - | | | | | | | | | |
| L5 | Evaluat | te | - | - | - | | | | | | | | | |
| L6 | Create | | - | - | - | | | | | | | | | |
| SEE A | ssessme | nt Patt | ern(50 Mai | rks – Theory) | | | | | | | | | | |
| | | 1_ | Exam M | Aarks | | | | | | | | | | |
| l I | KB1 Leve | IS | Distribut | ion (50) | | | | | | | | | | |
| L1 | Remen | ıber | 1(|) | | | | | | | | | | |
| L2 | Unders | tand | 20 |) | | | | | | | | | | |
| L3 | Apply | | 1(|) | | | | | | | | | | |
| L4 | Analyz | е | 10 |) | | | | | | | | | | |
| L5 | Evaluat | te | - | | | | | | | | | | | |
| L6 | Create | | - | | | | | | | | | | | |
| Sugge | ested Lea | rning | Resources: | | | | | | | | | | | |
| Text | BOOK: | . h . n - i | wal Dwaf | Amina Viinare D | | ~f C | oftenere Ex | acring India DDD | | | | | | |

- 1) Hitesh, Mohapatra| Prof. Amiya Kumar. Fundamentals of Software Engineering. India, BPB Publications, 2020.
- 2) Sharma, Pallavi. Selenium with Java A Beginner's Guide: Web Browser Automation for Testing Using Selenium with Java. India, BPB Publications, 2022.
- 3) Merkow, Mark. Secure, Resilient, and Agile Software Development. United States, CRC Press, 2019.
- 4) Baumgartner, Manfred, et al. Test Automation Fundamentals: A Study Guide for the Certified Test Automation Engineer Exam Advanced Level Specialist ISTQB® Compliant. Germany, dpunkt. verlag, 2022.

Reference Books:

- 1) Stephens, Rod. Beginning Software Engineering. United States, Wiley, 2022.
- 2) Bierig, Ralf, et al. Essentials of Software Testing. Singapore, Cambridge University Press, 2021.

Web links and Video Lectures (e-Resources):

- https://www.tutorialspoint.com/software_engineering/index.htm
- https://www.geeksforgeeks.org/software-engineering/
- https://www.javatpoint.com/software-testing-tutorial
- https://www.guru99.com/software-testing.html
- https://www.selenium.dev/selenium-ide/docs/en/introduction/getting-started
- https://github.com/SeleniumHQ/selenium-ide

Activity-Based Learning (Suggested Activities in Class)/ Practical Based learning

- Creating a Software Design Document (SDD) for a web application
- Student Seminar Presentations
- Using Selenium IDE for automated testing of a web application

| COMPUTER NETWORKS | | | | | | | | | | | | | | | |
|-------------------|---|---|-------------------|-------------------|------------------|----------------|--------------------|--------------------|------------------|---------|---------|---------|---------|--------|--|
| Course Code | 22M | CA15 | | | | | | CIE | Marks | 5 | 50 | | | | |
| L:T:P:S | 3:0:1 | :0 | | | | | | SEE | Mark | s | 50 | | | | |
| Hrs / Week | 5 | | | | | | | Tota | al Mar | ks | 100 | 100 | | | |
| Credits | 04 | | | | | | | Exa | m Hou | irs | 03 | | | | |
| Course outcor | nes: | | | | | | | | | | | | | | |
| At the end of th | ne cour | se, the | stude | nt will | be abl | e to: | | | | | | | | | |
| 22MCA15.1 | Unde | rstand | the ba | asic co | ncepts | of net | works | and re | ferenc | e mode | els. | | | | |
| 22MCA15.2 | Apply | y error | detec | tion ar | nd corr | ection | techni | ques d | uring | data tr | ansmi | ssion. | | | |
| 22MCA15.3 | Imple | ement nacke | IP add t deliv | dressir erv ha | ng and sed on | routir | ng algo and IPV | orithms 76 hear | s to fin ders | nd sho | rtest p | oaths f | for net | work | |
| 22MCA15.4 | Illust | ustrate the essential principles of a transport layer protocol. | | | | | | | | | | | | | |
| | Com | Compose the frame format and functionalities of TCP and UDP and analyse the | | | | | | | | | | | | | |
| 22MCA15.5 | ICA15.5 Compose the frame format and functionalities of TCP and UDP and analyse the different functions of application layer protocols. | | | | | | | | | | | | | | |
| Mapping of Co | ourse (| Outcor | nes to | Progr | am Ou | utcom | es and | Progr | am Sp | oecific | Outco | mes: | | | |
| | P01 | P02 | P03 | P04 | P05 | P06 | P07 | P08 | P09 | P010 | P011 | P012 | PSO1 | PSO2 | |
| 22MCA15.1 | 1 | 1 | - | - | - | - | 2 | - | - | 2 | - | - | 2 | 1 | |
| 22MCA15.2 | 1 | 1 | - | 2 | - | - | 2 | - | 1 | 2 | - | - | 2 | 1 | |
| 22MCA15.3 | 3 | 3 | - | 2 | 2 | - | 2 | - | 1 | 2 | - | - | 2 | 1 | |
| 22MCA15.4 | 3 | 3 | - | 2 | 2 | - | 3 | - | 1 | 2 | - | - | 2 | 1 | |
| 22MCA15.5 | 3 | 3 | - | 2 | - | - | 3 | - | 1 | 2 | - | - | 2 | 1 | |
| MODULE-1 | INTF NET | RODU(WORK | CTION KS | TO C | OMPU | TER | | | 22 | MCA1 | 5.1 | 9 |) Houi | ſS | |
| Introduction, | Applica | ations, | Requ | iremei | nts, co | nnecti | vity, N | letwor | k top | ology, | modes | s, scal | e. Net | work | |
| Protocol Stack | (TCP/ | IP and | ISO-0 | SI).Phy | vsical I | Layer: 🕻 | Fransn | nission | media | a –guid | ed and | d ungu | ided m | iedia, | |
| Digital Modula | ation t | cechnic | ques (| NRZ,N | RZI ,N | A anche | , ster | 4B/5B] |) and | multij | plexing | g (FDI | MA, T | DMA, | |
| CDMA), Implen | nentin | g Netw | vork Sc | oftwar | e, perfo | orman | ce, mol | oile tel | ephon | e syste | ms (10 | G, 2G,3 | G and | 4G). | |
| Self-study / | HAN | DS ON | | | | | | | | | | | | | |
| Case Study / | Using | g TCP/ | IP soc | kets, v | vrite a | client | -serve | r prog | ram to | o make | e the c | lient s | end th | e file | |
| Applications | name | e and to | o make | e the se | erver s | end ba | ck the | conter | nts of t | he requ | uested | file if | presen | ıt. | |
| Text Book | Text | Book 1 | :1,2 | Text E | Book 2 | : 1.1, 1 | 1.2, 1.3 | | | | | | | | |
| MODULE-2 | DAT | A LINI | K LAY | ER | | | | | 22 | MCA1 | 5.2 | 9 | Hou | rs | |
| Data Link Lay | er Des | ign iss | sues, S | ervice | s prov | vided t | o Netv | vork L | ayer, | Framir | ng, Err | or De | tection | and | |
| Correction Cod | les, Da | ta Linl | k Proto | ocols a | nd Sli | ding w | indow | proto | cols e | lement | tary D | ata Lir | nk Prot | tocol, | |
| unrestricted si | mplex | Protoc | col, Sin | plex S | Stop-ai | 1d-Wai | t Proto | ocol, Si | mplex | Protoc | col for | a Nois | sy, ARQ |), Go- | |
| back-n ARQ Me | ethod, | Selecti | ve-rep | eat Al | Q. Me | dium | Acces | s Subla | ayer: I | Multipl | e acce | ss pro | otocols | and | |
| Examples: AL | OHA, I | Pure A | | , Slott | ed AL | | rotoco | l, Ethe | rnet: | Larrier | Sense | e Mult | iple A | ccess | |
| (LSMA), Frame | e form | at of (rmat V | JSMA, Nirolo | Types | OI US | MA,CS | MA WI | th Col | lision | Detect | ion(CS | MA/C | DJ,Eth | ernet | |
| LAN (002.3) II | | ns on | • | 55 LAN | , Diuei | .0011, 5 | painin | ig ti ee | • | | | | | | |
| Self-study / | | Writ | • • • • r | rogra | m for | Hamr | ning (| ode a | onora | tion fo | r orr | or de | tection | and | |
| Case Study / | • | corr | ection | nogra | 101 | mann | ining (| out g | ciicia | | | or uc | | anu | |
| Applications | | Writ | e an | roorai | n for | distar | nce ve | ctor a | loorith | im to | find | suitah | le nat | h for | |
| nppneutions | • | tran | smissi | on. | 11 101 | uistai | ice ve | ctor a | 150110 | | mu | Suitub | ic pat | 1 101 | |
| Text Book | Text | Book 1 | :3,4 | Text E | Book 2 | : 2.2, 2 | .4, 2.5, | 2.6 | | | | | | | |
| MODULE-3 | NET | WORK | K LAYI | ER | | | | | 22 | MCA1 | 5.3 | Ģ |) Hou | ſS | |
| Functions of r | Functions of network layer Network Layer Design issues Routing algorithms- Dijkstra algorithm | | | | | | | | | | | | | | |
| Bellman-ford a | Bellman-ford algorithm, Flood-based routing algorithm, Multicasting routing, Routing among Mobile | | | | | | | | | | | | | | |
| Devices, Conge | stion (| Control | Algo | rithms | s, caus | se of | conges | stion, | conge | stion | contro | l meth | ods : 0 |)pen- | |
| Loop Congestio | on Con | trol, Cl | osed-I | loop C | ongest | tion. Co | ngesti | on avo | idance | mecha | anism | s. | | - | |
| Quality of Serv | ice: lea | ky buc | cket, to | ken bi | ucket. | | - | | | | | | | | |
| Internetwork | ing: sin | mple ir | nterwo | rking | and sig | gnificai | nce, Gl | obal IP | addre | sses. | | | | | |

| Self-study / Case Study / Applications | HANE Write | IANDS ON: Write a program for congestion control using leaky bucket algorithm. | | | | | | | | | | | | |
|--|--|--|--|---|---|--|--|--|--|--|--|--|--|--|
| Text Book | Text E | Book 1 : 5 T | ext Book 2 : 3 | | | | | | | | | | | |
| MODULE-4 | INTR LAYE | ODUCTION R | I TO NS2 & TRA | NSPORT | 22MCA15.4 | 9 Hours | | | | | | | | |
| Basics of NS2 Fragmentation Configuration of transport pr | 2, Wire version Protoco otocols HANI | ed TCL scr ns of IP: IPv l), ICMP (In <u>, connection</u>)S ON: | ipt components an 4 and Ipv6, ARP (Add ternet of Control Me establishment: Two | d paramet dress Resoli ssage Proto -Way Hand | ers .Quality of S ution Protocol), DF ocol). The Transpo shake, connection | ervice: tunnelling, ICP (Dynamic Host rt Layer: Elements and release. | | | | | | | | |
| Self-study / Case Study / Applications | • | Simulate a three mode point-to-point network with duplex links between them. Set the queue size and vary the bandwidth to find the number of packets dropped. Simulate to study transmission of packets over Ethernet LAN and determine the number of packets drop destination. Text Book 1 : 6 Text Book 2 : 4.1.3, 4.4.2 | | | | | | | | | | | | |
| Text Book | Text E | 300k 1 : 6 Te | ext Book 2 : 4.1.3, 4.4 | .2 | | | | | | | | | | |
| MODULE-5 | APPL | ICATION L | AYER | | 22MCA15.5 | 9 Hours | | | | | | | | |
| The Internet T Application La architecture, w | ranspoi ayer: D vorking | rt Protocol: 1 NS, structur of WWW, St | functionality of TCP a re of DNS, DNS me creaming audio and V | and UDP, co ssage form Video and Co | mparison betweer at. Examples: Em ontent Delivery, F1 | UDP and TCP. The ail, WWW, WWW P, TELNET. | | | | | | | | |
| Self-study / Case Study / Applications | • | Simulate th The node n to node n3 and sends time is 10 s Simulate th wired netw network. | e network with five a 4 is at the centre. No (a TCP sink) throug UDP packets to node econds. e different types o ork and analyze the | nodes n0, n ode n0 is a h the node e n2 throug f internet tr packet dr | 1, n2, n3, n4 formi TCP source, which n4. Node n1 is and th n4. The duratio raffic such as FTP op and packet o | ng a star topology. In transmits packets other traffic source, In of the simulation and TELNET over a delivery ratio in the | | | | | | | | |
| Text Book | Text E | 300k 1 : 7 Te | ext Book 2 : 9 | | | | | | | | | | | |
| CIE Assessme | nt Patt | ern (50 Ma | rks – Theory) | | | | | | | | | | | |
| DDTLow | alc | Tact (c) | Marks Distribu | Ition | CIE | | | | | | | | | |
| KDI LEVE | :15 | 25 | Assessment 5 | LaD 2(| | | | | | | | | | |
| L1 Remer | nber | 5 | 2 | - | , | | | | | | | | | |
| L2 Under | stand | 10 | 3 | - | | | | | | | | | | |
| L3 Apply | | 5 | - | 20 |) | | | | | | | | | |
| L4 Analyz | ze | 5 | - | - | | | | | | | | | | |
| L5 Evalua | te | - | - | - | | | | | | | | | | |
| L6 Create | | - | - | - | | | | | | | | | | |
| SEE Assessme | nt Patt | ern (50 Ma | <u>rks – The</u> ory) | | | | | | | | | | | |
| RBT Leve | els | Exam Marks Distribution (50) | | | | | | | | | | | | |
| L1 Remem | ber | 10 |) | | | | | | | | | | | |
| L2 Unders | tand | 20 |) | | | | | | | | | | | |
| L3 Apply | | 10 | | | | | | | | | | | | |
| L4 Analyze | e | 1(|) | | | | | | | | | | | |
| L5 Evaluat | e | - | | | | | | | | | | | | |
| | | - | | | | | | | | | | | | |

| Sugge | ested Learning Resources: |
|----------|--|
| Text | Books: |
| 1) | "Computer Networks" 6th Edition,2021 by Andrew S Tanenbaum rije University, Amsterdam, The Netherlands Nick Feamster, University of Chicago David J. Wetherall, University of Washington |
| 2) | "Computer Networks A Systems Approach, Sixth Edition, 2021" Larry L Peterson |
| Refer | rence Books: |
| 1) | Computer Networks Principles, Technologies and Protocols for Network Design, by Natala Olifer and Victor Olifer, 2010. |
| 2) | http://www.ietforg/rfc.html relevant RFC document could be used to get more detailed information about any of the concepts prescribed in the syllabus like RFC 2460 can be referred to get detailed information about IDV6 |
| XAZ - la | |
| web | inks and video Lectures (e-Resources): |
| • | https://www.tutorialspoint.com/computer_fundamentals/computer_networking.htm |
| • | https://www.geeksforgeeks.org/computer-network- |
| | tutorials/https://archive.nptel.ac.in/courses/106/105/106105183/ |
| • | https://onlinecourses.swayam2.ac.in/cec23_cs07/preview |
| Activ | ity-Based Learning (Suggested Activities in Class)/ Practical Based learning: |
| • | Demonstration of working of NS2 with TCL programs. |
| • | Demonstration of encoding scheme. |
| • | Demonstration of Error detection and correction methods. |
| • | Video demonstration of latest technology in computer networks. |
| • | Contents related activities (Activity-based discussions) |
| | For active participation of students, instruct the students to write and execute networks related program. |
| | Organizing Group wise discussions on various applications |
| | |

➢ Seminars

| | JAVA LAB | | | | | | | | | | | | | | |
|------------------|---|---|----------|------------|---------------|---------|----------|----------|----------------|-------|---------|------|---------------|-------|--|
| Course Code | 22M | CAL16 | | | | | | CIE | Mark | S | 50 | | | | |
| L:T:P:S | 0:0:1 | .5:0 | | | | | | SEE | Mark | S | 50 | | | | |
| Hrs / Week | 3 | | | | | | | Tot | al Mar | 'ks | 100 | | | | |
| Credits | 1.5 | | | | | | | Exa | m Hoı | ırs | 03 | | | | |
| Course outcom | nes: | | | | | | | | | | | | | | |
| At the end of th | ie cour | se, the | studer | nt will | be able | e to: | | | | | | | | | |
| 22MCAL16.1 | Write | e basic | java pi | ogram | using | proper | r synta | x and s | emant | tics. | | | | | |
| 22MCAL16.2 | Creat | e an ar | oplicati | ion usi | ng inte | rfaces | and pa | ckages | | | | | | | |
| 22MCAL16.3 | Apply error | Apply the concepts of Multithreading and Exception handling to develop efficient and error free codes | | | | | | | | | | | | | |
| 22MCAL16.4 | Deve | Develop Applet programs and manipulate the IO streams. | | | | | | | | | | | | | |
| 22MCAL16.5 | Develop Applet programs and manipulate the to streams. Design and develop database applications. | | | | | | | | | | | | | | |
| Mapping of C | ourse | Outco | mes t | o Prog | gram (| Jutcor | nes ar | nd Pro | gram | Speci | fic Out | come | s: | | |
| | P01 | P02 | P03 | P04 | P05 | P06 | P07 | P08 | P09 | P010 |) P011 | P012 | 2 PSO1 | PSO2 | |
| 22MCAL16.1 | 3 | 3 | 2 | - | 3 | - | 1 | - | 1 | - | 1 | 2 | 2 | 2 | |
| 22MCAL16.2 | 3 | 3 | 3 | - | 2 | - | 1 | - | - | - | 1 | 1 | 2 | 2 | |
| 22MCAL16.3 | 3 | 2 | 2 | - | 3 | - | 2 | - | 1 | - | 1 | 1 | 2 | 2 | |
| 22MCAL16.4 | 3 | 3 | 3 | - | 2 | - | 1 | - | - | - | 1 | 3 | 2 | 2 | |
| 22MCAL16.5 | 3 | 2 | - | 2 | 3 | - | - | - | 1 | - | 1 | - | 2 | 2 | |
| | - | | | | | | | | | | | | | | |
| Pgm. No. | | | | Lis | st of P | rogra | ms | | | | Hou | rs | CO | S | |
| | - | | | Prer | equisi | te Pro | ogram | ıs / De | emo | | | | | | |
| | • | Cor | e JAVA | Progr | ammin | ıg | | | | | 2 | | N | | |
| | • | Bas | ics of (| Core JA | VA Pro | ogramr | ning | | | | 5 NA | | | 1 | |
| | • | | | |] | PART | -A | | | | | | | | |
| 1 | Write | e a JAV | A Prog | ram to | implei | nent c | lass, ob | oject an | ld met | hod. | 3 | 2 | 2MCAL | 16.1 | |
| 2 | Write | e a Java | a progr | ram to | sort fo | or an e | lement | in a g | iven li | st of | 3 | 2 | 2201 | 16.2 | |
| 2 | elem | ents u | sing bu | ubble s | ort. | | | | | | 3 | 4 | 2 MCAL | 10.2 | |
| 3 | Write | e a | JAVA | Progr | am to | den | nonstr | ate C | onstru | ctor | 3 | 2 | 2MCAL | 16.1 | |
| | Over | oading | g and M | lethod | Overlo | Dading | 1 | | | | | | | | |
| 4 | write | e a pro | ogram | in Jav | a for a motho | String | nandii | ng, the | e prog | ram | 3 | 2 | 2MCAL | 16.2 | |
| 5 | Write | | A Prog | ram to | demoi | istrate | Inheri | tance | | | 3 | 2 | 22MCAI | .16.3 | |
| 5 | Simp | le Pros | ram o | n Iava | for th | e impl | lement | ation of | of Mul | tiple | 5 | | 21010111 | 10.5 | |
| 6 | inher | itance | using | inter | faces | to cal | lculate | the a | area (| of a | 3 | 2 | 2MCAL | 16.3 | |
| | recta | ngle ar | ıd triar | , 1gle. | | | | | | | | | | | |
| | | | | |] | PART | -B | | | | | | | | |
| 7 | Write | e a Java | a prog | ram to | demo | nstrate | e the ir | npleme | entatio | on of | 2 | | OMCAL | 16.4 | |
| / | multi | thread | ing. | | | | | | | | 3 | 2 | Z MCAI | 10.4 | |
| | Write | e a JAV | 'A prog | gram t | o creat | te a pa | ickage | named | l shap | e, to | | | | | |
| 8 | creat | e som | e clas | sses in | ı the | packa | ge rep | oresent | ting s | ome | 3 | 2 | 2MCAI | 16.4 | |
| | comn | non sh | apes li | ke Squ | iare, Ti | riangle | , and (| Lircle a | ind im | port | - | | | | |
| | and c | ompile | e these | classe | s in oth | ier pro | gram. | | | 6 | | | | | |
| 9 | write | e a pr | ogram | to a | emons | trate | the im | ipieme | ntatio | n or | 3 | 2 | 2MCAL | 16.4 | |
| 10 | Write | exception handling in Java. | | | | | | | | | | | | | |
| 10 | Write | | IAVA | annle | t nro | gram | to i | mplem | ent 4 | AWT | J | | | 10.0 | |
| 11 | comp | onents | , 5. | ~PPic | - PIO | 0 | | | 1 | | 3 | 2 | 22MCAL | 16.5 | |
| 10 | Write | e a JAV | /A Pro | gram | to crea | ate a s | imple | calcula | ator w | hich | n | | 0014011 | 16 5 | |
| 12 | perfo | rms a l | basic n | nathem | natical | operat | ions us | sing jav | <u>a sw</u> ir | ıg. | 3 | 4 | ZMCAL | 10.5 | |

PART-C Beyond Syllabus Virtual Lab Content (To be done during Lab but not to be included for CIE or SEE)

- https://java-iitd.vlabs.ac.in/exp/abstraction/
- https://java-iitd.vlabs.ac.in/exp/encapsulation/

CIE Assessment Pattern (50 Marks – Lab)

| | DDT Lovolc | Test (s) | Weekly Assessment |
|----|------------|----------|-------------------|
| | RD1 Levels | 40 | 10 |
| L1 | Remember | 10 | - |
| L2 | Understand | 10 | 5 |
| L3 | Apply | 10 | 5 |
| L4 | Analyze | 10 | - |
| L5 | Evaluate | - | - |
| L6 | Create | - | - |

SEE Assessment Pattern (50 Marks - Lab)

| | RBT Levels | Exam Marks Distribution (50) |
|----|-------------------|---------------------------------|
| L1 | Remember | 5 |
| L2 | Understand | 10 |
| L3 | Apply | 20 |
| L4 | Analyze | 10 |
| L5 | Evaluate | - |
| L6 | Create | 5 |

Suggested Learning Resources:

Reference Books:

- 1) First Java, Kathy Sierra & Bert Bates, Shroff/O'Reilly Publication, 2nd Edition 2005.
- 2) Core Java Volume I Fundamentals, Cay S. Horstmann, Prentice Hall, 11th Edition May 2018.
- 3) Java 6 Programming Black Book, Dreamtech Press, 2012.

| LINUX PROGRAMMING LAB | | | | | | | | | | | | | | |
|---|---|--|--|--|---|---|--|---|--|--|----------------------------|------|---------------|--------|
| Course Code | 22 | 2MCAL | 17 | | | | | CIE | Marks | | | 50 | | |
| L:T:P:S | 0: | 0:1.5:0 | | | | | | SEE | Marks | ; | | 50 | | |
| Hrs / Week | 3 | | | | | | | Tota | al Marl | KS | | 100 | | |
| Credits | 1. | 5 | | | | | | Exai | n Hou | rs | | 03 | | |
| At the end of the | mes: he cour | se, the | studen | t will b | e able t | 0: | | | | | | | | |
| 22MCAL17.1 | Use fi | ilter co | mmand | ls to de | velop u | ser app | olicatio | ns | | | | | | |
| 22MCAL17.2 | Imple | ement s | hell sci | ripts to | analyz | e user a | authent | ication | and fil | e prope | erties. | | | |
| 22MCAL17.3 | Desig | gn shell | scripts | for pat | tern m | atching | gusing | regular | expres | ssions. | | | | |
| 22MCAL17.4 | Imple | Implement shell scripts for non-interactive text processing | | | | | | | | | | | | |
| 22MCAL17.5 | 22MCAL17.5 Develop awk scripts to solve complex computing problems while understanding its limitations. | | | | | | | | | | | | | |
| Mapping of Course Outcomes to Program Outcomes and Program Specific Outcomes: | | | | | | | | | | | | | 1 | |
| | P01 | PO2 | P03 | P04 | P05 | P06 | P07 | P08 | P09 | P010 | P011 | P012 | PSO1 | PSO2 |
| 22MCAL17.1 | 3 | 3 | 3 | - | 1 | 1 | 1 | - | 1 | - | - | - | 2 | 2 |
| 22MCAL17.2 | 3 | 3 | 3 | - | 1 | 1 | 1 | - | 1 | - | - | 1 | 2 | 2 |
| 22MCAL17.3 | 3 | 3 | 3 | - | 1 | 1 | 1 | - | 1 | - | - | 1 | 2 | 2 |
| 22MCAL17.5 | 3 | 3 | 3 | | 1 | 1 | 1 | | 1 | - | - | 1 | 2 | 2 |
| | | 1 | | | | | | | | 1 | | | | |
| Pgm. No. | | | | l | List of | Progr | ams | | | | H | ours | Cos | |
| Prerequisite Programs / Demo | | | | | | | | | | | | | | |
| | • | Insta Intro Basi | allation oductio c Comr | of VM on to the nands o | Ware e LINUX of Linux | K enviro and Fi | onment le Man | : agemer | nt Com | mands. | | 3 | NA | |
| | | | | | | PAR | T-A | | | | | | | |
| 1 | Write "Good upon Write comp is na direct | a shel l Morn time at a she onents med n tories a | Il scrip ing" or which Il scrip in that npc, th , a/b, a | t that g "Good the use ot that path na en the /b/c, a/ | gets ex Aftern er logs i accept ame as e comr /b/c/d. | ecuted 100n" o n. s a pat directo nand 1 | display or "Goo th nam ries. Fo mpc a, | ys the d Even ne and or exam /b/c/d | messa ing"do create ple, if t shoul | ge eith ependin s all th he scri d crea | er ng he pt te | 3 | 22MC <i>A</i> | AL17.1 |
| 2 | Write comm the p match the ke | shell s nand). I asswor ning pa eyword | script t t shoul d ente ssword until a | o imple d prom red by as con matchi | ement to pt the the unifirmation | ermina user fo ser, it on and sword i | al locki r a pas must if mat s enter | ng (sim sword. prompt ch occu ed agai | ilar to After a again rs, it n n by th | the lo acception for the nust loose of the section | ck ng ne ck | 3 | 22MCA | AL17.1 |
| 3 | Write and c direct Creat and o | the keyword until a matching password is entered again by the user.Write a shell script that accept one or more filenames as argument and convert all of them to uppercase, provided they exist in current directory.3Create a script file called file-properties that reads a file name entered and outputs it properties3 | | | | | | | | | | | AL17.2 | |
| 4 | Write its cr messa Write at leas | a shell eation age. a shell st 10 ch | l script time if script naracte | that ac f file e to list a rs. (Use | ccepts a xist an all the f | as filena d if it files in ommar | ame as does r a direc nd to ch | argum not sen tory wł eck the | ent and d outp lose fil length | d displa out err ename i). | ay or is | 3 | 22MC <i>A</i> | AL17.2 |

| 5 | Write a shell script which accepts valid log-in names as arguments and prints their corresponding home directories, if no arguments are specified, print a suitable error message. | 3 | 22MCAL17.3 | | | | | | | |
|--------|---|---|------------|--|--|--|--|--|--|--|
| 6 | Write a shell script that takes a valid directory name as an argument and recursively descend all the sub-directories, finds the maximum length of any file in that hierarchy and writes this maximum value to the standard output. | 3 | 22MCAL17.3 | | | | | | | |
| PART-B | | | | | | | | | | |
| 7 | Write a shell script that accepts two file names as arguments, checks if the permissions for these files are identical and if the permissions are identical, output common permissions and otherwise output each file name followed by its permissions.Write a shell script that displays all the links to a file specified as the first argument to the script. The second argument, which is optional, can be used to specify in which the search is to begin. If this second argument is not present, the search is to begin in current working directory. In either case, the starting directory as well as all its subdirectories at all levels must be searched. The script need not include any error checking. | 3 | 22MCAL17.3 | | | | | | | |
| 8 | Write a shell script that accept a list of filenames as its argument, count and report occurrence of each word that is present in the first argument file on other argument files. Write a shell script to display the calendar for current month with current date replaced by * or ** depending on whether the date has one digit or two digits. | 3 | 22MCAL17.3 | | | | | | | |
| 9 | Write a shell script that accept the file name, starting and ending line number as an argument and display all the lines between the given line number. Write a shell script that folds long lines into 40 columns. Thus any line that exceeds 40 characters must be broken after 40th, a "\" is to be appended as the indication of folding and the processing is to be continued with the residue. The input is to be supplied through a text file created by the user. | 3 | 22MCAL17.4 | | | | | | | |
| 10 | Write an awk script that accepts date argument in the form of dd-mm- yy and displays it in the form if month, day and year. The script should check the validity of the argument and in the case of error, display a suitable message. | 3 | 22MCAL17.5 | | | | | | | |
| 11 | Write an awk script to delete duplicated lines from a text file. The order of the original lines must remain unchanged. | 3 | 22MCAL17.5 | | | | | | | |
| 12 | Write an awk script to find out total number of books sold in each discipline as well as total book sold using associate array down table as given below: Electrical 34, Mechanical 67, Electrical 80, Computer Science 43, Mechanical 65, Civil 98, Computer Science 64. | 3 | 22MCAL17.5 | | | | | | | |
| ł | Science 43, Mechanical 65, Civil 98, Computer Science 64. PART-C Beyond Syllabus Virtual Lab Content (To be done during Lab but not to be included for CIE or SEE) https://spoken-tutorial.org/watch/Linux/More+on+sed+command/English/ | | | | | | | | | |

| CIE Assessment Pattern (50 Marks - Lab) | | | | | | | | |
|---|------------|----------|-------------------|--|--|--|--|--|
| | DDT Louolo | Test (s) | Weekly Assessment | | | | | |
| | RD1 Levels | 40 | 10 | | | | | |
| L1 | Remember | - | 2 | | | | | |
| L2 | Understand | 10 | 2 | | | | | |
| L3 | Apply | 20 | 4 | | | | | |
| L4 | Analyze | 10 | 2 | | | | | |
| L5 | Evaluate | - | - | | | | | |
| L6 | Create | - | - | | | | | |

SEE Assessment Pattern (50 Marks - Lab)

| | DDT Lovale | Exam Marks |
|----|------------|-------------------|
| | KD1 Levels | Distribution (50) |
| L1 | Remember | - |
| L2 | Understand | 05 |
| L3 | Apply | 20 |
| L4 | Analyze | 20 |
| L5 | Evaluate | 05 |
| L6 | Create | - |

Suggested Learning Resources

Reference Books:

- Barrett, Daniel J. Efficient Linux at the Command Line. " O'Reilly Media, Inc.", 2022. Miller, Scott Alan. Linux Administration Best Practices. Packt Publishing, 2022. 1)
- 2)
- Linux: The Complete Reference, Sixth Edition, 1 July 2017, Richard Petersen, Mc Graw Hill. 3)

| Course C-J- | RESEARCH METHODOLOGY AND IPR | | | | | | | | | | | | | | |
|---|--|---|--|--|--|---|---|---|--|---|---|--|--|--|--|
| LOUISE COAE | 22M | CA18 | | | | | CIE Marks 50 | | | | | | | | |
| L:T:P:S | 2:0:0 |):0 | | | | | | SEE | SEE Marks | | | | 50 | | |
| Hrs / Week | 2 Total Marks | | | | | | | | | 100 | | | | | |
| Credits02Exam Hours03 | | | | | | | | | | | | | | | |
| Course outcon | Course outcomes: | | | | | | | | | | | | | | |
| At the end of the course, the student will be able to: | | | | | | | | | | | | | | | |
| 22MCA18.1 | Und | Understand the Research Methodology (RM) types and their significances. | | | | | | | | | | | | | |
| 22MCA18.2 | Defi | ne a re | search | probl | em and | l its de | sign. | | | | | | | | |
| 22MCA18.3 | Illus | Illustrate the criteria of sampling with relevant characteristics. | | | | | | | | | | | | | |
| 22MCA18.4 | Inve | estigate | e IPR w | vith its | infring | ement | k rem | edies. | | | | | | | |
| 22MCA18.5 | Eva | luate a | and pro | otect a | uthor's | s worł | c from | theft | or pira | acy and | d desig | gn a p | roduct | or | |
| Manulasse | proc | cess to | meett | he pro | ducts s | specific | cation. | Data | | | 0 | | | | |
| Mapping of Co | urse u | DOC | nes to | Progr | | | es and | Prog | ram 5 | | | Dimes: | DCO1 | DCOO | |
| 222464404 | P01 | P02 | P03 | P04 | P05 | P06 | P07 | P08 | P09 | P010 | PUII | P012 | P501 | P502 | |
| 22MCA18.1 | - | 2 | 2 | 2 | - | - | - | - | - | - | - | - | - | 3 | |
| 22MCA18.2 | 2 | 1 | 2 | 2 | 1 | - | 1 | - | - | - | - | - | - | 3 | |
| 22MCA18.3 | 1 | 2 | 2 | 2 | 1 | - | - | - | - | - | - | - | - | 3 | |
| 22MCA18.4 | - | - | - | - | 1 | - | - | - | - | - | - | 2 | - | 3 | |
| 22MCA18.5 | - | - | - | - | 1 | 2 | - | - | 1 | - | - | 2 | - | 3 | |
| MODULE-1 | E-1 RESEARCH METHODOLOGY 22MCA18.1 5 Hours | | | | | | | | | | ours | | | | |
| Methods versus is done, Resear | s Meth | odolog cess, C | gy, Res | earch of goo | and Sc od rese | ientifi arch, F | c Meth Problei | nod, In ns enc | nporta | nce of red by | Know | ing ho chers | w rese | earch | |
| Text Book | Text | BOOK] | 1: 1.1 t | 0 1.12 | | | Text Book 1: 1.1 to 1.12 | | | | | | | | |
| | DEFINING THE RESEARCH PROBLEM22MCA18.25 Hours | | | | | | | | | | | | | | |
| Definition Pro | DEFI | NING electic | THE I | RESEA | RCH | PROB | <mark>LEM</mark> the pr | oblem | Tech | 22M | CA18. | <mark>2</mark> ved in | defini | ours | |
| Definition, Prol problem and il | DEFI blem s lustrat | electic | THE I on, Nec Resear | cessity ch De | of def sign: 1 | PROB fining Meanii | LEM the pr ng, Ne | oblem ed, Fe | , Tech atures | 22MO niques of a g | CA18. invol good d | <mark>2</mark> ved in lesign, | defini Impo | ours ing a rtant | |
| Definition, Pro problem and il concepts relation | DEFI blem s lustrat ng to re | electic tion. R esearc | THE I on, Nec Resear h desig | cessity ch De gn, Diff | of def sign: 1 | Fining Meanin Sesear | LEM the pr ng, Ne ch desi | oblem ed, Fe | , Tech atures | 22MO niques of a g | CA18. invol good d | 2 ved in lesign, | defini Impo | ours ing a rtant | |
| Definition, Pro problem and il concepts relatio | DEFI blem s lustrat ng to re Case | electic tion. R esearc Studie | THE I on, Neo Resear h desig | cessity ch De gn, Diff the fol | RCH of def sign: ferent lowing | PROB fining Meanin resear g resea | LEM the pr ng, Ne ch desi arch q | oblem ed, Fe igns. uestio | , Tech atures ns: | 22M niques of a g | CA18. invol good d | <mark>2</mark> ved in lesign, | defini Impo | ours ing a rtant | |
| Definition, Prol problem and il concepts relation Self-study / | DEFI blem s lustrat ng to re Case | electic tion. R esearc Studie Ho | THE I on, Nec Resear h desig es for t ow do c | cessity ch De gn, Diff the fol compa | of def sign: 1 ferent f lowing nies a | PROB fining Meanin cesear g resea dapt t | LEM the pr ng, Ne ch desi arch q o chan | oblem ed, Fe igns. uestio ging c | , Tech atures ns: consur | 22MC niques of a g ner pr | CA18. invol good d eferen | 2 ved in lesign, nces? | defini Impo | ours ing a rtant | |
| Definition, Pro problem and il concepts relation Self-study / Case Study / | DEFI blem s lustrat ng to re Case | electic tion. R esearc Studie Ho Ho | THE I on, Nec Research h desig es for t ow do c | RESEA cessity ch De gn, Diff the fol compa organi | erent i lowing zation | PROB fining Meanin cesear g resea dapt t s use s | LEM the pr ng, Ne ch desi arch qu o chan social | oblem ed, Fe igns. uestio ging c media | , Tech atures ns: consur | 22M niques of a g ner pro- | cA18. invol good d eferen g and | 2 ved in lesign, nces? marke | defini Impo eting? | ours ing a rtant | |
| Definition, Pro problem and il concepts relatin Self-study / Case Study / Applications | DEFI blem s lustrat ng to re Case | electic cion. R esearch Studie Ho Ho Wh | THE I on, Nec Research h desig es for t ow do c ow do c hat ar | cessity ch De gn, Diff the fol compa organi ce the | refection and a straight for the second seco | Fining Meanin resear g resear dapt t s use s ts of | LEM the pr ng, Ne ch desi arch qr o chan social the C | oblem ed, Fe igns. uestio ging c media | , Tech atures ns: consur for br -19 p | 22M niques of a g ner pro- randin andem | cA18. invol good d eferen g and nic on | 2 ved in lesign, ices? marke the | defini Impo eting? hospi | ours ing a rtant tality | |
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| Definition, Pro problem and il concepts relation Self-study / Case Study / Applications Text Book | DEFI blem s lustrating to re Case Text | INING electic cion. R esearc Studio Ho Ho Wi inc Book 1 PLINC | THE I on, Nec Resear h desig es for t ow do c hat ar dustry 1: 2.1 to G DESI | RESEA cessity ch De gn, Diff the fol compa organi e the ? o 2.3, 3 | of def sign: 1 ferent 1 lowing nies a zation effec 3.1 to 3 | PROB fining Meanin resear g resea dapt t s use ts of 5.5 | LEM the pr ng, Ne ch desi arch q o chan social the C | oblem ed, Fe igns. uestio ging c media COVID | , Tech atures ns: consur for bi -19 p | 22MC niques of a g ner pro- randin andem | CA18.: invol good d eferen g and nic on | 2 ved in lesign, aces? marke the | defini Impo eting? hospi | ours ing a rtant tality | |
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| CIE Assessment Pattern(50 Marks - Theory) | | | | | | | | | | |
|---|------------|--------------------|-------------------------------|-------|------------|--|--|--|--|--|
| | | Marks Distribution | | | | | | | | |
| R | BT Levels | Test (s) | Qualitative Assessment (s) | MCQ's | Activities | | | | | |
| | | 25 | 15 | 5 | 5 | | | | | |
| L1 | Remember | 5 | 3 | 1 | - | | | | | |
| L2 | Understand | 10 | 4 | 2 | - | | | | | |
| L3 | Apply | 5 | 4 | 1 | - | | | | | |
| L4 | Analyze | 5 | 4 | 1 | - | | | | | |
| L5 | Evaluate | - | - | - | - | | | | | |
| L6 | Create | - | - | - | - | | | | | |

SEE Assessment Pattern(50 Marks – Theory)

| | RBT Levels | Exam Marks Distribution (50) |
|----|------------|---------------------------------|
| L1 | Remember | 10 |
| L2 | Understand | 20 |
| L3 | Apply | 10 |
| 9L | Analyze | 10 |
| 4 | - | |
| L5 | Evaluate | - |
| L6 | Create | - |

Suggested Learning Resources:

Text Books:

- 1) Research Methodology Methods and techniques, C.R Kothari, Gaurav Garg, New Age, 2020,4th Edition, ISBN:978938669225.
- 2) Professional Programme Intellectual Property Rights, Law and Practice, The Institute of Company Secretaries of India, Statutory Body Under an Act of Parliament, September 2013

Reference Books:

- 1) Research Methodology a step-by-step guide for beginners, Ranjit Kumar, SAGE, 2011, ISBN: 978-1-84920-300-5.
- 2) Essentials of Research Design and Methodology, Geoffrey Marczyk, David DeMatteo, David Festinger, John Wiley & Sons Inc., 2005.

3) Intellectual Property, David I Bainbridge, Pearson, 2010, 8th Edition, ISBN: 978-1-4082-2928-6

Web links and Video Lectures (e-Resources):

- https://www.youtube.com/watch?v=1vf8ZvADxfY
- https://www.youtube.com/watch?v=GSeeyJVD0JU
- https://www.youtube.com/watch?v=GKqOWCK71K4
- http://www.digimat.in/nptel/courses/video/109106128/L44.html

Activity-Based Learning (Suggested Activities in Class)/ Practical Based learning:

- To demonstrate the preparation of research paper writing
- To demonstrate the process of filing a patent
- Seminars

| LIFE SKILLS FOR PROFESSIONALS – 1 | | | | | | | | | | | | | | |
|--|--|---|---------------------------|------------------|-------------------|-------------------|-----------------|----------------|-------------------|----------------------------|-------------------|-----------------|--------|---------|
| Course Code | 22HS | SSC19 | | | | | | CIE I | CIE Marks 50 | | | | | |
| L:T:P:S | 1:0:0 |):0 | | | | | | SEE | Marks | 5 | 50 | | | |
| Hrs / Week | 2 | | | | | | | | l Mar | ks | 100 | | | |
| Credits | 01 | 01 Exam Hours 01 | | | | | | | | | | | | |
| Course outcomes: | | | | | | | | | | | | | | |
| At the end of the | e cours | se, the | studer | nt will | be able | e to: | | | | | | | | |
| 22HSSC19.1 | Recal Comr | Recall the Knowledge of English Grammar and Vocabulary for Effective | | | | | | | | | | | | |
| 22HSSC19.2 | Dem | onstrat | te Prof | ession | al Com | munic | cation (| Compe | tencie | s. | | | | |
| | Deve | lop an | nd Inte | egrate | the U | se of | the F | our La | inguag | ge Skil | ls i.e. | Readi | ng, Wi | riting, |
| 22HSSC19.3 | Speal Chall | Speaking and Listening Identify and Apply Communication Abilities to face Corporate Challenges | | | | | | | | orate | | | | |
| 22HSSC19.4 | Analy | ze the | Impoi | tance | of Pro | fession | al Etiq | uette f | for Cor | porate | Comr | nunica | tion. | |
| Mapping of Co | urse O | utcom | ies to 1 | Progra | am Ou | tcome | es and | Progr | am Sp | ecific | Outco | mes: | | |
| | P01 | PO2 | P03 | P04 | P05 | P06 | P07 | P08 | P09 | P010 | P011 | P012 | PSO1 | PSO2 |
| 22HSSC19.1 | - | - | - | - | - | - | 3 | - | 3 | | 2 | | 2 | - |
| 22HSSC19.2 | - | - | - | - | - | - | 3 | - | 3 | - | 2 | - | 2 | - |
| 22HSSC19.3 | - | - | - | - | - | - | 3 | 3 | 3 | - | 2 | - | 2 | - |
| 22HSSC19.4 | - | - | - | - | - | 3 | 3 | - | 3 | - | 3 | - | 2 | - |
| MODULE-1 | IMP | ORTA | NCE O | F CON | IMUN | ICATI | ON | | 22H 22H 22H | ISSC19 ISSC19 ISSC19 | 9.1 9.2 9.3 | 3 | Hour | 'S |
| Speaking – Sel Achievements. Tenses (Simple Know classmates/ Role play | Communication: Verbal. Non- Verbal; Listening Skillsg - Self Introduction -Talking about Self, Ambition, Hobbies, Likes, Dislikes, Talents and ments.Simple Present & Continuous, Simple Past, Past Continuous & Present Perfect).Understand Different ways of Self-Introduction; Learn about Others and Introduce them; Listen to others and list Common errors | | | | | | | | | | | | | |
| MODULE-2 | PRE | SENTA | ATION | SKIL | LS | | | | 22H 22H 22H | ISSC19 ISSC19 ISSC19 | 9.1 9.2 9.3 | 3 | Hour | 'S |
| Preparation, Practice and Delivery Overcoming Stage Fear Talking about the Routine of Self and Family Members with an Emphasis on "Do & Does".Nonverbal Communication: Body Language: Kinesics, Oculesics, Facial Expression, Para Language. Activity: Product Presentation, Interpreting Charts, Graphs and Tables Reporting on Work Completed and Work in Progress: Verbal Ability: Cloze Exercise, Sentence Completion.Movie/ Book Review and PresentationUnderstand the Part of Public Speaking and Coming out of your Comfort Zone. | | | | | | | | | | | | | | |
| MODULE-3 | GRA | MMAI | R ANI | D VO | CABU | LARY | | | 22H 22H | ISSC19 ISSC19 | 9.1 9.2 | 3 | Hour | 'S |
| Prepositions, An Activity: Produc and work in Pro Verbal Ability: V | ticles, ct Pres gress: /erbal | Subjec entatic Analog | ct Verb on, Inte gy | Agree erpreti | ement, ing cha | Synon arts, Gl | yms & Eraphs | Anton and T | iyms, (Tables | Cohesiv Repor | ve Dev ting or | ices. 1 work | Comp | leted |
| Quiz – synonyms and antonyms | Voca | bulary | Buildi | ng and | l Sente | ence St | ructur | e | | | | | | |

| 4cs of 21st Century Skills with Special Emphasis on Communication Skills & Collaboration. Organizational Communication: Relevance of communication & English in the Present Corporat Scenario. Professional Etiquette: Language and Phrases for Job Interviews/Meeting Skills/Office Conversations Skills. Situational role play MODULE-5 CORPORATE ORIENTATION AND 22HSSC19.2 22HSSC19.2 22HSSC19.4 Email writing; CV writing, Paragraph Writing, Error Detection Reading Comprehension Situational email writing, Paragraph Writing, Error Detection Reading Comprehension Situational email writing, Resume writing Warks Distribution RBT Levels Marks Distribution Assessment (s) 12 Understand 7 6 6 13 Apply 8BT Levels Exam Marks Distribution of 6 14 Analyze 10 7 12 Understand 7 14 Analyze 15 Evaluate - - 12 Understand 10 13 Apply 14 Analyze 10 13 12 Understand 13 Apply 20 </th <th>MOI</th> <th>DULE-4</th> <th>PRO</th> <th colspan="9">PROFESSIONALISM IN COMMUNICATION 22HSSC19.2 22HSSC19.4 3 Hours</th> | MOI | DULE-4 | PRO | PROFESSIONALISM IN COMMUNICATION 22HSSC19.2 22HSSC19.4 3 Hours | | | | | | | | |
|--|--|---|--|---|--------------------------|-----------------|-------------------------|---------------------|-----------------|--|--|--|
| Protessional Etquette: Language and Phrases for Job Interviews/Meeting Skills/Office Conversatio Skills. Situational Understand Situational Vocabulary and Etiquette role play CORPORATE ORIENTATION AND 22HSSC19.2 3 Hours Email writing; CV writing, Paragraph Writing, Error Detection Reading Comprehension 3 Hours Situational Understand Etiquettes of Professional writing 3 Hours email writing, Resume Writing 4 CIE Assessment Pattern(50 Marks - Theory) Test (s) Qualitative RBT Levels Test (s) Qualitative 25 25 1 11 Remember - 12 Understand 7 6 13 Apply 8 7 14 Analyze 10 7 15 Evaluate - 5 16 Create - - 12 Understand 10 1 13 Apply 20 - 14 Analyze 10 - 15 Evaluate - - | 4cs of Organ Scena | 4cs of 21st Century Skills with Special Emphasis on Communication Skills & Collaboration. Organizational Communication: Relevance of communication & English in the Present Corporate Scenario. | | | | | | | | | | |
| Situational Vocabulary and Etiquette MODULE-5 CORPORATE ORIENTATION AND COMMUNICATION 22HSSC19.2 22HSSC19.4 3 Hours Email writing; CV writing, Paragraph Writing, Error Detection Reading Comprehension Output: Situational email writing, Resume writing Understand Etiquettes of Professional writing CIE Assessment Pattern(50 Marks - Theory) KBT Levels Test (s) 25 Qualitative Assessment (s) Assessment (s) 11 Remember - - - 12 Understand 7 6 - - 13 Apply 8 7 - - - - 14 Analyze 10 7 - | Profe Skills | Professional Etiquette: Language and Phrases for Job Interviews/Meeting Skills/Office Conversation Skills. | | | | | | | | | | |
| MODULE-5 CORPORATE ORIENTATION AND COMMUNICATION 22HSSC19.2 22HSSC19.4 3 Hours Email writing; CV writing, Paragraph Writing, Error Detection Reading Comprehension Understand Etiquettes of Professional writing 3 Hours Situational email writing, Resume writing Understand Etiquettes of Professional writing 0 3 Hours CIE Assessment Pattern (50 Marks - Theory) Marks Distribution Test (s) 0 0 RBT Levels Test (s) Qualitative Assessment (s) 25 25 L1 Remember - - L2 Understand 7 6 L3 Apply 8 7 L4 Analyze 10 7 L5 Evaluate - - SEE Assessment Pattern(50 Marks - Viva- voce) Exam Marks Distribution (50) 1 L1 Remember 10 12 L3 Apply 20 1 L4 Analyze 10 1 L5 Evaluate - - L6 Create - - L6 Create - - | Situat role p | Situational Understand Situational Vocabulary and Etiquette | | | | | | | | | | |
| Email writing; CV writing, Paragraph Writing, Error Detection Reading Comprehension Situational email writing, Resume writing Understand Etiquettes of Professional writing CIE Assessment Pattern(50 Marks - Theory) CIE Assessment Pattern(50 Marks - Theory) RBT Levels Marks Distribution Test (s) Qualitative Assessment (s) 11 Remember 2 25 12 Understand 7 6 13 Apply 8 7 14 Analyze 10 7 15 Evaluate 9 5 16 Create 11 Remember 10 11 11 Remember 12 Understand 13 Apply 20 Exam Marks Distribution (50) 11 Remember 10 12 12 Understand 13 Apply 20 1 14 Analyze 10 1 12 | MOI | DULE-5 | ULE-5 CORPORATE ORIENTATION AND 22HSSC19.2 3 Hours | | | | | | | | | |
| Situational email writing, Resume writing Understand Etiquettes of Professional writing CIE Assessment Pattern(50 Marks - Theory) | Email | l writing; CV | / writi | ng, Paragraj | oh Writing, H | Error De | tection Read | ing Comprehension | | | | |
| CIE Assessment Pattern(50 Marks - Theory) Marks Distribution RBT Levels Qualitative RBT Levels Test (s) Qualitative Assessment (s) Z5 Z5 L1 Remember - L2 Understand 7 L3 Apply 8 7 L4 Analyze 10 7 L5 Evaluate - 5 L6 Create - - SEE Assessment Pattern(50 Marks - Viva- voce) RBT Levels Exam Marks Distribution (50) L1 Remember 10 L2 Understand 10 1 Ramember 10 L3 Apply 20 1 4 Analyze 10 1 L4 Analyze 10 1 Create - 1 Suggested Learning Resources: Reference Books: Normer Practice Activities, Penny Ur Combridge University Prace </td <td colspan="9">Situational Understand Etiquettes of Professional writing Resume writing</td> | Situational Understand Etiquettes of Professional writing Resume writing | | | | | | | | | | | |
| Marks Distribution RBT Levels Test (s) Qualitative Assessment (s) 25 25 L1 Remember - L2 Understand 7 L3 Apply 8 7 L4 Analyze 10 7 L5 Evaluate - 5 L6 Create - - SEE Assessment Pattern(50 Marks - Viva-voce) Exam Marks Distribution (50) - L1 Remember 10 - L2 Understand 10 - L2 Understand 10 - L2 Understand 10 - L3 Apply 20 - L4 Analyze 10 - L3 Apply 20 - L4 Analyze 10 - L5 Evaluate - - L6 Create - - Suggested Learning Resources: - - Reference Books: - - < | CIE A | ssessment | t Patte | ern(50 Mai | ·ks – Theor | y) | | | | | | |
| RBT Levels Test (s) Qualitative Assessment (s) 25 25 L1 Remember - L2 Understand 7 6 4 L3 Apply 8 7 6 L3 Apply 8 7 10 7 5 L6 Create - - SEE Assessment Pattern(50 Marks - Viva- voce) RBT Levels Exam Marks Distribution (50) L1 Remember 10 10 L2 Understand 10 10 L3 Apply 20 14 4 Analyze 10 10 L3 Apply 20 14 4 Analyze 10 10 L5 Evaluate - - L6 Create - - Suggested Learning Resources: Reference Books: 1) Grammar Bracting Activities, Penny Ur Cambridge University Programmer | | | | Marks | Distributi | on | | | | | | |
| 2525L1Remember-L2Understand7613Apply8714Analyze1071015Evaluate-516CreateSEE Assessment Pattern(50 Marks - Viva- voce)RBT LevelsExam Marks Distribution (50)L1Remember10L2Understand10L3Apply20L4Analyze10L5Evaluate-L6Create-Suggested Learning Resources:Reference Books:-1)Grammar Parating Activities, Panny Ur Cambridge University Press | 1 | RBT Level | s | Test (s) | Qualita Assessme | tive ent (s) | | | | | | |
| L1 Remember - - L2 Understand 7 6 L3 Apply 8 7 L4 Analyze 10 7 L5 Evaluate - 5 L6 Create - - SEE Assessment Pattern(50 Marks - Viva- voce) RBT Levels Exam Marks Distribution (50) L1 Remember 10 L2 Understand 10 12 L3 Apply 20 14 L4 Analyze 10 13 L2 Understand 10 13 L3 Apply 20 14 L4 Analyze 10 15 L5 Evaluate - - L6 Create - - Suggested Learning Resources: Reference Books: - L0 Grammar Practice Activities, Penny Ur Cambridge University Press | | r | | 25 | 25 | | | | | | | |
| L2 Understand 7 6 L3 Apply 8 7 L4 Analyze 10 7 L5 Evaluate - 5 L6 Create - - SEE Assessment Pattern(50 Marks - Viva- voce) Exam Marks Distribution (50) L1 Remember 10 10 L2 Understand 10 12 L3 Apply 20 14 L4 Analyze 10 15 Evaluate - - L6 Create - Suggested Learning Resources: Reference Books: - L0 Grammar Practice Activities, Penny Ur Combridge University Prace | L1 | Rememb | er | - | - | | | | | | | |
| L3 Apply 8 7 L4 Analyze 10 7 L5 Evaluate - 5 L6 Create - - SEE Assessment Pattern(50 Marks - Viva- voce) Exam Marks Distribution (50) L1 Remember 10 10 L2 Understand 10 12 L3 Apply 20 14 L4 Analyze 10 15 Evaluate - - 10 L5 Evaluate - - L6 Create - - Suggested Learning Resources: Reference Books: 1) - L0 Grammar Practice Activities - Renny Ur Combridge University Prace - | L2 | Understa | Ind | 7 | 6 | | | | | | | |
| L4 Analyze 10 7 L5 Evaluate - 5 L6 Create - - SEE Assessment Pattern(50 Marks - Viva- voce) RBT Levels Exam Marks Distribution (50) L1 Remember 10 L2 Understand 10 12 L3 Apply 20 14 L5 Evaluate - - L6 Create - - Suggested Learning Resources: Reference Books: 1) Grammar Practice Activities, Penny Ur Combridge University Prace | L3 | Apply | | 8 | 7 | | | | | | | |
| L5 Evaluate - 5 L6 Create - - SEE Assessment Pattern(50 Marks - Viva- voce) RBT Levels Exam Marks Distribution (50) L1 Remember 10 L2 Understand 10 L3 Apply 20 L4 Analyze 10 L5 Evaluate - L6 Create - Suggested Learning Resources: Reference Books: 1) Grammar Practice Activities, Ponny Ur Cambridge University Press | L4 | Analyze | | 10 | 7 | | | | | | | |
| Lo Create - - SEE Assessment Pattern(50 Marks - Viva- voce) Exam Marks Distribution (50) L1 Remember 10 L2 Understand 10 L3 Apply 20 L4 Analyze 10 L5 Evaluate - L6 Create - Suggested Learning Resources: Reference Books: 1) Grammar Practice Activities, Penny Ur Cambridge University Prace | L5 | Evaluate | | - | 5 | | | | | | | |
| SEE Assessment Pattern(50 Marks – Viva- voce) RBT Levels Exam Marks Distribution (50) L1 Remember 10 L2 Understand 10 L3 Apply 20 L4 Analyze 10 L5 Evaluate - L6 Create - Suggested Learning Resources: Reference Books: 1) Grammar Practice Activities- Penny Ur Cambridge University Prace | LO | Create | | - | - | | | | | | | |
| RBT Levels Exam Marks Distribution (50) L1 Remember 10 L2 Understand 10 L3 Apply 20 L4 Analyze 10 L5 Evaluate - L6 Create - Suggested Learning Resources: Reference Books: 1) Grammar Practice Activities, Penny Ur Cambridge University Prace | SEE A | Assessmen | t Patt | ern(50 Ma | rks – Viva- | voce) | | | | | | |
| L1 Remember 10 L2 Understand 10 L3 Apply 20 L4 Analyze 10 L5 Evaluate - L6 Create - Suggested Learning Resources: Reference Books: 1) Carammar Practice Activities, Penny Ur Cambridge University Prace | | RBT Leve | ls | Exam Distribu | Marks (50) | | | | | | | |
| L2 Understand 10 L3 Apply 20 L4 Analyze 10 L5 Evaluate - L6 Create - Suggested Learning Resources: Reference Books: 1) Crammar Practice Activities, Penny Ur Cambridge University Prace | L1 | Remem | ber | | 10 | | | | | | | |
| L3 Apply 20 L4 Analyze 10 L5 Evaluate - L6 Create - Suggested Learning Resources: Reference Books: 1) Grammar Practice Activities, Penny Ur Cambridge University Prace | L2 | Underst | tand | | 10 | | | | | | | |
| L4 Analyze 10 L5 Evaluate - L6 Create - Suggested Learning Resources: Reference Books: 1) Grammar Practice Activities, Penny Ur Cambridge University Pract | L3 | Apply | | | 20 | | | | | | | |
| L5 Evaluate - L6 Create - Suggested Learning Resources: Reference Books: 1) Grammar Practice Activities, Penny Ur Cambridge University Prace | L4 | Analyze | • | | 10 | | | | | | | |
| L6 Create Suggested Learning Resources: Reference Books: 1) Grammar Practice Activities, Penny Ur Cambridge University Press | L5 | Evaluat | e | | - | | | | | | | |
| Suggested Learning Resources: Reference Books: | L6 | Create | | | - | | | | | | | |
| Reference Books: | Sugg | ested Lear | ning F | Resources: | | | | | | | | |
| 1) Grammar Practice Activities, Penny Ur Cambridge University Press | Refer | rence Bool | ks: | | | | | | | | | |
| ij Graniniai Fractice Activities- reliny O, Calibridge Oniversity Press. | 1) | Grammar | Practi | ce Activitie | s- Penny Ur, | Cambri | dge Universi | ity Press. | | | | |
| 2) Basic Business Communication: Skills for Empowering the Internet Generation-Flately and Lesikar, Tata Mc Graw Hill, 10th Edition, 2005. | 2) | Basic Business Communication: Skills for Empowering the Internet Generation-Flately and Lesikar, Tata Mc Graw Hill, 10th Edition, 2005. | | | | | | | | | | |
| 3) Wren, P.C.; Martin, H; Prasad Rao, N.D. V (1973-2010) High School English Grammar & Composition, New Delhi; S. Chand, ISBN 81-219-2197-X. | 3) | Wren, P.O Composit | C.; Ma ion. Ne | rtin, H; Pı ew Delhi: S. | asad Rao, Chand. ISBN | N.D. V 81-21 | (1973-2010 9-2197-X. |)) High School Eng | glish Grammar & | | | |
| 4) The Skills of Communicating-Bill Scott-Jaico | 4) | The Skills | of Cor | nmunicatin | g-Bill Scott- | Jaico | | | | | | |
| Activity-Based Learning (Suggested Activities in Class)/ Practical Based learning | Activ | ity-Based | Learn | ing (Sugge | sted Activit | ties in (| lass)/ Prac | tical Based learnin | g | | | |
| Presentation | | Prese | ntatio | n | | | | | - | | | |
| Movie/ book review | | • Movie | e/ boo | k review | | | | | | | | |
| Resume writing | | • Resul | me wr | iting | | | | | | | | |
| Email writing | | • Emai | l writi | ng | | | | | | | | |

| PROGRAMMING LOGIC AND DESIGN | | | | | | | | | | | | | | |
|---|----------------|--|----------------------|--------------------|----------|----------|---------|----------|----------|--------------|---------|-----------|--------|---------|
| Course Code | 22M | CA110 | * | | | | | CIE | Marks | 5 | 50 | | | |
| L:T:P:S | 0:0:0 |):0 | | | | | | SEE | Mark | S | 50 | | | |
| Hrs / Week | 3 | 3 | | | | | | | | 'ks | 100 |) | | |
| Credits | 00 | | | | | | | Exa | m Hou | ırs | 03 | | | |
| Course outcomes: | | | | | | | | | | | | | | |
| At the end of the course, the student will be able to: | | | | | | | | | | | | | | |
| 22MCA110.1 | Unde | Understand the fundamentals of digital computer with its basic operations. | | | | | | | | | | | | |
| 22MCA110.2 | Explo | Explore the types of algorithmic problem solving techniques with their implications. | | | | | | | | | | | | |
| 22MCA110.3 | Reco | gnize t | he imp | ortanc | e of ke | y prog | rammi | ng con | cepts a | and con | trol st | ructure | es. | |
| 22MCA110.4 | Apply appli | y the cation: | funda: s. | mental | logic | of a | rrays a | and fu | inction | is for | a var | iety of | f soft | ware |
| 22MCA110.5 | Use opera | comple ations | ex data in file h | a types nandlin | s to m | odel t | the rea | l-worl | d prol | blems | and e | xamine | the | basic |
| Mapping of Cou | rse Ou | itcome | es to P | rogran | n Outc | omes | and Pr | ogran | 1 Spec | ific Ou | tcome | s: | | |
| hupping of cou | P01 | PO2 | P03 | PO4 | P05 | P06 | PO7 | P08 | P09 | P010 | P011 | P012 | PSO1 | PSO2 |
| 22MCA110.1 | 2 | 2 | 2 | - | 1 | - | 1 | - | - | - | - | - | 1 | - |
| 22MCA110.1 | 2 | 2 | 2 | - | 1 | - | 1 | - | - | - | - | - | 1 | - |
| 22MCA110.3 | 2 | 2 | 2 | - | 1 | - | 1 | - | - | - | - | - | 1 | - |
| 22MCA110.4 | 2 | 2 | 2 | - | 1 | - | 1 | - | - | - | - | - | 1 | - |
| 22MCA110.5 | 2 | 2 | 2 | - | 1 | - | 1 | - | - | - | - | - | 1 | - |
| MODULE-1 | NUM | NUMBER SYSTEM22MCA110.16 Hours | | | | | | | | | | | | |
| Number Systems, Digital Computers and Digital Systems, Binary, Octal and Hexadecimal Numbers, | | | | | | | | | | | | | | |
| Number Base C | onvers | ion, sı | ıbtract | ion usi | ing r's | and r | -1 com | pleme | nts, Bi | inary (| Code, E | Binary | storag | ge and |
| Registers | | | | | | | | | | | | | | |
| Text Book | Text | Book 2 | l: 1 Tex | t Book | 3:1 | | | | | | | | | |
| MODULE-2 | INTF PRO | RODU(BLEM- | CTION -SOLV | T ING | 0 | COMF | PUTER | 22 | MCA1 | 1 0.2 | | 6 H | ours | |
| Introduction, P | roblem | n-Solvi | ng As | pect, [| Гор-Do | own D |)esign, | Imple | ementa | ation o | of Alg | orithm | s, Pr | ogram |
| Verification, Effi | ciency | of Algo | orithms | s, Analy | sis of A | lgorithi | ns, Pse | udo co | de, Str | ucture | d Engli | ish and | Flow | chart. |
| Self-study / | Case | study | on solv | ing pro | oblems | using | differe | nt app | roache | es. | | | | |
| Lase Study / | | | | | | | | | | | | | | |
| Applications Text Peole | Toyt | Pool 1 | .1 2 T | ovt Do | Jr 7, 1 | | | | | | | | | |
| Text DOOK | FSSE | | | | | | TPOL | | | | | | | |
| MODULE-3 | STR | UCTUF | RES | JUNAN | | | IIKUL | 22 | MCA1 | 10.3 | | 6 H | ours | |
| Types and Inpu | it/outr | out On | erators | s. Oper | rators | and E | xpress | ions. (| Control | State | ments | Decisi | ion m | aking. |
| Iteration and Iur | nping s | statem | ents. | , oper | atorb | unu D | npress | 10110) (| | blate | | Decis | | , , |
| Text Book | Text | Book 1 | : 3, 4, 5 | 5, 6, 7 | | | | | | | | | | |
| MODULE-4 | ARR | AYS A | ND FU | NCTIC | ONS | | | 22 | MCA1 | 10.4 | | 6 H | ours | |
| Array technique | s: One | -dimer | nsional | and to | wo-din | nensio | nal arr | ays, D | eclarat | ion an | d initi | alizatio | n of a | irrays, |
| Strings: string h | nandlin | g func | tions. | Functio | ons- El | lement | s of us | ser-def | fined f | unctior | ns, cat | egory o | of fun | ctions, |
| Recursion, Call-b | oy-valu | e and o | call-by | referei | nce. | | | | | | | | | |
| Self-study / | Self-s | study o | n the u | isage o | f array | s in rea | al time | applic | ations | | | | | |
| Case Study / | | | | | | | | | | | | | | |
| Applications | | | 0.0.4 | 1.0 | | | | | | | | | | |
| Text Book | Text | Book 1 | : 8, 9, 1 | 10 | DEC | | | 1 | | | 1 | | | |
| MODULE-5 | PROI | PLEX BLEMS | DAT. | A TY | PES | TU | SOLVE | 22 | 2MCA1 | 10.5 | | 6 H | ours | |
| Structures, Unio | n and l | Jser-de | efined | data ty | pes: er | num, ty | vpedef. | Pointe | ers: Deo | claring | and ut | tilizatio | n of p | ointer |
| variables, acces | sing a | variat | ole thr | ough i | ts poir | nter, p | ointer | arithn | netic. | Introd | uction | to FII | LE ha | ndling |
| techniques. | r | | | | | | | | | | | | | |
| Text Book | Text | Book 1 | : 11, 1 | 2,13 | | | | | | | | | | |

| CIE A | CIE Assessment Pattern(50 Marks – Theory) | | | | | | | | |
|------------|---|--------------------|-------------------------------|-------|--|--|--|--|--|
| RBT Levels | | Marks Distribution | | | | | | | |
| | | Test (s) | Qualitative Assessment (s) | MCQ's | | | | | |
| | | 25 | 15 | 10 | | | | | |
| L1 | Remember | 10 | 5 | 5 | | | | | |
| L2 | Understand | 10 | 5 | 5 | | | | | |
| L3 | Apply | 5 | 5 | - | | | | | |
| L4 | Analyze | - | - | - | | | | | |
| L5 | Evaluate | - | - | - | | | | | |
| L6 | Create | - | - | - | | | | | |

SEE Assessment Pattern(50 Marks - Theory)

| | RRT Levels | Exam Marks |
|----|------------|-------------------|
| | IDT ECCIS | Distribution (50) |
| L1 | Remember | 20 |
| L2 | Understand | 20 |
| L3 | Apply | 10 |
| L4 | Analyze | - |
| L5 | Evaluate | - |
| L6 | Create | - |

Suggested Learning Resources:

Text Book:

- 1) E. Balaguruswamy, "Programming in ANSI C", McGrawHill Publishers, 8th Edition, 2019.
- 2) Joyce Farrell, Programming Logic & Design, CENGAGE learning, 9th Edition, 2018.
- 3) Programming Logic And Design, "Tony Gaddis", Pearson, 2016, ISBN: 978-0-13-3985078

Reference Books:

- 1) V Rajaraman: Computer Programming in C, PHI, 2019, ISBN: 9789388028332.
- 2) Peter Norton, "Introduction to Computers", 7th Edition, McGraw Hill Education, 2017, ISBN- 10: 9789387067028.

Web links and Video Lectures (e-Resources):

- https://www.coursera.org/specializations/c-programming
- https://onlinecourses.nptel.ac.in/noc22_cs40/preview
- https://www.tutorialspoint.com/cprogramming/index.htm

Activity-Based Learning (Suggested Activities in Class)/ Practical Based learning

- Organizing Group wise discussions on various topics
- Seminars
SECOND SEMESTER MCA SYLLABUS (2023-24)

| | DATA STRUCTURES USING C++ ourse Code 22MCA21 CIE Marks 50 | | | | | | | | | | | | | |
|------------------------------------|---|-----------------|---------------------|-------------------|------------------|----------|---------|------------|--------------|-----------|----------|---------|-------------|---------|
| Course Code | 22MC A | \21 | | | | | | | CIE I | Marks | 5 | 0 | | |
| L:T:P:S | 3:0:0:0 |) | | | | | | | SEE | Marks | 5 | 0 | | |
| Hrs / Week | 3 | | | | | | | | Tota | l Mark | s 1 | 00 | | |
| Credits | 03 | | | | | | | | Exar | n Hour | 's 0 | 3 | | |
| Course outco | mes: | | | | | | | | | | | | | |
| At the end of the | he course | e, the | studer | nt will ł | oe able | to: | | | | | | | | |
| 22MCA21.1 | Unders | stand | the fur | ıdameı | ıtal pri | nciples | of Obj | ect-Ori | ented | progra | mming | 5. | | |
| 22MCA21.2 | Apply t | the op | peratio | nal asp | ects of | stacks | to solv | ve recui | rsive a | pplicati | ions. | | | |
| 22MCA21.3 | Analys applica | e var ations | ious t _. | ypes o | of quei | ues an | d link | ed lists | s with | their | opera | tions 1 | for diff | ferent |
| 22MCA21.4 | Analys approa | e var ich fo | rious t ragive | ypes o en scen | of sort ario. | ing an | d sear | rching | techni | ques a | ind id | entify | the op | otimal |
| 22MCA21.5 | Constru structu | uct d ires. | lifferen | t type | es of t | trees f | or vis | ualizin | g the | operat | ions o | of non | -linear | data |
| Mapping of Co | ourse Ou | utcon | nes to l | Progra | ım Out | comes | and P | rogran | n Spec | ific Ou | tcome | es: | | |
| | P01 F | PO2 | P03 | P04 | P05 | P06 | P07 | P08 | P09 | P010 | P011 | P012 | PSO1 | PSO2 |
| 22MCA21.1 | - | - | - | - | - | 1 | 1 | - | - | - | 2 | 1 | 3 | - |
| 22MCA21.2 | 2 | - | - | - | 1 | - | 1 | 1 | - | - | 2 | 1 | 3 | - |
| 22MCA21.3 | 2 | 3 | - | - | 1 | 1 | 1 | 1 | - | - | 3 | 1 | 3 | - |
| 22MCA21.4 | 2 | 3 | - | 1 | 2 | 1 | 1 | 1 | 1 | 1 | 3 | 1 | 3 | - |
| 22MCA21.5 | 2 | 3 | - | 1 | 2 | 1 | 1 | 1 | 1 | 1 | 3 | 1 | 3 | - |
| MODULE-1 | C++ PROGRAMMING CONCEPTS 22MCA21.1 8 Hours Object Oriented Paradigm Structured vs Object Oriented Paradigm Elements of Object 0 | | | | | | | | | | | | | |
| Overview of C | ., Ubject | Uriei | ntea Pa | aradigi Classo | n, Stru | lctured | VS. UI | oject U | rienteo | i Parac | ligm. I | Elemen | ts of C | bject |
| C_{++} Overview | Differe | nt Da | ijeci, ita Tvr | Liasse | s, En | s Fyni | ression | s Arra | vs and | d Strine | re Cla | sses a | nd Obi | ects - |
| Access Membe | rs. Const | tructo | ors. Des | structo | rs. | 5, шлрі | COSION | ., mia | iyo une | a oti ing | 55. 014 | 5505 u | | |
| Modular Prog | ramming | g wit | h Fun | ctions | - Fun | ction (| Compo | nents, | Argun | nent Pa | assing, | Inline | e Func | tions, |
| Function Over | loading, l | Funct | tion Te | mplate | s. | | 1 | | 0 | | U, | | | |
| Text Book | Text Bo | ook 1 | : 11 to | 18 | | | | | | | | | | |
| MODULE-2 | STACK | AND | RECU | RSION | | | | | 2 | 22MCA | 21.2 | | 8 Hou | ırs |
| Types of Data | Structu | res a | nd Apj | olicatio | ons. Sta | ack - A | bstrac | t Data | Туре, | Repres | entatio | on of S | Stacks | Using |
| Sequential Org | ganizatio | n (Ar | rays), | Stack (|)perati | ons, Aj | oplicat | ions - E | Expres | sion Ev | aluatio | on and | Conve | rsion, |
| Processing of I | Function | Calls | , Rever | sing a | String, | Checki | ng Cor | rectnes | s of W | ell-forr | ned Pa | renthe | eses. | |
| Use of stack in | Recursio | on, Ex | cecutio | n of Re | cursive | e Calls, | Sampl | e Progr | ams. | 1 | | | | |
| Self-study / | Case st | uales | for de | monsti | rating t | ne use | of stac | KS IN K | ecursiv | ve Appi | icatior | 1S. | | |
| Applications | | | | | | | | | | | | | | |
| Text Book | Text Bo | nok 2 | 23 | | | | | | | | | | | |
| MODULE-3 | OUEU | ES AN | ID LIS | TS | | | | | 2 | 22MCA | 21.3 | | 8 Hor | irs |
| Concept of Ou | | | as Abe | stract | Data T | vne Li | near (| Лиене | Circul | ar Oue | ue Do | uble F | nded (|)110110 |
| (Deque). Appli | cations of | of Oue | eues. | Julace 1 | Data 1 | урс, п | incur (| zucuc, | Gircun | ii Que | uc, D0 | | mucu (| zucuc |
| Comparing Lir | nked List | t ove | r Array | ys, Typ | es-Sing | gly Lin | ked Li | st - Ins | serting | and R | emovi | ng Noo | les in a | a List, |
| Circular Linke | d Lists, D | oubly | y Linke | d List, | Applic | ation o | f Linke | d List- | Polync | omial M | lanipul | lations | | |
| Self-study / | Case st | udies | for de | monsti | rating t | he use | of que | ues and | l linke | d lists i | n real t | time ap | plicati | ons. |
| Case Study / | | | | | | | | | | | | | | |
| Applications | | | | | | | | | | | | | | |
| Text Book | Text Bo | ook 2 | : 4.1, 4. | 2, 4.5, | 4.6 | | | | - | | | | | |
| MODULE-4 | SORTI | NG A | ND SEA | ARCHI | NG | | | | 2 | 22MCA | 21.4 | | 8 Hou | ırs |
| Introduction to Sort. Searching | Introduction to Sorting and Searching Techniques, Selection Sort, Merge Sort, Heap Sort, Shell Sort, Radix Sort. Searching Techniques- Linear and Binary Search, Indexed Sequential Search. | | | | | | | | | | | | | |
| Text Book | Text Bo | ook 2 | : 6, 7 | | | | | | | | | | | |

| MOI | DULE-5 | TREES | 5 | | | | | 22MCA21.5 | 8 Hours | | | |
|---|--|-----------------------|---------------------------|----------------------------|----------------|--------------|--------|-------------------------|-------------------|--|--|--|
| Tree traversals, Binary Search Tree and Operations, AVL Tree and Operations, 2-3 Trees, Red-Black Tree, | | | | | | | | | | | | |
| Threa | aded Bina | ry Trees | 5. | | | | | | | | | |
| Text | Book | Text B | ook 2: 5 | | | | | | | | | |
| CIE A | ssessme | nt Patte | rn(50 Mar | ks – Theory | 7) | | | | | | | |
| | | | N | larks Distri | bution | | | | | | | |
| | RBT Lev | els | Test (s) | Qualitat Assessme | tive nt (s) | MCQ's | | | | | | |
| | | | 25 | 15 | | 10 | | | | | | |
| L1 | Reme | mber | 5 | 3 | | 3 | | | | | | |
| L2 | Under | stand | 10 | 4 | | 3 | | | | | | |
| L3 | Apply | | 5 | 4 | | 2 | | | | | | |
| L4 | Analy | ze | 5 | 4 | | 2 | | | | | | |
| L5 | Evalua | ate | - | - | | - | | | | | | |
| L6 | Create | e | - | - | | - | | | | | | |
| SEE Assessment Pattern(50 Marks – Theory) RBT Levels Exam Marks Distribution (50) | | | | | | | | | | | | |
| L1 | Reme | mber | 1 |) | | | | | | | | |
| L2 | Under | stand | 2 |) | | | | | | | | |
| L3 | Apply | | 1 |) | | | | | | | | |
| L4 | Analy | ze | 1 |) | | | | | | | | |
| L5 | Evalua | ate | - | | | | | | | | | |
| L6 | Create |) | - | | | | | | | | | |
| Sugg | ested Lea | arning F | Resources: | | | | | | | | | |
| Text | Books: | | | | | | | | | | | |
| 1) | C++, The 0070532 | Comple 465. | ete referenc | e, 4 th Edition | ı, Herbe | ert Schildt, | Мс | Graw Hill Education, 2 | 017, ISBN: 978- | | | |
| 2) | Data Stru | ictures I | Using C and | C++, by Yec | lidyahL | angsam, | Mosł | ne J. Augenstein, Aaron | M. Tenenbaum, | | | |
| | Pearson | Educatio | on India; | 2nd Edition, | 2015, I | SBN: 978 | -9332 | 2549319. | | | | |
| | | | | | | | | | | | | |
| Refe | Reference Books: | | | | | | | | | | | |
| 1) | Data stru 2014, ISI | ictures a 3N: 978- | nd Algorith 0-13-2847: | im Analysis : 377. | ın C++, | Mark Allei | n Wei | ss, Pearson Education. | Ltd., 4thEdition, | | | |
| 2) | Data stru | uctures | and Algori | thms in C++ | , Micha | ael T.Good | lrich, | R.Tamassia and David | l M.Mount, John | | | |
| | Wiley and Sons, 2ndEdition, 2011, ISBN-13 978-0-470-38327-8. | | | | | | | | | | | |
| Web | links and | l Video | Lectures (| e-Resources | 5) | | | | | | | |

- https://www.youtube.com/watch?v=ZzaPdXTrSb8
- https://www.youtube.com/watch?v=RBSGKlAvoiM •
- https://www.youtube.com/watch?v=B31LgI4Y4DQ •
- https://www.youtube.com/watch?v=jHZ6q_FCmbU •
- https://www.youtube.com/playlist?list=PL2_aWCzGMAwI3W_JlcBbtYTwiQSsOTa6P

Activity-Based Learning (Suggested Activities in Class)/ Practical Based learning

- Demonstration of sorting algorithms ٠
- Demonstration of recursive algorithms •
- Demonstration of queues and list operations •
- Contents related activities (Activity-based discussions) •
- Seminars

| | AD | VANO | CED JA | AVA A | AND E | NTE | RPRIS | SE AR | CHIT | ECTU | JRE | | | |
|--|--|---|------------------------------------|--|---------------------------------------|--------------------------|--|---|-----------------------------|---|--|---------------------------------------|--|------------------|
| Course Code | 22M | CA22 | | | | | | | CIE | Mark | s | 50 | | |
| L:T:P:S | 3:0:0 | :0 | | | | | | | SEF | E Mark | S | 50 | | |
| Hrs / Week | 3 | | | | | | | | Tot | al Maı | rks | 100 | | |
| Credits | 03 | | | | | | | | Exa | ım Hoı | urs | 03 | | |
| Course outcomes | i: | | | | | | | | | | | | | |
| At the end of the c | ourse, | the stı | ıdent v | will be | able to | : | | | | | | | | |
| 22MCA22.1 | Und | erstan | d the f | undam | iental e | lemen | ts in es | tablish | ing a d | latabas | se con | nectior | ۱. | |
| 22MCA22.2 | Crea | ate dyn | amic v | veb pa | ges usi | ng Ser | vlet, Jav | va Serv | ver Pag | ges and | stand | lard tag | g librar | ies. |
| 22MCA22.3 | Des | ign and | d devel | lop ser | ver sid | e appli | ication | s using | g Angu | lar fori | ms. | | - | |
| 22MCA22.4 | Dev | elop a | dvnam | nic weł | o applio | cation | using H | liberna | ate. | | | | | |
| 22MCA22.5 | Ana | lvze ar | nd eval | uate li | ve buil | t-in ap | plicatio | ons. | | | | | | |
| Mapping of Cours | se Out | comes | to Pr | ogram | Outco | mes a | nd Pro | ogram | Speci | fic Out | tcome | s: | | |
| | P01 | P02 | P03 | P04 | P05 | P06 | P07 | P08 | P09 | P010 | P011 | P012 | PS01 | PSO2 |
| 22MCA22.1 | 3 | 1 | 3 | - | - | - | - | - | - | - | - | - | 3 | - |
| 22MCA22.2 | 3 | 1 | 3 | - | - | - | - | - | - | - | - | 1 | 3 | - |
| 22MCA22.3 | 3 | 1 | 3 | - | 2 | - | - | 2 | - | 2 | - | 1 | 3 | - |
| 22MCA22.4 | 3 | 1 | 3 | - | 2 | - | - | 2 | 1 | 2 | - | 1 | 3 | - |
| 22MCA22.5 | 3 | 2 | 3 | - | 2 | - | - | 2 | 1 | 2 | - | 1 | 3 | - |
| MODULE-1 | JDB | C | | | | | | | | 22MC A | 22.1 | | 8 Hou | ırs |
| The Concept of JDBC, JDBC Driver Types, JDBC Packages, A Brief Overview of JDBC Process, Database Connection, Associating the JDBC/ODBC Bridge with the Database, Statement Objects, ResultSet, Transaction Processing, Metadata, Data Types, Exceptions. JDBC and Embedded SQL: Model Programs, Tables, Indexing, Inserting Data into Tables, Selecting Data from a Table, Metadata, Updating Tables, Deleting Data from a Table, Joining Tables, Calculating Data, Grouping and Ordering Data, Subqueries, | | | | | | | | | | | | | | |
| VIEW. | Tout | Deals | . 2 4 | ۲ 7 ۳. | | - 5. 2 | 4 5 6 | 7 | | | | | | |
| | rext | | .: 3, 4, 1 | 5, 7 Te | XL D001 | \$ 5: 5, 4 | 4, 3, 0, | / | · · | | 22.2 | | 0 11 | |
| MODULE-2 | SERV | LEIS | 0 1 | 1 | | | | | | ZMCA | | | 8 HOI | |
| Handling HTTP (Session Tracking. Java Server Pages JSP, Implicit Obje Variables), Page D | ET Re (JSP): ects, JS | rviets, equest, Introc P Scri es. | Servie Hand luctior pting | et Arch lling H n, Adva Eleme | ntectur TTP P ntages nts- (I | of JSF | b Cont lequest P, JSP A ves, De | ainer, c, Serv archite eclarat | let Co cture, ives, S | Serviet: nfig, S JSP life Scriplet | s Life ervlet e Cycle ts, Exj | Cycle, Conte e, Deve pressio | serviet xt, Coc loping ns, Im | First plicit |
| Text Book | Text | Book 1 | : 1, 2, 3 | 3, 4, 6, | 7, 8,9 | | | | | | | | | |
| MODULE-3 | JAVA LIBR | A SERV | VER PA | AGES, S A BEA | STANI NS | DARD | TAG | | : | 22MCA | 22.3 | | 8 Hou | ırs |
| Why you should Tags, Tag Library simple JSP 2.0 cus A Bean Example, J | Indicate a JAVA BEARS and use the JSTL, JSTL Expression Language, Core Tags, custom tag Libraries: why custom ry basics, how are tags being used, new and old custom tags, Tag library Descriptors (TLDs), custom tags. Java Beans: What is a Java Bean? Advantages of Java Beans, The Java Beans API. e, JSP with Java Beans. | | | | | | | | | | | | | |
| Text Book Text Book 1: 1, 10, 11, 13 | | | | | | | | | | | | | | |
| MODULE-4 | ES6, ANG | TYP Ular (| PE S COMP | CRIPT ONENT | , AN FS | GULA | R-CLI | AND | | 22MCA | 22.4 | | 8 Hoi | ırs |
| ES6, Type Script, Angular Modules Types of directive | Angula - Root s, Built | r-CLI a Modul -in dir | & proj le vs. F ectives | ect stri Feature s, Writi | ucture, e Modu ing you | Angul le, Mo r own | ar Con dule de directi | nponer efinitio ves. | nts. An on, Mo | gular I dule co | Modul onfigu | les and ration. | directi Directi | ives - ives - |
| Self-study / Case Study / Applications | Installation of Angular frame work | | | | | | | | | | | | | |
| Text Book | Text | Book 3 | 8:1,2,3 | 3, 4, 5 | | | | | | | | | | |

| MO | DULE-5 | ANG | ULAR FOR | MS | | | | 22 | MCA22.5 | 8 Hours | | | | |
|---------|---|---|--------------|----------------|------------|-------------|--------|----------|-----------------|-----------------|--|--|--|--|
| Templ | nplate-driven forms, Reactive forms, Form Builder, Form validation, Custom validators, Async idators. Hibernate-ORM Fundamentals: Hibernate Fundamentals, Advantages and Disadvantages, pping Hibernate configuration files. Configure bibernate in a start up preject. Select. Delate Update | | | | | | | | | | | | | |
| validat | tors. Hiberi | nate-(| ORM Funda | mentals: | Hibernate | Fundame | entals | , Adva | ntages and | Disadvantages, | | | | |
| Маррі | ng Hibernat | te coi | nfiguration | files, Confi | igure hibe | rnate in a | star | t-up pr | oject, Select, | Delete, Update | | | | |
| querie | s, Object Sta | ites, S | ession Facto | ory. Hiber | rnate Quer | y Support: | Quei | ry Supp | ort through H | IQL, Native SQL | | | | |
| and Cr | iteria API, T | 'ransa | iction Mana | gement. | | | | | | | | | | |
| Self-St | udy / | ٠ | Installatio | n of Hiberr | nate frame | work | | | | | | | | |
| Case S | tudy / | • | Develop ai | n interactiv | ve GUI app | lication to | demo | onstrate | e the angular f | forms | | | | |
| Applic | cations | | | | | | | | _ | | | | | |
| Тех | Text Book Text Book 4: 2, 3, 5 | | | | | | | | | | | | | |
| CIE As | E Assessment Pattern(50 Marks – Theory) | | | | | | | | | | | | | |
| | Marks Distribution | | | | | | | | | | | | | |
| 1 | RBT Levels Test (s) Qualitative MCO's | | | | | | | | | | | | | |
| 1 | RBT Levels Test (s) Quantative Assessment (s) MCQ's | | | | | | | | | | | | | |
| | 25 15 10 | | | | | | | | | | | | | |
| L1 | Remembe | $\begin{array}{c ccccccccccccccccccccccccccccccccccc$ | | | | | | | | | | | | |
| L2 | Understa | nd | 5 | L | 1 | 2 | | | | | | | | |
| L3 | Apply | | 10 | L | 1 | 3 | | | | | | | | |
| L4 | Analyze | | 5 | 4 | 1 | 3 | | | | | | | | |
| L5 | Evaluate | | - | - | - | - | | | | | | | | |
| L6 | Create | | - | - | - | - | | | | | | | | |
| SEE As | ssessment l | Patte | rn(50 Mark | s – Theor | y) | | | | | | | | | |
| | | | Exam N | / larks | | | | | | | | | | |
| 1 | RBI Levels | | Distribut | ion (50) | | | | | | | | | | |
| L1 | Remember 10 | | | | | | | | | | | | | |
| L2 | Understa | nd | 10 |) | | | | | | | | | | |
| L3 | Apply | | 20 |) | | | | | | | | | | |
| L4 | Analyze | | 1(|) | | | | | | | | | | |
| L5 | Evaluate | | | | | | | | | | | | | |
| L6 | Create | | - | | | | | | | | | | | |

Suggested Learning Resources:

Text Book:

- 1) Core Servlets and Java Server Pages. Volume 1: Core Technologies, Marty Hall, Larry Brown, Prentice Hall, 2nd Edition, 2013.
- 2) Java 6 Programming Black Book, Dreamtech Press, 2012.
- 3) Pro Angular 9, Build Powerful and Dynamic Web Apps, Adam Freeman, 4th Edition 2020.
- 4) Hibernate in action, Bauer, Christian, and GavinKing. Vol.1, Manning, 2018. ISBN: 9781932394153
- 5) Expert Oracle JDBC Programming by R. M. Menon

Reference Books:

- 1) Developing Enterprise Java Components. Enterprise JavaBeans 3.1.0'reilly. Andrew Lee Rubinger, Bill Burke, O'Reilly Media, 2010.
- 2) EJB 3 Developer Guide, A practical guide for developers and architects to the Enterprise Java Beans Standard, Michael Sikora, Shroff Publishers & Distributors PVT LTD. July 2008.

Web links and Video Lectures (e-Resources)

- https://www.geeksforgeeks.org/introduction-java-servlets/
- https://www.javatpoint.com/java-jdbc
- https://www.tutorialspoint.com/jsp
- https://www.geeksforgeeks.org/introduction-to-hibernate-framework/

Activity-Based Learning (Suggested Activities in Class)/ Practical Based learning

- Video demonstration of latest technologies in Java.
- For active participation of students, instruct the students to write and execute Java related program.
- Expert talk & Seminars

| DESIGN AND ANALYSIS OF ALGORITHMS | | | | | | | | | | | | | | |
|---|---|-------------------|--|-------------------|------------------|--------------------|------------------|----------------|-----------------|----------|-------------|------------|----------|---------|
| Course Code | 22M0 | CA23 | | | | | | | CIE N | larks | 50 |) | | |
| L:T:P:S | 2:1:0 | :0 | | | | | | | SEE N | Marks | 50 |) | | |
| Hrs / Week | 4 | | | | | | | | Tota | l Mark | s 1(|)0 | | |
| Credits | 03 | | | | | | | | Exan | 1 Hour | s 03 | 3 | | |
| Course outcom | 165. | | | | | | | | | | | | | |
| At the end of th | e cours | e, the s | studen | t will b | e able t | to: | | | | | | | | |
| 22MCA23.1 | Sum | marize gorizin | e the pairs the pairs of the pa | aradigi lems b | ms and ased o | l appro n the r | oaches opulai | used t doma | to desi ins. | gn and | l analy | ze alg | orithm | s by |
| 22MCA23.2 | Disci | uss Bru | ute For | ce, Div | ride & c | conque | r algoi | rithms | and m | easure | their p | perform | nance. | |
| 22MCA23.3 | Class | sify the | e diffe echniau | rent D 1e. | ecreas | e and | conqu | er algo | orithm | s and | discus | s space | e and | time |
| 22MCA23.4 | Char tech | acteriz | ze the | featur | es of v | various | grapł | nical p | roblen | ns with | the h | elp of | a suit | able |
| 22MCA23.5 | Evalu | uate th | e limit | ations | of algo | orithm | by cat | egorizi | ing the | proble | ems su | ch as I | P, NP o | r NP |
| Mapping of Course Outcomes to Program Outcomes and Program Specific Outcomes: | | | | | | | | | | | | | | |
| mapping of C0 | | | | | | DOL | | DOO | | | DO11 | 3. D017 | DCO1 | סכטי |
| 22MCA22.1 | FUI | 2 | 2 | FU4 | FU3 | FUO | FU/ | FUO | FU9 | FUIU | FUII | FUIZ | 2 | F302 |
| 22MCA23.1 | 2 | 2 | 2 | - | - | - | - 2 | - | - | - | - 2 | - | 2 | - |
| 22MCA23.2 | 2 | 2 | 2 | 2 | - | - | 2 | - | - | - | 2 | - | 2 | - |
| 22MCA23.3 | 2 | 2 | 2 | 2 | - | - | 2 | - | - | - | 2 | - | 2 | - |
| 22MCA23.4 | 2 | 3 | 3 | 2 | - | - | | - | - | - | 2 | - | 3 | - |
| ZZMCAZ3.5 | | 3 | 3 | | - | - | - | - | - | | <u> </u> | - | 3 | |
| MODULE-1 INTRODUCTION AND ANALYSIS 22MCA23.1 8 Hours | | | | | | | | | | | | | | |
| Notion of Algor | ithm, F | undam | iental c | of Algoi | rithmic | Proble | em Solv | ving, In | nporta | nt Prot | olem Ty | ypes, B | asics o | f data |
| structures. Fun | idamen | tals of | t the A | nalysi | s or | Algori | thm E | fficienc | cy: Ai | naiysis | Frame | ework, | Asym | ptotic |
| Notations and | Basic e | fficien | cy clas | ses, Ma | athema | itical a | nalysis | s of Re | cursive | e and N | lon-ree | cursive | algor | thms, |
| Examples. | | | 4.0 | | | | | | | | | | | |
| Text Book | Text | BOOK 1 | : 1, Z | D DIII | | | | | | | | | 0.11 | |
| MODULE-2 | RKUI | TE FOR | CE AN | D DIV | IDE AN | ID CON | QUER | | 2 | 2MCA | <u>23.2</u> | | 8 Hou | irs |
| Selection Sort, I | Bubble | sort, Si | tring M | latchin | g, Exha | ustive | Search | n. Divid | le and | Conque | er: Mer | ge sor | t, Quicl | k sort, |
| Binary Search, I | Binary | tree tra | aversal | s and r | elated | proper | rties, M | lultipli | cation | of large | eintege | ers. | | |
| Text Book | Text I | Book 1 | : 3, 4 | | | | | | [| | | | | |
| MODULE-3 | DECH | REASE | AND (| CONQU | JER AI | ND SPA | ACE AN | ND | 2 | 2MCA | 23.3 | | 8 Hou | irs |
| | | | EOLLS |) D 1. | 1 10 | | 1 | | | | | 6 | 0 | |
| Insertion Sort, | Depth | - Firs | t and | Breadt | h-First | t Searc | ch, Top | ologic | al sort | ing, Al | gorith | ms for | Gene | rating |
| Combinatorial (| Jbjects, | , Decre | ase by | a cons | tant fac | ctor alg | gorithn | ns. | | | | | | |
| Algorithm, Hasl | e Trade ning, B- | Trees. | Sorting | g by Co | ounting | , Input | t Enhai | ncemei | nt in Si | tring M | latchin | g using | g Hors | pool's |
| Text Book | Text l | Book 1 | : 5, 7 | | | | | | | | | | | |
| MODULE-4 | DYNA TECH | AMIC P | ROGR E | AMMI | NG AN | D GRE | EDY | | 2 | 2MCA | 23.4 | | 8 Hou | ırs |
| Dynamic Progr | Dynamic Programming - Computing a binomial coefficient, Warshall's and Floyd's algorithms, Knapsack | | | | | | | | | | | | | |
| Greedy Technic | Problem. Graady Tachniqua – Drim's Algarithm, Kryskal's Algarithm, Diikstra's Algarithm, Huffman Traas | | | | | | | | | | | | | |
| Shill | Dool i | timo al | gorith | m_{c} to k | skal s A | anod i | n tho f | iold of | compu | tor not | tworks | byuc | ing Cri | adu |
| Dovolonment | Toch | aiguo | igoriun | | Je uesi | gneu n | ii tile i | | compt | iter ne | LWUIKS | by us | ing die | euy |
| | recin | iique. | | | | | | | | | | | | |
| Text Rook | Tevt I | Rook 1 | · 8 9 | | | | | | | | | | | |
| I CAL DOOK | LIMI | | <u>NS</u> | ND | COPIN | IG W | ЛТН | THE | | | | | | |
| MODULE-5 | LIMI | ΓΑΤΙΟ | NS OF | ALGOI | RITHM | | ER | 11112 | 2 | 2MCA | 23.5 | | 8 Hou | irs |
| Introduction L | ower h | ound | argume | nts. De | ecision | trees | P. NP | and NI | P-comr | olete ni | rohlem | s. Con | ing wi | h the |
| limitations of | limitations of algorithm power: Backtracking, n-queens problem, Hamiltonian Circuit problem, Subset- | | | | | | | | | | | | | |
| Sum problem. | Branch | -and-B | ound - | Knapsa | ack pro | blem, ' | Fravell | ing Sal | esman | Proble | em, Ass | ignme | nt prol | olem. |

| Skill | | Compa | arison anal | ysis can be | e done | based | on | both | techniques | by | using | real | time |
|-------------|------------|----------|---------------------|---------------|----------------------|--------|------|-------|--------------|-----|----------|-------|--------|
| Develo | opment | applica | ations. | | | | | | | | | | |
| Activit | ties | | | | | | | | | | | | |
| Text | t Book | Text Be | ook 1: 11, 12 | 2 | | | | | | | | | |
| CIE As | ssessmen | t Patter | n(50 Mark | s – Theory) | | | | | | | | | |
| | | | I | Marks Distr | ibution | | | | | | | | |
| , | | la | Test (a) | Qualitat | ive | MCO | | | | | | | |
| 1 | KDI Leve | :15 | Test (s) | Assessme | nt (s) | MCQ | 5 | | | | | | |
| | | | 25 | 15 | | 10 | | | | | | | |
| L1 | Remem | ıber | 5 | 5 | | 5 | | | | | | | |
| L2 | Unders | tand | 10 | 5 | | 5 | | | | | | | |
| L3 | Apply | | 5 | 3 | | - | | | | | | | |
| L4 | Analyze | e | 5 | 2 | | | | | | | | | |
| L5 | Evaluat | te | - | - | | | | | | | | | |
| L6 | Create | | - | | | | | | | | | | |
| CEE A | ccoccmor | t Datta | m(E0 Mort | c Theory) | | | | | | | | | |
| SEE A | ssessmer | It Patte | Evom N | Aprilia | | | | | | | | | |
|] | RBT Leve | els | Exam N Distribut | rar KS | | | | | | | | | |
| L1 | Remem | her | 1(|) | | | | | | | | | |
| L2 | Unders | tand | 20 |) | | | | | | | | | |
| 1.3 | Annly | unu | 10 |) | | | | | | | | | |
| L3 | Analyze | a | 1(|) | | | | | | | | | |
| L5 | Evaluat | e . | - | | | | | | | | | | |
| L6 Create - | | | | | | | | | | | | | |
| Suggo | ctod Log | ming D | COURCOCI | | | | | | | | | | |
| Jugge | Sieu Leai | ining Ke | esources. | | | | | | | | | | |
| 1) | Introducti | on to th | e Design an | d Analysis of | ^F Algorit | hme Δr | าวทบ | Lovit | in Pearson F | duc | ation 3 | rd Ed | lition |
| י (ד י | 2021 ISR | N· 9780' | 137541133 | a mary 313 01 | ingoin | | lany | | | uut | ation, 5 | iu Bu | |
| 4 | | | 10,011100. | | | | | | | | | | |

Reference Books:

- 1) Design and Analysis of Algorithms, Sandeep Sen, Amit Kumar, Cambridge University Press, 2019, ISBN: 978110849682.
- 2) Design and Analysis of Algorithms, Parag H. Dave, Pearson Education, 2007, ISBN: 9788177585957.
- 3) Introduction to Algorithms, Thomas H. Cormen, Charles E.Leiserson, Ronal L.Rivest, Clifford Stein, MIT Press, 2001, ISBN: 9780262032933.
- 4) Algorithms: Design and Analysis, Sushil C. Dimri, Preeti Malik, Mangey Ram, De Gruyter Publications, 2021, ISBN: 9783110693751.
- 5) Fundamentals of Computer Algorithms, Horowitz E., Sahani S., Rajasekharan S, Galgotia Publications, 2nd Edition, ISBN: 9788175152571.

Web links and Video Lectures (e-Resources)

- https://onlinecourses.nptel.ac.in/noc19_cs47/preview
- https://www.coursera.org/specializations/algorithms
- https://nptel.ac.in/courses/106101060
- https://ocw.mit.edu/courses/6-046j-design-and-analysis-of-algorithms-spring-2015

Activity-Based Learning (Suggested Activities in Class)/ Practical Based learning

- Video demonstration of latest techniques
- Contents related activities
 - Organizing Group wise discussions
 - Presentations

| | DATABASE MANAGEMENT SYSTEMS | | | | | | | | | | | | | |
|-------------------|---|---|----------|--------------------|----------|----------|-----------------|------------------|-------------------|----------|------------------|--------------------|-------------------|--------|
| Course Code | 22M | CA24 | | | | | | | CIE N | larks | 50 | 0 | | |
| L:T:P:S | 3:0:1 | :0 | | | | | | | SEE I | Marks | 5(| 0 | | |
| Hrs / Week | 5 | | | | | | | | Tota | l Mark | s 10 | 00 | | |
| Credits | 04 | | | | | | | | Exan | n Hour | s 03 | 3 | | |
| Course outcom | nes: | | | | | | | | | | | | | |
| At the end of the | e cours | se, the s | studen | t will b | e able t | to: | | | | | | | | |
| | Under | rstand | the ba | sic arcł | nitectu | re of d | atabas | e mana | igemer | nt syste | m and | datab | ase sch | iema |
| 22MCA24.1 | with o | constra | ints. | | | | | | 0 | 5 | | | | |
| | Desig | n ER n | nodel a | nd rela | ational | datab | ase sch | iema fo | or real | world | applic | ation a | nd ana | alvze |
| 22MCA24.2 | Relati | ional a | lgebra | expre | ssions | to che | ck pei | forma | nce of | data | models | s with | respe | ct to |
| | desig | n and n | nanipu | lation. | | | • | | | | | | • | |
| 22MCA24.3 | Descr | ibe the | basics | of SQL | and co | onstru | ct quer | ies usir | ng SQL | | | | | |
| 22MCA24.4 | Under | rstand | the cor | ncepts o | of norm | nalizat | ion and | d desig | n datal | oase. | | | | |
| 22MCA24.5 | Form | ulate ai | nd imp | lement | querie | es usin | g RDBI | MS pac | kage. | | | | | |
| Mapping of Co | urse O | utcom | es to P | rogra | n Outo | comes | and P | rogran | n Spec | ific Ou | tcome | s: | | |
| | P01 | P02 | P03 | P04 | P05 | P06 | P07 | P08 | P09 | P010 | P011 | P012 | PSO1 | PSO2 |
| 22MCA24.1 | 2 | 2 | 3 | - | 1 | - | 2 | - | 1 | - | - | 2 | 3 | 2 |
| 22MCA24.2 | 2 | 3 | 3 | - | 1 | - | 2 | - | 1 | - | - | 2 | 3 | 2 |
| 22MCA24.3 | 3 | 3 3 1 3 - 2 - - 1 3 3 2 3 3 2 3 - 2 - 1 2 1 2 3 2 | | | | | | | | | | | | |
| 22MCA24.4 | 3 | 3 3 2 3 - 2 - 1 2 1 2 3 2 3 3 - 3 - 2 - 1 2 1 1 3 2 | | | | | | | | | | | | |
| 22MCA24.5 | 3 3 3 - 3 - 2 - 1 2 1 1 3 2 IDEC ORIECT | | | | | | | | | | | | | |
| MODULE-1 | | OBJEC | Т | 1 4 4 | | .1 | | 7 1 | 2 | ZMCA | 24.1 | | 9 Hou | irs |
| Unaracteristics | of Data | abase a | approa | ch; Act | ors on | the sc | ene; v | vorker | s ben | ind the | e scen | ie; Adv | vantag | es of |
| Suctom Concont | pproac | II; A D Archite | nei ni | Data I | Modele | Dase F | Applica | uons, d Inctr | when | NOL LO | Use a | | itoctur | and |
| Data Independ | ence | Databa | se La | - Data I nguage | s and | Inter | fias, ai | The D | ances, latahas | se Svst | em F | a Alcii. nviron | ment-I |)RMS |
| Component Mo | dules. | classif | ication | of Da | tabase | Mana | gemen | t Svste | ms. | The Re | lationa | al Data | Mode | land |
| Relational Data | base C | onstra | ints: R | elation | al Mo | del Co | ncepts | Domai | ins, At | tribute | s, Tup | les, an | d Rela | tions, |
| Characteristics | of Rela | tions. | | | | | • | | | | | | | |
| Self-study / | нам | | | | | | | | | | | | | |
| Case Study / | IIAN | Jo UN. | tallatio | n of M | 201 | | | | | | | | | |
| Applications | • | 11150 | lallatio | II OI MIS | JQL | | | | | | | | | |
| Text Book | Text | Book 1 | :1 , Tex | kt Book | 2:1 | | | | | | | | | |
| MODULE-2 | RELA | TION | AL MO | DEL CO | ONSTR | AINTS | AND | | 2 | 2MCA | 24.2 | | 9 Hou | irs |
| | RELA | TIONA | AL DA' | <u>rabas</u> | E SCHI | EMAS | | | | | | | 1.0.1. | |
| Domain Constra | aints, K | ey Con | Istraint | ts and (| Lonstra | aints o | n NULI | J Value | s, Rela | tional | Databa | ises an | d Relat | lonal |
| Database Schen | nas, m onetroi | nt Vio | , Refer | Data | Model | ty and | Foreig | n Keys | , Upua | tionchi | ration: | s, Tran Modo | | i and |
| Detahase Annli | cation | Fntity | Types | Fntity | v Sets | Attrih | ites ai | nd Kev | s Fnti | tv Tvn | p (EK) os Fnt | ity Set | I. A Sa s Kevs | and |
| Value Sets. Ini | itial Co | nceptu | al Des | ign of | the Co | ompan | v Data | base: F | Relatio | nshin [| Evnes. | Relatio | onshin | Sets. |
| Roles, and Stru | ictural | Constr | raints, | Constr | aints o | on Bina | arv Re | lations | hip Ty | pes, A | ttribut | es of F | Relation | nship |
| Types, Weak E | ntity T | ypes, E | ER Dia | grams, | Namir | ng Con | ventio | ns and | Desig | n Issue | es, Rela | ationsh | ір Тур | es of |
| Degree Higher t | han Tv | vo. Rela | ational | Databa | ase De | sign Us | ing ER | - to-Re | lationa | al Mapp | oing. | | | |
| Self-study / | HAN | DS ON: | 1 | | | | | | | | | | | |
| Case Study / | • | Dra | iw an E | R diag | ram fo | r Empl | oyee M | anager | nent S | ystem | using d | lrawin | g tools | |
| Applications | • | Dra | iw an E | R diag | ram fo | r Libra | ry Man | ageme | nt Syst | tem usi | ng dra | wing to | ools | |
| Text Book | Text | Book 1 | :2, Tex | t Book | 2:2 | | | | r | _ | _ | | | |
| MODULE-3 | UNA | RY REL | LATIO | VAL OF | PERAT | IONS | | | 2 | 2MCA | 24.3 | | 9 Hou | irs |
| SELECT and PR | OJECT | Relation | onal Al | gebra | Operat | tions fr | om Se | t Theoi | ry; Bin | ary Re | lationa | l Oper | ations: | JOIN |
| and DIVISION A | Addition | nal Rel | ational | Opera | tions, I | Aggreg | ate fur | ictions | and gi | Couping | g; Exan | nples o | t Quer | ies in |
| relational Algel | ora. SQ | 2L- SQ | L Data | Defini | ition a | ind Da | ta Typ Const | es, Th | e CRE | ATE TA | ABLE (| | and in | SQL, |
| Attribute Data | iypes : | and Do | mains | in SQI | , spec | urying | Lonstr | | 1 SQL, ibuta ' | Basic I | Alice | ai Que | ries in | SQL, |
| INSERT, DELET | ь diiu | UrDA | IE SIA | tement | 5 III 30 | ųl, All | Inignor | is All | innite l | vames, | Anasi | ng, re | uaiiiiiil | ; anu |

| Tuple Variables Arithmetic Oper | s, Unspecified WHERE Clause and Use of the Aster rators. | risk. Substring Patterr | n Matching and |
|---|--|---|--|
| | HANDS ON: | | |
| Self-study / Case Study / Applications | Creating a table student with following info columns and data types - rollno number(6), varchar(20) Inserting data into the student tabl Altering table by adding new colum from the table Drop column branch Alter table by changing the data typ Delete all the data from student tabl Delete the table Create Sales table with the following fields(amount, DOB) Insert five records Calculate total Sales amount in each Display all the salesmen, DOB who day in character format | rmation - Name of tabl , name varchar(20), bra e nn class varchar(20) D pe of rollno to number(ble Sales No, Sales name, H h branch each branch are born in the month | e: student, anch eleting a row 8) Branch, Sales of December as |
| Text Book | Text Book 1 :3, 4 Text Book 2:3, 4 | | |
| MODULE-4 | MORE COMPLEX SQL QUERIES | 22MCA24.4 | 9 Hours |
| Nested Queries, Joined tables in Database Desig 3NF and Bovce- | Tuples, and Set/Multiset comparisons, Correlated ne SQL and Outer Joins. Aggregate functions in SQL, Grou n - Informal Design Guidelines for Relation Schema Codd Normal Form. | ested queries, UNIQUE uping, Views in SQL. s; Functional Depende | function in SQL, ncies 1NF, 2NF, |
| Self-study / Case Study / Applications | HANDS ON: An Enterprise wishes to maintain a database to a divided into certain departments and each departments Update the employee salary by 15%, whose Delete the employees, who completed 30 ye Display the manager who is having maximulation under him Create a view, which contain employee name | automate its operation ent consists of employe e experience is greater t ears of service im number of employed nes and their manager | as. Enterprise is ees than 10 years es working |
| Text Book | Text Book 1: 3, 4 Text Book 2: 5 | | |
| MODULE-5 | INTRODUCTION TO PL/SQL | 22MCA24.5 | 9 Hours |
| Basics of PL/SC Labeling a PL/S Cursor, Opening Executing a S Subprograms, exceptions- Syr Exceptions, trig | QL- Identifiers, Delimiters, Comments, Data types, back SQL Loop, Loop Control Statements, Cursors- Implicit g the cursor, Fetching the cursor, Closing the cursor tandalone Procedure, Deleting a Standalone Pro Functions-Creating a Function, Calling a Func itax for Exception Handling, Raising Exceptions, gers-Benefits of Triggers, Creating Triggers, Triggerin | asic syntax, control sta t cursor, explicit cursor r. Procedures- Creatir cedure, Parameter Mo ction, PL/SQL Recurs User-defined Exception ng a Trigger. | tements, loops- s- Declaring the ng a Procedure, odes in PL/SQL ive Functions, ons, Pre-defined |
| Self-study / | HANDS ON: | | |
| Case Study / | Write a PL/SQL program to demonstrate Cu | ursors | |
| Applications | Write PL/SQL queries to create Procedures | 5 | |
| ripplications | Write a PL/SQL program to demonstrate Fill | unctions | |
| Text Book | Text Book 1: 3, 4 | | |

| CIE As | ssessment Patt | ern(50 Mar | ks – Theo | rv) | | |
|--------|----------------|---------------------|-------------------|----------|---------|--|
| | | | Marks Di | stributi | on | |
| F | RBT Levels | Test (s) | Assess | nent | Lab CIE | |
| | | 25 | 5 | | 20 | |
| L1 | Remember | 5 | 2 | | - | |
| L2 | Understand | 10 | 3 | | - | |
| L3 | Apply | 5 | - | | 20 | |
| L4 | Analyze | 5 | - | | - | |
| L5 | Evaluate | - | - | | - | |
| L6 | Create | - | - | | - | |
| SEE A | ssessment Patt | ern(50 Mai | ·ks – Theo | ory) | | |
| F | RBT Levels | Exam M Distribut | larks ion (50) | | | |
| L1 | Remember | 10 |) | | | |
| L2 | Understand | 20 |) | | | |
| L3 | Apply | 10 |) | | | |
| L4 | Analyze | 10 |) | | | |
| L5 | Evaluate | - | | | | |

Suggested Learning Resources

Create

Text Book:

L6

- 1) Abraham Silberschatz, Henry F Korth and S. Sudarshan: Database System Concepts, 7th Edition, McGraw-Hill, 2021.
- 2) Ramez Elmasri, Shamkant B. Navathe, "Fundamentals of Database systems", Sixth Edition, Pearson / Addison Wesley, 2017.

Reference Books:

1) Niraj Gupta, "SQL-PLSQL", Createspace Independent Pub, 2015.

-

2) Coronel, Morris ,"Database Principles Fundamentals of Design, Implementation and Management ", Rob- Cengage Learning, 2013.

Web links and Video Lectures (e-Resources):

- https://handoutset.com/wp-content/uploads/2022/05/Database-System-Concepts-etc..pdf
- https://onlinecourses.nptel.ac.in/noc22_cs91/preview
- https://www.coursera.org/learn/database-structures-and-management-with-mysql

Activity-Based Learning (Suggested Activities in Class)/ Practical Based learning

- Designing a Database Management System for a web application
- Implementing Exception handling using PL/SQL for a management system

| H | PROFI | ESSIO | NAL] | ELEC | FIVES | 5 -1 (E | BUSIN | ESS A | NALY | TICS | TRA | CK) | | |
|--|---|---|--------------------|--------------------|-------------------|------------------|----------|----------|----------|--------------------|----------------|--------------------|----------------|---------|
| | | D | ATA | WAR | EHOU | JSING | AND | DATA | A MIN | ING | <u> </u> | | | |
| Course Code | 22M0 | <u>A251</u> | | | | | | | CIE N | <u>larks</u> | 5 | 0 | | |
| L:T:P:S | 2:1:0 | :0 | | | | | | | SEE N | Marks | 50 | 0 | | |
| Hrs / Week | 3 | | | | | | | | Tota | Mark | $\frac{s}{10}$ | 00 | | |
| Credits | 03 | | | | | | | | Exan | 1 Hour | S U. | 3 | | |
| Course outcom | les: e cours | e the s | student | t will h | e able | to· | | | | | | | | |
| | IInde | rstand | the | fundan | nentals | s of Γ |)ata c | ollectio | n and | l the | differe | ont nr | -nroce | essing |
| 22MCA251.1 | techn | iques. | the | Iunuan | liciitai | 5 01 1 | vata c | Sheetio | in and | i the | uniere | ine pro | | ,551115 |
| 22MCA251.2 | Distir | nguish | the dif | ferent | Data w | varehou | ise mo | dels an | d their | ' implei | nentat | tions. | | |
| 22MCA251.3 | Analy | ze the | variou | s patte | ern mir | ning alg | gorithn | is and t | their ap | pplicati | ions. | | | |
| 22MCA251.4 | Exam | ine the | e perfo | rmanc | e accur | acies c | of the v | arious | classifi | ers. | | | | |
| 22MCA251.5 | Evalu differ | ate th ent Ou | e diffe tlier D | erent o etectio | lusteri n Metł | ing tec 10ds. | chnique | es in r | eal-tin | ne scei | nario a | and fo | rmulat | e the |
| Mapping of Co | urse O | utcom | es to P | rogra | m Out | comes | and P | rogran | n Spec | ific Ou | tcome | es: | | |
| | P01 | P02 | P03 | P04 | P05 | P06 | P07 | P08 | P09 | P010 | P011 | P012 | PS01 | PSO2 |
| 22MCA251.1 | 3 | 2 | 2 | 2 | - | - | - | - | - | 1 | - | - | - | 3 |
| 22MCA251.2 | 3 | 2 | 2 | 2 | - | - | - | - | - | 1 | - | - | - | 3 |
| 22MCA251.3 | 3 | 3 3 2 - - 1 - - 3 3 3 2 - - 1 - - 3 | | | | | | | | | | | | |
| 22MCA251.4 | 3 | 3 3 2 - - 1 - - 1 3 3 3 2 - - 1 - - 3 | | | | | | | | | | | | |
| 22MCA251.5 | 3 | <u>3</u> 332 | | | | | | | | | | | | |
| MODULE-1 | INTRODUCTION, GETTING TO KNOW YOUR DATA, DATA PRE-PROCESSING22MCA251.18 Hours | | | | | | | | | | | | | |
| Data Mining ar | 1 Overv | view, ŀ | Kinds o | of data | mine | d, Kind | ls of P | atterns | mine | d, Tecł | nolog | ies use | ed, Kin | ds of |
| Applications Ta | rgeted, | Major | issues | in data | a minir | 1g. | T | л · с | | 10 | | (D | | |
| Getting to know | your I | Jata - L | Jata Ut | Doto I | na Att Cleanir | ribute | Types, | Basic S | Data E | cal Des Poducti | on Da | ns of D to Trai | ata. Asform | ation |
| and Data Discre | tizatio | n. | | Data | Sicami | ig, Dat | a mue | ration, | Data I | luuuuu | 011, Da | | 13101111 | ation |
| Text Book | Text | Book 1 | : 1.2 | | | | | | | | | | | |
| MODULE_2 | DATA | A WAR | EHOU | SING A | ND OI | NLINE | | | 2 | 2MCA | 251 2 | | 8 Hor | irc |
| MODOLE-2 | ANAI | YTIC | AL PRC | CESSI | NG | | | | - | ZMCA | 231.2 | | 0 1100 | 11.5 |
| Data Warehous | e: Bas | ic con | cepts, | Data V | Vareho | ouse M | odellir | ıg - Da | ita Cuł | be and | OLAP | , Data | Wareh | iouse |
| Design and Usa | ge, Data | a Ware | house | Impler | nentat | ions. | | | | | | | | |
| Text Book | Text | <u>Book 1</u> | : 3 | | mmpp | | | TIONO | | | | | | |
| MODULE-3 | MINI AND | NG FR CORRI | ELATIO | NT PA DNS | TTER | NS, AS | SUCIA | TIONS | 2 | 2MCA | 251.3 | | 8 Hoi | ırs |
| Basic Concepts | and M | lethod | s, Adv | anced | Patter | n Min | ing - F | requer | nt Patt | erns B | asic C | oncept | s, Frec | quent |
| Itemset Mining | Meth | ods, Pa | attern | Evalua | ation I | Method | ls. Ac | lvanced | d Patte | ern Mi | ning: | Patterr | n Minii | ng in |
| Multilevel, Mult | tidimer | nsional | Space | , Cons | traint | Based | Freque | ent Pat | tern M | lining, | Patter | n Expl | oratior | 1 and |
| Application. | | | | | | | | | | | | | | |
| Text Book | Text | Book 1 | : 4, 5 | DACIO | CONC | TEDTC | | | 2 | 21404 | | | 0 11 | |
| MODULE-4 | CLAS | SIFICA | TION: | BASIC | CUNC | LEP IS | | | 2 | ZMCA | 251.4 | | 8 HOL | IFS |
| Basic Concepts, Decision Tree Induction, Bayes Classification Methods, Rule-Based Classification, Model Evaluation and Selection, Techniques to Improve Classification Accuracy. | | | | | | | | | | | | | | |
| Skill | Skill Click have been started by the second | | | | | | | | | | | | | |
| Development | Self-s | study (| on Mii | nng M | ledical | Imag | es for | classif | yıng p | atient | recor | ds inte | | ID-19 |
| Activities | miec | leu or | norma | u. | | | | | | | | | | |
| Text Book | Text | Book 1 | :6 | | | | | | | | | | | |
| MODULE-5 | CLUS | TERIN | IG ANA | LYSIS | | | - | | 2 | 2MCA | 251.5 | | 8 Hou | irs |
| Basic Concepts | and M | ethods | s, and | Outlier | Detec | tion: C | luster | Analys | is, Par | titionir | ng Met | hods, 1 | Hierard | :hical |
| Methods - Ag | glomer | ative | versus | Divis | ive Hi | erarch | ical C | lusterir | ig, De | nsity-B | ased | Metho | as-DBS | CAN, |
| Evaluation of (| Justeri | <u>ng. (</u> | utiler | Detect | <u>ion: 0</u> | utilers | and (| Jutiler | Analys | sis, Ou | <u>uier</u> D | etectic | <u>m met</u> | 1100S, |

| r | | | | | | | |
|--------|-----------------|-----------|---------------|--------------------|-------------------------------|------------------|---|
| Cluste | ring - Bas | ed Appr | oaches, Clas | ssification-E | Based Ap | proaches. | |
| Skill | | намр | S ON: | | | | |
| Devel | opment | | Juling tool | le for vieual | ization | foluctoring an | proachag |
| Activi | ties | • | USINg LOU | is for visual | | of clustering ap | proaches |
| Tex | t Book | Text B | ook 1: 8, 11 | | | | |
| | coccmon | t Datta | m(E0 Mark | c Theory |) | | |
| | sessmen | t Fatter | III SU MAIK | S - Theory |) atributi | | 7 |
| | | | | | | on | - |
| | RBT Leve | ls | Test (s) | Quanta | iuve | MCQ's | |
| | | | 25 | Assessing | ent (s) | 10 | - |
| | D | | 25 | 15 | | 10 | - |
| | Remem | ber | 5 | 5 | | 5 | - |
| | Unders | tand | 10 | 5 | | 5 | - |
| L3 | Apply | | 5 | 2 | | - | - |
| L4 | Analyze | 9 | 5 | 3 | | - | _ |
| L5 | Evaluat | e | - | - | | - | |
| L6 | Create | | - | - | | - | |
| _ | | | | | | | |
| SEE A | ssessmen | t Patte | rn(50 Mark | <u>ks – Theory</u> | ') | | |
| | RBT Leve | ls | Exam N | Marks | | | |
| | | 10 | Distribut | ion (50) | | | |
| L1 | Remem | ber | 10 |) | | | |
| L2 | Unders | tand | 20 |) | | | |
| L3 | Apply | | 10 |) | | | |
| L4 | Analyze | 9 | 10 |) | | | |
| L5 | Evaluat | e | - | | | | |
| L6 | Create | | - | | | | |
| Sugge | sted Lear | ning R | esources | | | | |
| Text I | Book: | 0 | | | | | |
| 1) H | an. Iiawei | Pei. Iia | an., Tong. H | anghang. D | ata Mini | ng: Concepts a | nd Techniques, Netherlands: Elsevier |
| Ś | cience, 202 | 22. | , - 0, | 0 0 | | 8 | |
| | , . | | | | | | |
| Refer | ence Boo | oks: | | | | | |
| 1) Pa | ang-Ning | Tan. Mi | chael Steinl | bach. Vipin | Kumar: | Introduction | to Data Mining. Pearson Publication. |
| Se | econd Edit | ion. 202 | 21. ISBN-10: | 935449104 | 19 | | , , , , , , , , , , , , , , , , , , , |
| 2) A | run K Puia | ri: Data | Mining Tec | hniques Un | iversitv | Press. 2nd Edit | ion. 2019. ISBN-10:8173716722. |
| 3) G. | K. Gupta: | Introdu | iction to Dat | ta Mining w | ith Case | Studies, 3rd Ed | lition, PHI, New Delhi, 2018, ISBN-10 : |
| 8 | 12035002 | 2. | | 0 | | ŗ | |
| Web l | inks and | Video I | lectures (e- | Resources |) | | |
| • | https:// | /www.v | outube.com | /watch?v= | 9 9 1 1 1 GOiG | bAs | |
| • | https:// | /www.v | outube.com | /watch?v= | CHYPF7i | xlik | |
| • | https:// | /www.i | avatpoint.co | , m/data-wa | rehouse | | |
| • | https:// | /www.i | nvestonedia | .com/terms | s/d/data | mining.asp | |
| • | https:// | /www.w | outube com | /watch?v= | lokv-h48 | 80YI | |
| • | https:// | /intellin | aat com/blo | og/classific | ation-in- | data-mining/ | |
| | | r | (2) | | | | |
| Activi | ty-Based | Learni | ng (Suggest | ed Activiti | es in Cla | iss)/ Practical | Based learning |
| • | Literati | ire Revi | lew on Recei | nt Classifica | ition, Clu | istering and Ou | tlier Detection Mechanisms |
| • | Student | t Semina | ar Presentat | ions | | | |
| | | | | | *** | :* | |
| | | | | | | | |
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| | | | RO | BOTI | C PR | OCES | S AUT | 'OMA | TION | | | | | |
|----------------------|-------------------------------|---------------|----------------|--------------------|-----------|----------|----------|-----------|------------|---------------|----------|------------|----------|-------------|
| Course Code | 22M0 | CA252 | | | | | | | CIE N | larks | 50 |) | | |
| L:T:P:S | 2:1:0 | :0 | | | | | | | SEE N | Marks | 50 |) | | |
| Hrs / Week | 4 | | | | | | | | Tota | l Mark | s 10 |)0 | | |
| Credits | 03 | | | | | | | | Exan | 1 Hour | s 03 | 3 | | |
| Course outcom | ies: | | | | | | | | | | | | | |
| At the end of th | e cours | e, the s | studen | t will b | e able t | to: | | | | | | | | |
| 22MCA252.1 | Und | erstand | ding th | e autor | nation | potent | tial and | l realizi | ing the | value | in RPA | | | |
| 22MCA252.2 | Dem | onstra | te good | d unde | rstandi | ing RP/ | A Platfo | orm Ar | chitect | ure an | d Comp | onent | s. | |
| 22MCA252.3 | Dem | onstra | te goo | d unde | rstand | ing of I | Record | ers, Ed | itor, ar | nd vari | ous ess | ential | Comma | ands |
| 22MCA252.4 | to bi Inde | illa sin | nple ta: | SKS / B velon s | ots for | autom | ating s | imple j | tasks | ses and | i Auton | nating | tasks. | |
| 22MCA252.5 | Dem | onstra | te good | d unde | rstandi | ing of F | PA an | d its us | e cases | 3 | | | | |
| Manning of Co | | utcom | es to P | rnora | m Out | romes | and P | rogran | n Snec | ,. ific Au | trome | s. | | |
| mapping of co | P01 | PO2 | P03 | P04 | P05 | PO6 | PO7 | POS | P09 | PO10 | P011 | 9. PO12 | PSO1 | PS02 |
| 22MCA252.1 | - | - | - | - | - | - | - | - | - | - | - | - | - | 3 |
| 22MCA252.2 | 2 | 2 | - | - | 2 | - | - | - | - | - | - | - | - | 3 |
| 22MCA252.3 | 1 | 1 | - | - | 2 | - | - | 1 | - | - | - | - | - | 3 |
| 22MCA252.4 | 3 | 3 | 1 | - | 2 | - | - | 1 | - | 1 | 1 | - | - | 3 |
| 22MCA252.5 | 3 | 3 | 1 | - | 2 | - | - | 1 | - | 1 | 1 | - | - | 3 |
| MODULE-1 | INTR | ODUC | TION | TO RP | A | | | | 22 | 2MCA2 | 52.1 | | 8 Hoi | ırs |
| Understanding | Enterp | rise Pi | rocesse | es Robo | otic Pr | ocess A | Automa | tion, A | reas R | lipe for | r Autor | nation | , Seeki | ng an |
| RPA Solution, S | Seeing | the Va | lue in | RPA, A | Attende | ed and | Unatt | ended | Autom | ation, | RPA ir | nprove | ement | cycle, |
| Introduction to | RPA, A | utoma | tion Ar | iywhei | re Ente | rprise | Tool – | An intr | oducti | on. | | | | |
| Text Book | Text | Book 2 | :1 Tex | t Book | : 1: 2, 3 | , 4 | | AND | | | | | | |
| MODULE-2 | COM | FORM PONEN | ITS | ARCI | HITEC | IURE | | AND | 22 | 2MCA2 | 252.2 | | 8 Hou | I rs |
| Installing Auto | mation | Anyw | vhere I | Enterpi | rise A2 | 2019, 9 | Setting | up a | cloud- | enable | d depl | oymen | t mod | el for |
| enterprise, AA (| Control | Room | Contro | ol Rooi | n Setti | ngs Lic | ense S | ettings | All Me | enus Tl | neory, o | demon | stratio | n and |
| hands on practi | ce and | experi | ence of | n the sy | ystem. | | | | | | | | | |
| 1 ext Book | lext | BOOK 1 | : 5, 6 DECT | | | UTOM | | IC. | 2' | DMCAT | 1222 | | 0 Uou | |
| MODULE-3 | c Docig | n haso | DE21 | PRAU | I ICE A | UIUM | AIIUI | ND | Z 1 | ZMCAZ | 152.3 | | 8 100 | ITS |
| Recorders - We | s Desig | n-Dase | su. Screen | Record | der Sn | hart Re | corder | · ΔΔ (| omma | inds R | ead fro | m CSV | /Text | Fycel |
| Database Files/ | Folder | | Juicen | Recon | aci, sii | | coruci | | 20111110 | inus in | Lau IIO | | / I CAL, | LACCI |
| | HANI | DS ON: | | | | | | | | | | | | |
| Skill | | • Scr | een rec | order | | | | | | | | | | |
| Development | | • Sim | ple we | b reco | rder | | | | | | | | | |
| Activities | | • We | b recor | der wi | th data | ibase a | utoma | tion | | | | | | |
| Text Book | Text l | Book 1 | : 4 | | | | | | - | | | | | |
| MODULE-4 | BUIL | DING I | BEST P | RACTI | ICE AU | TOMA | TIONS | | 22 | 2MCA2 | 252.4 | | 8 Hou | Irs |
| Error Handling | String | Operat | tion Va | riables | Variał | ole Ope | eration | PDF In | tegrat | ion Em | ail Aut | omatio | on, OCR | R Web |
| Recorder Prope | erties, V | Vorkflo | ow, Tip | s & Tri | cks. | | | | | | | | | |
| | HANI | DS ON: | .1 . | | | | | | | | | | | |
| Skill | | • Em | ail Auto | omatio | n J DD | Г. : | | | | | | | | |
| Development | | • FIF | ' auton | ation a | and PD | r integ | gration | | | | | | | |
| Activities | | • 501 | ng ope | ration | cond or | mail | | | | | | | | |
| | | • Sm: | art reco | uer æ: order | senu ei | IIall | | | | | | | | |
| Text Book | Text | Book 1 | : 5 | Jiuci | | | | | | | | | | |
| I ON LOOK | GETT | 'ING S | MARTI | ER THI | ROUGH | I COGN | NITIVE | | - | | | | 0.77 | |
| MODULE-5 | AUTOMATION 22MCA252.5 8 Hours | | | | | | | | | | | | | |
| What AI brings | , Auton | nated o | custom | er eng | ageme | nt – Ch | at bot | s, Voice | e bots, | Virtua | l agent | , Autor | nated | mails, |
| Dynamic intera | ctive vo | oice re | sponse | , Visua | l IVR. | | | | | | | | | |

| | | 1 | | | | | | | | | | | |
|---------|--|--|--|---------------|----------|---|--|--|--|--|--|--|--|
| | | HAND | S ON: | | | | | | | | | | |
| | | Advanced | | | | | | | | | | | |
| Skill | | | Smart Recorder with Excel automation and database automation | | | | | | | | | | |
| Develo | opment | | Web recorder with files and folder | | | | | | | | | | |
| Activit | ties | | • Masters | | | | | | | | | | |
| | | | Masters Xml automation | | | | | | | | | | |
| | | Web recorder to excel automation | | | | | | | | | | | |
| Toy | Web recorder to excel automation Toxt Book Toxt Book 1:6 | | | | | | | | | | | | |
| | Text Book Text Book 1:6 | | | | | | | | | | | | |
| CIE As | ssessmen | t Patte | rn(50 Mark | s – Theory) | | 7 | | | | | | | |
| | | | N | larks Distrib | ution | _ | | | | | | | |
| | | | | Qualitativ | re | | | | | | | | |
| | RBT Leve | els | Test (s) | Assessmer | nt MCQ's | | | | | | | | |
| | | | | (s) | | | | | | | | | |
| | | | 25 | 15 | 10 | | | | | | | | |
| L1 | Remem | ıber | 5 | 5 | 5 | | | | | | | | |
| L2 | Unders | tand | 10 | 5 | 5 | | | | | | | | |
| L3 | Apply | | 5 | 2 | - | | | | | | | | |
| L4 | Analyze | 9 | 5 | 3 | - | | | | | | | | |
| L5 | Evaluat | te | - | - | - | | | | | | | | |
| L6 | Create | | - | - | - | | | | | | | | |
| SEE As | ssessmer | nt Patte | rn(50 Mark | s – Theory) | | | | | | | | | |
| | | | Exam N | Jarks | | | | | | | | | |
| | RBT Leve | els | Distribut | ion (50) | | | | | | | | | |
| L1 | Remem | ıber | 10 |) | | | | | | | | | |
| L2 | Unders | tand | 20 |) | | | | | | | | | |
| L3 | Apply | | 10 |) | | | | | | | | | |
| L4 | Analyze | e | 10 |) | | | | | | | | | |
| L5 | Evaluat | te | - | | | | | | | | | | |
| L6 | Create | | - | | | | | | | | | | |
| Sugge | sted Lear | rning R | esources | | | | | | | | | | |

Text Book:

- 1) Robotic Process Automation for dummies, NICE special edition, NICE RPA team with Steve Kaelble, ISBN: 978-1-119-45774-9, 2018.
- 2) Groover M.P., "Industrial Robotics -Technology Programming and Applications", McGraw Hill, 2012.

Reference Books:

1) The Robotic Process Automation Handbook: A Guide to Implementing RPA Systems, Tom Taulli, ISBN: 978-1-4842-5728-9, 2020.

Web links and Video Lectures (e-Resources):

- https://youtu.be/n6nxTBB16ag
- https://www.youtube.com/live/G0gVfi7ri7w?si=T0VleP7QeSeG05oF
- https://www.automationanywhere.com/rpa/robotic-process-automation

Activity-Based Learning (Suggested Activities in Class)/ Practical Based learning

- A write up on the usage of Remote Process Automation in varied real life scenario.
- Class Room based discussions on videos given in Web links and Video Lectures.

| SOCIAL MEDIA ANALYTICS | | | | | | | | | | | | | | |
|--|--|---|-------------------------|----------|----------|------------|----------|------------|----------|----------|----------|-----------|-------------|---------|
| Course Code | 22M0 | CA253 | | | | | | | CIE N | larks | 5(| 0 | | |
| L:T:P:S | 2:1:0 | :0 | | | | | | | SEE N | Marks | 50 | 0 | | |
| Hrs / Week | 4 | | | | | | | | Tota | l Mark | s 1(| 00 | | |
| Credits | 03 | | | | | | | | Exan | 1 Hour | s 03 | 3 | | |
| Course outcom | ies: | | | | | | | | | | | | | |
| At the end of th | e cours | e, the s | tudent | t will b | e able | to: | | | | | | | | |
| 22MCA253.1 | Identi | ify the s | subset | of avail | able da | ata to fo | ocus on | analys | is. | | | | | |
| 22MCA253.2 | Demo | monstrate the activities that assist in transforming raw data into insights. | | | | | | | | | | | | |
| 22MCA253.3 | Analy | nalyze various perspectives of insights to derive higher accuracy. | | | | | | | | | | | | |
| 22MCA253.4 | Evalu | valuate the information interpretation as a social analytic process. | | | | | | | | | | | | |
| 22MCA253.5 | Orgar comm | Organize information gathered from consumer to filter & find right data and formulate the common visualization techniques | | | | | | | | | | | | |
| Mapping of Co | urse O | utcom | es to P | rograi | m Out | comes | and P | rogran | n Spec | ific Ou | tcome | s: | | |
| | P01 | P02 | P03 | P04 | P05 | P06 | P07 | P08 | P09 | P010 | P011 | P012 | PS01 | PSO2 |
| 22MCA253.1 | 3 | 3 | - | - | 2 | 1 | - | - | - | 2 | 2 | - | - | 3 |
| 22MCA253.2 | 3 | 3 | - | - | 2 | 1 | - | - | - | 2 | 2 | - | - | 3 |
| 22MCA253.3 | 3 | 3 | 1 | - | 2 | 1 | - | - | - | 2 | 2 | 2 | - | 3 |
| 22MCA253.4 | 3 | 3 | 1 | - | 2 | 1 | - | - | - | 2 | 2 | 2 | - | 3 |
| 22MCA253.5 | 3 | 3 | 1 | - | 2 | 1 | - | - | - | 2 | 2 | 2 | - | 3 |
| MODULE-1 | DULE-1 DATA IDENTIFICATION 22MCA253.1 8 Hours | | | | | | | | | | irs | | | |
| Data, Subset of content, Attributes of data, Regular expressions and right subset of people, Predictive versus | | | | | | | | | | | | | | |
| Descriptive, Sentiment, Structured data versus Unstructured data, Big data and Identifying data in social | | | | | | | | | | | | | | |
| media outlets. | r | | <u> </u> | | | | | | | | | | | |
| Text Book | Text l | 000k 1: | 1, Tex | t book | 2: 1: 5 | | | | | | | | | |
| MODULE-2 | | A ANA | LYSIS | - 1 | <u> </u> | C | 1 . | | 22 | 2MCA2 | 53.2 | | 8 Hou | irs |
| Four dimension | ns of a | nalysis | taxon | omy, I | Jomaii | n of an | alysis, | Veloci | ity of (| data, V | alidati | ng the | hypot | hesis, |
| Discovering the | emes ai | ia topi | CS, USI | ng iter | ative i | netnoo | is. Stre | am coi | nputin | ig, IBM | Infost | time o | reams | S, SPL |
| Text Book | Tovt | graphs | , <u>33M E</u> 1 · Q | zampi | es, vai | ue uen | veunt | | meren | ice usii | ig real· | -time a | lialytic | 5. |
| MODULE-3 | | $\Delta \Delta N \Delta$ | | . II | | | | | 2 | 2MCA2 | 52.2 | | 8 Ho | irc |
| Ad-Hoc analysis | s Exam | nle of | Ad-Ho | r analv | sis Da | ta Inte | ority R | esnon | ding to | leads | identif | ied in s | ocial n | nedia |
| Support for dee | en analy | sis in a | analyti | cs soft | vare. | ta meş | Silly, I | copoin | uing to | icaus | luciti | icu ili s | | icula, |
| Enterprise Soci | al Netv | vork - | Social | collabo | oration | . Memo | orv of | organiz | zation. | Enterr | orise g | raph ai | nd deta | ails of |
| implementation | 1. | | | | | | 5 | 0 | , | 1 | 0 | 1 | | |
| Skill | A Cas | e Study | / Analy | sis on | Enterp | orise So | cial Ne | etwork | S | | | | | |
| Development | | | | | - | | | | | | | | | |
| Activities | | | | | | | | | | | | | | |
| Text Book | Text l | book 2: | 9:11 | | | | | | | | | | | |
| MODULE-4 | INFO | RMAT | ION IN | TERP | RETAT | ION | | | 2 | 2MCA2 | 53.4 | | 8 Hou | ırs |
| Finding the right | nt data, | Comm | unicat | ion, Ch | oosing | g filter v | words, | Custor | nizing | and Mo | odifyin | g tools | , Using | right |
| tools, Analyzing consumer reaction during hurricane study. | | | | | | | | | | | | | | |
| Text Book Text book 2: 12 | | | | | | | | | | | | | | |
| MODULE-5 VISUALIZATION AS AN AID TO ANALYTICS 22MCA253.5 8 Hours | | | | | | | | | | | | | | |
| Common visualizations – Pie, Bar, Line, Scatter plots. Common pitfalls – Information overload, Unintended | | | | | | | | | | | | | | |
| consequences of | of using | 3D, Us | ing col | our, Vi | sually | repres | enting | unstru | ctured | data. | | | | |
| Skill | Skill Case study on IBM Amplify - Data Identification, Data Analysis and Information | | | | | | | | | | | | | |
| Development | Interp | oretatio | on and | conclu | sions. | | | | | | | | | |
| Activities | | | | | | | | | | | | | | |
| Text Book | Text l | 000k 2: | 13 | | | | | | | | | | | |

| CIE As | E Assessment Pattern(50 Marks – Theory) | | | | | | | |
|--------|---|--------------------|-------------------------------|-------|--|--|--|--|
| | | Marks Distribution | | | | | | |
|] | RBT Levels | Test (s) | Qualitative Assessment (s) | MCQ's | | | | |
| | | 25 | 15 | 10 | | | | |
| L1 | Remember | 5 | 3 | 3 | | | | |
| L2 | Understand | 10 | 4 | 3 | | | | |
| L3 | Apply | 5 | 4 | 2 | | | | |
| L4 | Analyze | 5 | 4 | 2 | | | | |
| L5 | Evaluate | - | - | - | | | | |
| L6 | Create | - | - | - | | | | |

SEE Assessment Pattern(50 Marks - Theory)

|] | RBT Levels | Exam Marks Distribution (50) |
|----|------------|---------------------------------|
| L1 | Remember | 10 |
| L2 | Understand | 20 |
| L3 | Apply | 10 |
| L4 | Analyze | 10 |
| L5 | Evaluate | - |
| L6 | Create | - |

Suggested Learning Resources

Text Books:

- 1) Creating Value With Social Media Analytics, Gohar F. Khan, Create Space Independent Publishing Platform, 2018, ISBN: 9781977543974.
- 2) Social Media Analytics, Mathew Ganis, Avinash Kohirkar, IBM Press, 2016, ISBN: 978-0-13-389256-7.

Reference Books:

- 1) Learning Social Media Analytics with R, Raghav Bali, Dipanjan Sarkar, Tushar Sharma, Packt Publishing, 2017, ISBN: 9781787127524.
- 2) Social Media Analytics, Marshall Sponder, Mc-Graw Hill Publishers, 2011, ISBN: 9780071768627.
- Seven Layers of Social Media Analytics: Mining Business Insights from Social Media Text, Actions, Networks, Hyperlinks, Apps, Search Engine and Location Data, Gohar F. Khan, Amazon Digital Services, 2015, ISBN: 978-1507823300.

Web links and Video Lectures (e-Resources)

- https://www.ibm.com/topics/social-media-analytics
- https://blog.hubspot.com/marketing/social-media-analytics
- https://www.youtube.com/watch?v=Z1KJ-16Rfs0

Activity-Based Learning (Suggested Activities in Class)/ Practical Based learning

- Organizing Group wise discussions
- Presentations

^{****}

| BUSINESS INTELLIGENCE AND DATA ANALYTICS | | | | | | | | | | | | | | | |
|---|---|--|---------------|----------|----------|-----------------|----------|----------|------------|----------|----------|---------|-------------|-----------|--|
| Course Code | 22M | CA254 | • | | | | CI | E Mar | ks | | 50 | 50 | | | |
| L:T:P:S | 2:1:0 |):0 | | | | | SI | EE Mar | ks | | 50 | 50 | | | |
| Hrs / Week | 4 | | | | | | Т | otal Ma | arks | | 100 | | | | |
| Credits | 03 | | | | | | Ех | kam Ho | ours | | 03 | 03 | | | |
| Course outcom | nes: | | | | | | | | | | | | | | |
| At the end of th | e cours | e, the s | studen | t will b | e able † | to: | | | | | | | | | |
| 22MCA254.1 | Descr | ibe the | e funda | mental | l BI vis | ualizat | ions. | | | | | | | | |
| 22MCA254.2 | Exam | ine adv | vanced | BI visu | ıalizati | ions aci | ross di | fferent | dimen | sions. | | | | | |
| 22MCA254.3 | 2MCA254.3 Investigate on Table calculations and data densification. | | | | | | | | | | | | | | |
| 22MCA254.4 | 22MCA254.4 Adding value to visualizations through deep analysis. | | | | | | | | | | | | | | |
| 22MCA245.5 | MCA245.5 Dealing with data structure issues and mapping techniques in visualizations and | | | | | | | | | | | | | | |
| Mapping of Course Outcomes to Program Outcomes and Program Specific Outcomes: | | | | | | | | | | | | | | | |
| | P01 | P02 | P03 | P04 | P05 | P06 | P07 | P08 | P09 | P010 | P011 | P012 | PSO1 | PSO2 | |
| 22MCA254.1 | 3 | 3 | - | - | - | - | - | - | - | - | - | - | - | 3 | |
| 22MCA254.2 | 3 | 3 | - | 3 | 2 | - | - | - | - | - | 1 | 1 | - | 3 | |
| 22MCA254.3 | 3 | 3 | - | 3 | 2 | - | - | - | - | - | 1 | 1 | - | 3 | |
| 22MCA254.4 | 3 | 3 | 2 | 3 | 2 | - | - | - | 2 | - | 1 | 1 | - | 3 | |
| 22MCA245.5 | 3 | 3 | 2 | 3 | 2 | - | - | - | 1 | - | 1 | 1 | - | 3 | |
| MODULE-1 | CREA DASH | CREATINGVISUALIZATIONSAND22MCA254.18 HoursDASHBOARD22MCA254.11000000000000000000000000000000000000 | | | | | | | | | | | | | |
| Connections to | Connections to data, Foundations for building visualizations, Visualizing data, Creating charts, Creating | | | | | | | | | | | | | | |
| geographic visu | alizatio | ons. | | 1, 1, | | 1.4 | | | 1. 1 | 7 1. | | | | 1 C | |
| Working with I | Jata: Co | onnect | ing to (| data, M | lanagir | ig data | source | e meta | data, v | Vorking | g with | extrac | ts inste | ad of | |
| Toxt Pool | S, Flie U | ypes, jo | $\frac{1}{1}$ | a bien | us, Fill | ering u | ala | | | | | | | | |
| Text DOOK | MOV | | EPOM | FOI | | : 1,2 FIONAI | т | | | | | | | | |
| MODULE-2 | ADVA | NCED | VISUA | LIZAT | 'IONS | | | | 22M | CA254 | .2 | | 8 Houi | 'S | |
| Comparing valu | ies acro | oss diff | erent o | limens | ions, v | isualizi | ng dat | es and | times, | Relatiı | ng part | s of th | e data t | o the | |
| whole, Visualiz | ing dist | ributio | ons, Vis | sualizir | ıg mult | tiple ax | es to c | ompar | e diffe | rent m | easure | s. Usin | g Row- | level, | |
| Aggregate a Lev | vel of de | etail ca | lculati | ons. | 1. | | (1 1 | <u> </u> | | | | | | | |
| Skill | Cases | study t | o comp | bare vi | sualiza | ition m | ethods | for dif | ferent | amoui | its of d | lata po | ints. | | |
| Activities | | | | | | | | | | | | | | | |
| Text Book | Text I | Rook 1 | • 4 5 | | | | | | | | | | | | |
| MODULE-3 | TABL | E CAL | CULAT | IONS | | | | | 22N | ICA254 | 4.3 | | 8 Hour | (S | |
| Creating and e | diting t | able ca | lculati | ons, qu | iick tał | ole calc | ulatio | ıs, Rela | ative v | ersus f | ixed So | cope ai | nd dire | ction, | |
| Addressing and | l partiti | oning, | Custor | n table | calcula | ations, | Practic | al exai | nples, | Data d | ensifica | ation. | | , | |
| Text Book | Text I | Book 1 | : 6.7 | | | | | | | | | | | | |
| MODULE-4 | FORM | IATTI | NG VIS | UALIZ | ATION | I | | | 22N | 1CA254 | 4.4 | | 8 Hou | rs | |
| Formatting, Ac | lding v | alue to | o visua | lizatio | ns. Da | ata sto | ry wit | h Dasł | ıboard | s: Buil | ding v | iews, | creatin | g the | |
| dashboard fran | nework | , Imple | ementii | ng actio | ons, De | signing | g differ | ent dis | plays a | and dev | vices. | | | | |
| Deep analysis - Trending, Clustering, Distributions, Forecasting. | | | | | | | | | | | | | | | |
| Text Book Text Book 1: 7,8,9 | | | | | | | | | | | | | | | |
| MODULE-5 | MAK | ING DA | TA W | ORKS | | | | | <u>22N</u> | ICA25 | 4.5 | | 8 Hou | rs | |
| Structuring dat | ta, Tecl | inique | s for d | lealing | with o | data st | ructur | e issue | s, Adv | anced | visuali | ization | s, Adva | inced | |
| mapping tech | liques, | Using | раске | grouna | image | es, Sna | ring c | lata st | ory tr | irougn | Prese | ntatioi | ns, Prii | nting, | |
| Skill | uulisfi +ء f امک | iiig. udv or | theur | ane of | advan | ced vic | ualizat | ion ter | hnique | as in ro | ما انو | conar | io | | |
| Development | 5611 51 | uuy UI | i the us | age of | auvail | | uaii2dl | ion tet | mique | .5 11110 | aimes | SUCIIAL | .0. | | |
| Activities | | | | | | | | | | | | | | | |
| Text Book | Text B | look 1: | 13, 14 | , 15 | | | | | | | | | | | |

| CIE As | E Assessment Pattern(50 Marks – Theory) | | | | | | | | | |
|--------|---|----------|-------------------------------|-------|--|--|--|--|--|--|
| | | M | larks Distribution | | | | | | | |
|] | RBT Levels | Test (s) | Qualitative Assessment (s) | MCQ's | | | | | | |
| | | 25 | 15 | 10 | | | | | | |
| L1 | Remember | 5 | 5 | 5 | | | | | | |
| L2 | Understand | 10 | 5 | 5 | | | | | | |
| L3 | Apply | 5 | 2 | - | | | | | | |
| L4 | Analyze | 5 | 3 | - | | | | | | |
| L5 | Evaluate | - | - | - | | | | | | |
| L6 | Create | - | - | - | | | | | | |

SEE Assessment Pattern(50 Marks - Theory)

| | DDT Lovola | Exam Marks |
|----|------------|-------------------|
| 1 | KDI Leveis | Distribution (50) |
| L1 | Remember | 10 |
| L2 | Understand | 20 |
| L3 | Apply | 10 |
| L4 | Analyze | 10 |
| L5 | Evaluate | - |
| L6 | Create | - |

Suggested Learning Resources:

Text Book:

- 1) Learning Tableaue 10, Business Intelligence and data visualization that brings your business into focus, By Joshua N. Milligan, 2016, Packt Publishing, Second edition. ISBN: 978-1-78646-635-8.
- 2) Laursen, G.H. and Thorlund, J., 2016. Business analytics for managers: Taking business intelligence beyond reporting. John Wiley & Sons.

Reference Books:

1) Business Intelligence Guidebook: From Data Integration to Analytics 1st Edition, by Rick Sherman, 2014, Morgan Kaufmann Publisher, ISBN: 978

Web links and Video Lectures (e-Resources):

- https://youtu.be/YfE9jBq002s
- https://www.youtube.com/live/Hg8zBJ1DhLQ?si=d1cnUdjt6MptovC1

Activity-Based Learning (Suggested Activities in Class)/ Practical Based learning

- Brain-storming on choice of appropriate techniques for various real time scenario
- Expert talk on the subject related to relevance in the field of competitive management.

| SEARCH ENGINE OPTIMIZATION | | | | | | | | | | | | | | |
|--|--|-----------------|----------------|-------------|---------------|-----------------|----------|-----------|-----------------|----------------|------------------|---------|-------------|---------|
| Course Code | Course Code 22MCA255 | | | | | | | | | | 50 |) | | |
| L:T:P:S | 2:1:0:0 | | | | | | | | SEE | Marks | 50 |) | | |
| Hrs / Week | 4 | | | | | | | | Tota | l Mark | as 10 |)0 | | |
| Credits | 03 | | | | | | | | Exar | n Hour | s 03 | 3 | | |
| Course outcom | les: | | | | | | | | | | | | | |
| At the end of the | e course, th | e stud | ent wil | l b | e able t | to: | | | | | | | | |
| 22MCA255.1 | Impart t | he kno | wledg | e 0 | n funda | ament | als of s | earch e | ngine | optimi | zation. | | | |
| 22MCA255.2 | 255.2 Understand how to plan for a powerful search engine and how to make your site useful and visible | | | | | | | | | | | | | |
| 22MCA255.3 | 22MCA255.3 Understand the role of keywords creating pages. | | | | | | | | | | | | | |
| 22MCA255.4 | Underst | and th | e role c | f d | esignir | ng SEO | friend | ly web | pages. | | | | | |
| 22MCA255.5 | Creating | conte | nt for y | ou | r web | pages | and lin | king st | rategi | es for y | our we | eb page | 9. | |
| Mapping of Co | urse Outco | mes t | o Prog | ra | m Outo | comes | and P | rogran | n Spec | cific Ou | tcome | s: | | |
| | P01 P0 | 2 PO | 03 PC |)4 | P05 | P06 | P07 | P08 | P09 | P010 | P011 | P012 | PSO1 | PSO2 |
| 22MCA255.1 | 3 3 | - | - | | - | - | - | 2 | 2 | 2 | - | - | - | 3 |
| 22MCA255.2 | 3 3 | - | - | | - | - | - | 2 | 2 | 2 | - | 2 | - | 3 |
| 22MCA255.3 | 3 3 | - | 2 | | - | - | - | 2 | 2 | 2 | - | 2 | - | 3 |
| 22MCA255.4 | 3 3 | - | 2 | | - | - | - | 2 | 2 | 2 | - | 2 | - | 3 |
| 22MCA255.5 | 3 3 | 2 | 2 2 | | 3 | 2 | - | 2 | 2 | 2 | - | 2 | - | 3 |
| MODULE-1 | HOW SE | ARCH | ENGIN DNTEX | IES T | S WOR | K - PU | JTTIN | G SEAI | RCH | 22MC | A255. | 1 | 8 Hoi | irs |
| Identifying Sea | Identifying Search Engine Users, Figuring out Why People Use Search Engines. Discovering the Necessary | | | | | | | | | | | | | |
| Elements for G | etting High | Кеум | ord Ra | ınk | , kings, l | Jnders | tandin | g the S | Search | Engine | es: The | y're a | Comm | unity, |
| Meeting the Sea | arch Engine | s: Fin | ding th | e (| Commo | n Thr | eads ar | nong tl | he Eng | gines, G | etting | to Kno | w the | Major |
| Engines, Checl | king Out tl | ie Res | t of th | e l | Field: A | AOL ai | nd Ask | com, | Findin | ig Your | · Niche | : Verti | cal En | gines, |
| Discovering Int | ernal Site | Search | h, Und | ers | tandin | g Met | asearc | h Engii | nes, R | ecogniz | zing ar | id Rea | ding S | earch |
| Results: Readin | ig the Sear | ch En | igine R | esı | ults Pa | ge U | ndersta | anding | How | People | Look | at Sea | irch Re | esults, |
| Identifying Mob | one Users' S | earcn | Patteri | ıs, | DISCOV | ering | ne Fea | tures o | r a Sea | irch Re | sults Pa | age. | | |
| nANDS UN: | Traffic | | | | | | | | | | | | | |
| Seekiiş Avoidir | s Trainc | | | | | | | | | | | | | |
| Avoluli Analysi | ng Persona | lized 9 | Search' | c Iı | mnacti | on Rar | hking | | | | | | | |
| Ilsing N | lews Imag | s Boc | oks and | l ni | ther Se | arch V | ertical | s to Rai | nk | | | | | |
| Text Book | Text Bool | x 1: 1, 2 | 2 | | | | crticui | 5 to Ital | | | | | | |
| MODULE-2 | KEVWOI | | RATE | v | | | | | | 22M(| `A255 | 2 | 8 Hoj | irc |
| Employing Koy | word Door | anah ' | Tochni | | a and | Toolo | Diego | monina | Vour | Cito T | homo | Droinc | tormin | a for |
| Employing Key | word Rese | arch | l echnie | que | es and | 100lS | : Disco | overing | Your | Site I | neme, oing V | Brains | stormin | ig for |
| Competitor Reg | uilig a Su search Re | bjett search | ing Cl | i, ' ion | t Nich | ng un ng Kas | words | Chec | keywo king (| $\Delta ut Se$ | onig i asonal | Kovw | ord Tr | onds |
| Evaluating Key | word Rese | arch | Selectii | וכח וס | Kevwc | ords S | electin | g the | Prone | r Kevw | ord Pl | irases | Reinfo | rcing |
| versus Diluting | Your The | me. Pi | icking | Ke | vword | s Base | d on S | Subject | Categ | ories. | Unders | tandin | g Kevy | word- |
| Based Search ve | ersus Sema | ntic Se | earch, A | Ass | signing | Kevw | ords to | Pages | : Unde | erstandi | ing Wh | at a Se | earch E | ngine |
| Sees as Keywo | rds, Planni | ng Sul | bject T | he | me Ca | tegorie | es, Cho | osing | Landir | ng Page | es for S | Subject | t Categ | ories, |
| Organizing You | Organizing Your Primary and Secondary Subjects, Understanding Siloing "Under the Hood". Consolidating | | | | | | | | | | | | | |
| Themes to Help Search Engines See Your Relevance | | | | | | | | | | | | | | |
| HANDS ON: | | | | | | | | | | | | | | |
| Adjusting Keywords | | | | | | | | | | | | | | |
| Updatin | ng Keyword | ls | | | | | | | | | | | | |
| Using T | ools to Aid | Keyw | ord Pla | ce | ment | | | | | | | | | |
| Text Book | Text Bool | x 1: 4 | | | | | | | | | | | | |

| MODULE-3 SEO W | EB DESIG | N | | 22MCA255.3 8 H | Hours | | | | | | | |
|--|----------------|-----------------------|-------------|-------------------------------------|------------------|--|--|--|--|--|--|--|
| The Basics of SEO Web Design, Deciding on the Type of Content for Your Site, Making a User-Focused | | | | | | | | | | | | |
| Website, Choosing Key | words, Usir | ig Keywords in the | e Heading | Tags, Keeping the Code Clean, Or | ganizing | | | | | | | |
| Your Assets, Naming Y | our Files, K | eeping Design Sim | ole, Making | g a Site Dynamic, Making Your Site | e Mobile | | | | | | | |
| Friendly, Developing a | Design Proc | edure, Building an | SEO-Frien | dly Site: Preplanning and Organiz | ing Your | | | | | | | |
| Site. Designing Spider-H | riendly Cod | le. Creating a Them | e and Style | e. Writing Rich Text Content. Plann | ing Your | | | | | | | |
| Navigation Elements, In | nplementing | g a Site Search, Page | e Experiend | ce Update: Mobile Usability, Securi | ty Issues | | | | | | | |
| HANDS ON: | 1 (| , , | 1 | 1 57 | 5 | | | | | | | |
| Enriching Your | Site with Ri | ich Snippets | | | | | | | | | | |
| Skill Optim | izing HTML | Constructs for Sear | ch Engines | 3 | | | | | | | | |
| Development | U | | 0 | | | | | | | | | |
| Activities | | | | | | | | | | | | |
| Text Book Text B | ook 1: 5, 6 | | | | | | | | | | | |
| MODULE-4 CREAT | FING CONT | ENT | | 22MCA255.4 8 H | Hours | | | | | | | |
| Selecting a Style for Yo | our Audiend | ce: Knowing Your | Demograp | hic, Creating a Dynamic Tone, Ch | oosing a | | | | | | | |
| Content Style, Develop | oing a Blog | , Using Personas | to Define | Your Audience Creating persona | as Using | | | | | | | |
| personas to define your | audience, E | stablishing Conten | t Depth an | d Page Length: Building Enough Co | ontent to | | | | | | | |
| Rank well, Developing | Ideas for C | ontent, Using Vari | ous Types | of Content, Optimizing Images, M | <i>Aixing</i> in | | | | | | | |
| Video, Making the Text | Readable, A | llowing User Input, | Creating U | Jser Engagement, Writing a Call to | Action. | | | | | | | |
| HANDS ON: | | | C C | | | | | | | | | |
| Optimizing the | Content for | Local Searches | | | | | | | | | | |
| Sources of Dup | licate Conte | nt and How to Reso | olve Them | | | | | | | | | |
| Skill Develo | ping Conte | nt Using Your Keyw | vords | | | | | | | | | |
| Development | 1 0 | 0 , | | | | | | | | | | |
| Activities | | | | | | | | | | | | |
| Text Book Text B | ook 1: 5. 6. ' | 7.8 | | | | | | | | | | |
| MODULE-5 LINKI | NG | , | | 22MCA255.5 8 H | Hours | | | | | | | |
| Employing Linking Stra | tegies: The | ming Your Site by | Subiect Im | plementing Clear Subject Themes | . Siloing. | | | | | | | |
| Making the Most of Out | bound Link | s Obtaining Inbou | nd Links St | ructuring Internal Links: Subject | Theming | | | | | | | |
| Structure. Optimizing | Link Equity | . Creating and Ma | intaining S | Silos. Obtaining Links: Understan | ding the | | | | | | | |
| Benefits and Risks of I | ink Buildin | g. Identifying Oual | itv Links. | Attracting Links. Generating link | magnets | | | | | | | |
| Spreading the word t | nrough soc | ial media and pr | ess releas | es Guest posting Fostering relat | ionships | | | | | | | |
| Soliciting paid links for | advertising | How Not to Obtain | Links | | 1 | | | | | | | |
| HANDS ON: | 0 | | | | | | | | | | | |
| Identifying Inb | ound Links | | | | | | | | | | | |
| Avoiding Poor- | Ouality Link | (S | | | | | | | | | | |
| Promoting Med | lia on Social | Networking Sites | | | | | | | | | | |
| Ontimizing Soc | ial Media | | | | | | | | | | | |
| Text Book Text B | ook 1: 9, 10, | 12.13 | | | | | | | | | | |
| | | | | | | | | | | | | |
| CIE Assessment Pattern(50 Marks – Theory) | | | | | | | | | | | | |
| | N | larks Distribution | | | | | | | | | | |
| RBT Levels | Test (s) | Qualitative | MCQ's | | | | | | | | | |
| | | Assessment (s) | | | | | | | | | | |
| | 25 | 15 | 10 | | | | | | | | | |
| L1 Remember | 5 | 5 | 5 | | | | | | | | | |
| L2 Understand | 10 | 5 | 5 | 4 | | | | | | | | |
| L3 Apply | 5 | 2 | - | 4 | | | | | | | | |
| L4 Analyze | 5 | 3 | - | 4 | | | | | | | | |
| L5 Evaluate | - | - | - | ļ | | | | | | | | |
| L L6 Create | - | - | - | | | | | | | | | |

| SEE A | ssessment Patte | rn(50 Marks – Theory | y) |
|-------|-----------------|---------------------------------|----|
| | RBT Levels | Exam Marks Distribution (50) | |
| L1 | Remember | 10 | |
| L2 | Understand | 20 | |
| L3 | Apply | 10 | |
| L4 | Analyze | 10 | |
| L5 | Evaluate | - | |
| L6 | Create | - | |

Suggested Learning Resources

Text Book:

1) Search Engine Optimization All-in-One For Dummies, Bruce Clay, 4th Edition, John Wiley & Sons, 2022, ISBN 978-1-119-83749-7.

Reference Book:

- 1) SEO for Dummies, Peter Kent, Wiley Publication, 7th Edition, 2022, ISBN: 978-1-119-57960-1.
- 2) The Art of SEO Mastering Search Engine Optimization by Eric Enge Stephan Spencer, and Jessie C. Stricchiola, 3rd Edition, O'Really, 2015, ISBN: 9781491948965.

Web links and Video Lectures (e-Resources):

- http://www.dummies.com/web-design-development/search-engine-optimization/how-toread-search-engine-results-pages/
- https://moz.com/beginners-guide-to-seo
- https://www.wordstream.com/seo
- https://developers.google.com/search/docs/fundamentals/seo-starter-guide
- https://neilpatel.com/what-is-seo/
- https://www.oberlo.com/blog/seo-tools
- https://www.searchenginejournal.com/top-free-seo-tools/302553/
- https://www.wordstream.com/keywords

Activity-Based Learning (Suggested Activities in Class)/ Practical Based learning

- Video links mentioned may be discussed in groups for applications in real time
- Student presentations on related topics.

| PROFESSIONAL ELECTIVES – 2 (NETWORK SECURITY TRACK) | | | | | | | | | | | | | | |
|--|---|------------|------------------|----------|-----------|----------|---|-----------|------------|---------------|-------------------|---------|----------------------|---------------|
| | 0.000 | | CYI | BER S | ECUR | RITY A | AND C | YBER | <u>LAN</u> | / | | | | |
| Course Code | 22M | CA261 | | | | | | | CIE N | <u>larks</u> | 5 | 0 | | |
| L:T:P:S | 2:1:0 | :0 | | | | | | | SEEI | Marks | 5 | 0 | | |
| Hrs / Week | 4 | | | | | | | | 10ta | <u>I Mark</u> | | 200 | | |
| creatis | 03 | | | | | | | | Exall | I HOUI | 5 0 | 3 | | |
| At the end of th | ies: e cours | se, the s | student | t will b | e able t | to: | | | | | | | | |
| 22MCA261.1 | Und | erstan | d the v | arious | cvberc | rimes | in a rea | al time | scenar | io. | | | | |
| 22MCA261.2 | 22MCA261.2 Identify the security challenges in mobile and wireless devices. | | | | | | | | | | | | | |
| 22MCA261.3 Apply the appropriate tools and methods to address cyber security threats. | | | | | | | | | | | | | | |
| 22MCA261.4 | Ana | lyze th | e cybei | laws i | n India | an and | global | perspe | ctive. | rooour | | euto. | | |
| Apply the forensics tools and techniques to evaluate the evidences while investigating | | | | | | | | | | | | | | |
| cyber crimes. | | | | | | | | | | | | | | |
| Mapping of Course Outcomes to Program Outcomes and Program Specific Outcomes: | | | | | | | | | | | | | | |
| | P01 | PO2 | P03 | P04 | P05 | P06 | P07 | P08 | P09 | P010 | P011 | P012 | PSO1 | PSO2 |
| 22MCA261.1 | 3 | - | - | - | | - | 3 | - | - | 3 | - | - | - | 3 |
| 22MCA261.2 | 3 | - | - | - | 3 | - | 3 | - | - | 3 | 3 | 2 | - | 3 |
| 22MCA261.3 | 3 | 2 | 2 | 2 | 3 | - | 3 | - | - | 3 | 3 | 2 | - | 3 |
| 22MCA261.4 | 3 | 2 | - | - ว | - | 3 | 3 | - | 1 | 3 | 3 | - | - | 3 |
| MODULE-1 | | | Z TION 1 | | S FPCP | S IME | 3 | | - 2' | | 5 61 1 | | 8 Hor | |
| MODULE-1 INTRODUCTION TO CYBERCKIME 22Mica201.1 8 Hours Introduction Cybercrime: Definition and Origins of the Word Cybercrime and Information Security: Who | | | | | | | | | | | | | | |
| are Cybercriminals?, Classifications of Cybercrimes. Cybercrime: The Legal Perspectives. Cybercrimes: | | | | | | | | | | | | | | |
| An Indian Pers | spective | e, Cybe | rcrime | and th | e India | an ITA | , 2000, 1 | A Globa | al Pers | pective | on Cy | bercrin | nes | |
| Cyber Offenses | s: How | v Crim | inals | Plan T | Them: | Introd | luction | , How | Crim | inals I | Plan t | he Att | acks, S | Social |
| Engineering Cy | berstal | lking, (| Cyberca | afe and | d Cybe | rcrime | , Botn | ets, Th | e Fuel | for Cy | bercri | ime, At | tack V | ector, |
| Cloud Computin | ng. | | 4.0 | | | | | | | | | | | |
| Text Book | Text | BOOK 1 | : 1, <u>2</u> | | | IDELEC | C DEU | ICEC | 21 | | (1.) | | 0 11 | |
| MODULE-2 | | tion of | Mobil | BILE A | Virolos | | $\frac{55 \text{ DEV}}{200 \text{ Tr}}$ | ICE5 | Mohil | ity Cro | dit Ca | rd Frau | de in M | ITS Iobilo |
| and Wireless C | omputi | ng Fra | | rity Cl | hallenc | | sed by | Mohi | Ιο Που | ity, Cie | uit Ca. vietry | Setting | us III M is for M | Iobile |
| Devices. Auther | iticatio | n Serv | i, secu ice. | iity G | liancii | 503 10 | scu by | MODI | | ice neg | 513ti y, | Setting | 5 101 1 | lobiic |
| Security, Attac | ks on | Mobil | le/Cell | Phon | es, Mo | obile I | Devices | : Secu | ırity I | mplica | tions | for Or | ganiza | tions, |
| Organizational | Measu | res fo | or Han | dling N | Mobile, | Organ | nizatior | nal Sec | urity F | olicies | and I | Measur | es in M | lobile |
| Computing Era, | Laptor | ps. | | | | | | | | | | | | |
| Text Book | Text | Book 1 | : 3 | | | | | | | | | | | |
| MODULE-3 | T00 | LS AND |) METH | HODS U | JSED I | N CYB | ERCRI | ME | 2 | 2MCA2 | 61.3 | | 8 Hoi | irs |
| Introduction, P | roxy S | ervers | and A | nonym | nizers, | Phishi | ng, Pa | ssword | l Crack | king, K | eyloge | gers an | d Spyv | vares, |
| Virus and Worms, Trojan Horses and Backdoors, Steganography, DoS and DDoS Attacks, SQL Injection, | | | | | | | | | | | | | | |
| Buffer Overflow, Attacks on Wireless Networks. | | | | | | | | | | | | | | |
| Skill Case study on Steganography | | | | | | | | | | | | | | |
| Development | | | | | | | | | | | | | | |
| Activities | | | | | | | | | | | | | | |
| Text Book Text Book 1: 4,5.1,5.2,5.3 | | | | | | | | | | | | | | |
| MODULE-4 | CYBE | RCRIN | IES A | ND C | YBER | SECUR | ITY | | 2 | 2MCA2 | 61.4 | | 8 Hoi | ırs |
| The Legal H | Perspec | ctives I | ntrodu | ction, | Cyberc | rime a | nd the | Legal | Landso | cape ar | ound | the Wo | rld, Wl | ny Do |
| We Need Cyber laws: The Indian Context, The Indian IT Act, Challenges to Indian Law and Cybercrime | | | | | | | | | | | | | | |
| Scenario in India, Consequences of Not Addressing the Weakness in Information Technology Act, Digital | | | | | | | | | | | | | | |
| Signatures and | the Ind | lian IT | Act, Ar | nendm | ents to | o the Ir | ıdian I' | I' Act, C | yberci | rime ar | nd Pun | ishmer | nt, Cybe | erlaw, |
| Technology and | 1 Stude | nts: Ind | $\frac{11}{100}$ | enario. | | | | | | | | | | |
| I EXI DUUK | I LEXL | συυκ τ | . U | | | | | | | | | | | |

| MODU | MODULE-5 COMPUTER FORENSICS 22MCA261.5 8 Hours | | | | | | | | | | | |
|--|---|------------|------------------|---------------------|-------------|-------|--------------|----------------|-----------------|--|--|--|
| Understanding Computer Forensics Introduction, Historical Background of Cyberforensics, Digital | | | | | | | | | | | | |
| Forensics Science, The Need for Computer Forensics, Cyberforensics and Digital Evidence, Forensics | | | | | | | | | | | | |
| Analysis of E-Mail, Digital Forensics Life Cycle, Chain of Custody Concept, Network Forensics, Approaching | | | | | | | | | | | | |
| a Com | puter For | rensics I | nvestigation | n, Computer Foren | sics and St | egan | ography, Re | elevance of | the OSI 7 Layer | | | |
| Model | l to Comp | uter Fo | rensics. | | | | _ | _ | | | | |
| Foren | sics and | Social | Networking | g Sites - The Se | curity/Priv | /acy | Threats, (| Computer | Forensics from | | | |
| Comp | liance Pe | rspectiv | e, Challeng | es in Computer I | orensics, | Spec | cial Tools a | and Techni | ques, Forensics | | | |
| Auditi | ing, Antifo | rensics. | | | 1.4.1.0 | | 1 | | | | | |
| SKIII | | Hands | on session of | on Digital Forensic | and Antifo | rens | sic tools. | | | | | |
| Activit | Activities | | | | | | | | | | | |
| Toy | Text Book Text Book 1: 7 | | | | | | | | | | | |
| | IEXT BOOK IEXT BOOK I: / CIF Assessment Pattern(50 Marks - Theory) | | | | | | | | | | | |
| | CIE Assessment Pattern(50 Marks – Theory) Marks Distribution | | | | | | | | | | | |
| | | | Iv | Qualitativa | 1 | | | | | | | |
| | RBT Leve | els | Test (s) | Assessment (s) | MCQ's | | | | | | | |
| | | | 25 | 15 | 10 | | | | | | | |
| L1 | Remen | nher | 5 | 5 | 5 | | | | | | | |
| L2 | Unders | tand | 10 | 5 | 5 | | | | | | | |
| L3 | Apply | | 5 | 2 | - | | | | | | | |
| L4 | Analyz | e | 5 | 3 | - | | | | | | | |
| L5 | L4 Analyze 5 3 - L5 Evaluate - - - | | | | | | | | | | | |
| L5 EVAluate | | | | | | | | | | | | |
| CEE A | L6 Create | | | | | | | | | | | |
| SEE Assessment Pattern(50 Marks – Theory) Evam Marks | | | | | | | | | | | | |
| RBT Levels Exam Marks Distribution (50) | | | | | | | | | | | | |
| 11 | Domon | hor | DISCI IDUC 1(| $\frac{1011}{30}$ | | | | | | | | |
| 12 | Inders | tand | 20 | <u>,</u> | | | | | | | | |
| L2 L3 | Annly | anu | 1(| <u>,</u> | | | | | | | | |
| IA | Analyz | 0 | 10 | <u>,</u> | | | | | | | | |
| 1.5 | Evaluat | te | - | | | | | | | | | |
| L6 | Create | | - | | | | | | | | | |
| Suggo | ctod Log | ming D | | | | | | | | | | |
| Sugge | Sieu Leal | i iiiig Ko | esources | | | | | | | | | |
| 1) Cy | vher Secu | rity IIn | derstanding | Cyber Crimes Co | mnuter Fo | rens | sics and Leo | al Persner | tives – Nina | | | |
| L) G | odhole Su | init Bela | nure Wilev | • April 2011 India | Publication | is Re | eleased | ur reispee | erves minu | | | |
| Def | | | r | | | | | | | | | |
| Kerer | | KS: | ı . | | 000 14 | ~ | 004 10011 (| | 4501 | | | |
| 1) C | yber secu | rity fund | amentals, l | kajesh Kumar gout | ат, врв, М | ay 2 | 021, ISBN: 9 | 978939068 - | 4/31 | | | |
| 2) Ir | nternet Fo | orensics: | Using Digit | al Evidence to Solv | e Compute | r Cri | ime- Robert | Jones, O'Re | eilly Media, | | | |
| R | eleased: (| Jctober | 2005. | | | | | | | | | |
| 3) W | Vindows F | Forensic | s: The field | guide for conducti | ng corporat | te co | omputer inv | estigations | - Chad Steel, | | | |
| V | Viley, Dee | cember | 2006 India I | Publications. | | | | | | | | |
| Web l | inks and | Video I | ectures (e- | Resources): | | | | | | | | |
| • | https:/ | /onlined | courses.swa | yam2.ac.in/cec20_ | cs15/previ | ew | | | | | | |
| • | https://sgp.fas.org/crs/misc/R43831.pdf | | | | | | | | | | | |
| http://localhost:8080/xmlui/handle/123456789/18121 | | | | | | | | | | | | |
| Activity-Based Learning (Suggested Activities in Class)/ Practical Based learning | | | | | | | | | | | | |
| • Seminars | | | | | | | | | | | | |
| • | Video demonstration on cyber crimes in real time scenario | | | | | | | | | | | |
| • | Case St | udy on l | atest tools f | or cyber security | | | | | | | | |
| • | Hands- | on Sessi | ons | | | | | | | | | |
| | | - | | * * | | | | | | | | |

| DIGITAL FORENSICS | | | | | | | | | | | | | | | | | | | | | | |
|--|---|---|------------|----------|--------------------|----------|----------|----------|----------|-------------------|----------|----------|---|---------|--|--|--|--|--|--|--|--|
| Course Code | 22M | CA262 | | | | | | | CIE N | larks | 50 |) | | | | | | | | | | |
| L:T:P:S | 2:1:0 | :0 | | | | | | | SEE N | Marks | 50 |) | | | | | | | | | | |
| Hrs / Week | 4 | | | | | | | | Tota | l Mark | s 10 |)0 | | | | | | | | | | |
| Credits | 03 | | | | | | | | Exan | 1 Hour | s 03 | 3 | | | | | | | | | | |
| Course outcom | ies: | | | | | | | | | | • | | | | | | | | | | | |
| At the end of the | e cours | e, the s | studen | t will b | e able t | to: | | | | | | | | | | | | | | | | |
| 22MCA262.1 | Unde | rstand | the pr | ocess o | of digita | al forer | nsics ar | alysis. | | | | | | | | | | | | | | |
| 22MCA262.2 | Study | / about | the re | gulatio | ns of d | igital f | orensio | s analy | /sis. | | | | | | | | | | | | | |
| 22MCA262.3 | Desci enter | Describe the representation and organization of data and metadata of forensics analysis in enterprises. | | | | | | | | | | | | | | | | | | | | |
| 22MCA262.4 | Inves | nvestigate the digital evidence management. | | | | | | | | | | | | | | | | | | | | |
| 22MCA262.5 Create, recover and extract hidden information and develop. Effective solutions. | | | | | | | | | | | | | | | | | | | | | | |
| Mapping of Course Outcomes to Program Outcomes and Program Specific Outcomes: | | | | | | | | | | | | | | | | | | | | | | |
| | P01 | PO2 | PO3 | P04 | P05 | P06 | P07 | P08 | P09 | P010 | P011 | P012 | PSO1 | PSO2 | | | | | | | | |
| 22MCA262.1 | 3 | - | 3 | 3 | | - | 3 | - | - | 3 | - | - | - | 3 | | | | | | | | |
| 22MCA262.2 | 3 | - | 3 | 3 | 3 | - | 3 | - | 1 | 3 | 3 | 2 | - | 3 | | | | | | | | |
| 22MCA262.3 | 3 | 2 | 3 | 2 | 3 | - | 3 | - | 1 | 3 | 3 | 2 | - | 3 | | | | | | | | |
| 22MCA262.4 | 3 | 2 | - | - | - | 3 | 3 | - | 1 | 3 | 3 | - | - | 3 | | | | | | | | |
| 22MCA262.5 | 3 | - | - | - | - | 3 | 3 | - | - | 3 | 3 | - | - | 3 | | | | | | | | |
| MODULE-1 | MODULE-1 INTRODUCTION TO DIGITAL FORENSICS 22MCA262.1 8 Hours | | | | | | | | | | | | | | | | | | | | | |
| A brief history of forensics technology, Evolutionary cycle of digital forensics, Technical and Scientific | | | | | | | | | | | | | | | | | | | | | | |
| Invoctigative D | s, SWGI | JE, PIII Evict | ing Dr | | Modol | Manni | ng out | nroco | cc mo | dole T | ha nro | coss m | othod | alogy | | | | | | | | |
| workflow | locess | - EXIS | ing ri | ocess i | viouei, | маррі | ing out | proce | 55 110 | ueis, i | ne pro | cess II | ietiiout | лоду | | | | | | | | |
| Text Book | Text | Rook 1 | •127 | lext Bo | ok 2·1 | | | | | | | | | | | | | | | | | |
| MODULE-2 | FDUCATION TRAINING AND AWARENESS 22MCA262.2 8 Hours | | | | | | | | | | | | | | | | | | | | | |
| Organizational Roles and Responsibilities Types of training and awareness Specializations Educational | | | | | | | | | | ional | | | | | | | | | | | | |
| Roadmap, Nont | technic | al Kno | wledge | e. Law | vs, Star | ndards | and R | egulati | ons: T | he role | e of teo | chnolog | gy in c | rime, | | | | | | | | |
| types of laws, G | Good Pr | actices | s for co | ompute | er-base | d elect | ronic e | evidenc | ce, lega | l prece | edence, | , Searc | h Warr | ants, | | | | | | | | |
| Subpoenas and | Jurisdi | ction. | | _ | | | | | - | - | | | | | | | | | | | | |
| Text Book | Text | Book 1 | : 2, 3 T | ext Bo | ok 2: 1 | | | | | | | | | | | | | | | | | |
| MODULE-3 | ETH | ICS AN | D PRO |)FESSI | ONAL | COND | UCT | | 22 | 2MCA2 | 262.3 | | 8 Hou | irs | | | | | | | | |
| Importance of | ethics, | Princi | iples o | f Ethic | s, Ethi | cs in l | Digital | Forens | sics, C | ertifica | ition a | nd Acc | reditat | ions. | | | | | | | | |
| Business of Digi | ital For | ensics | - Role | of digit | al fore | nsics ii | n enter | prise, N | Mainta | ining a | digital | forens | ic Prog | gram, | | | | | | | | |
| Challenges and | Strat | egies, | Indust | ry reg | ulation | 1 and | Politic | al Infl | uences | s. Cont | trolling | g Mobi | le Dev | rices: | | | | | | | | |
| Persistent Thre | ats and | a Chall | enges, | MODIIE | e Devic | | ernance | e, Enter | rprise | Manag | ement | Strate | gies, De | evice | | | | | | | | |
| | Code | of Ethi | | lues, M | A hugi | levice p | Indeess | hohori | ion | y and it | egarco | isiuera | ations. | | | | | | | | | |
| Dovelopment | Coue | OLEUII | ICS : Ma | liware | , Abusi | ve woi | кріасе | Denavi | 101 | | | | | | | | | | | | | |
| Activities | | | | | | | | | | | | | | | | | | | | | | |
| Text Book | Text | Book 1 | : 4. 5 | | | | | | | | | | | | | | | | | | | |
| MODULE-4 | COM | RATTI | NG AN | TIFOR | FNSIC | s | | | 23 | 2MCA2 | 262.4 | | 8 Hou | irc | | | | | | | | |
| What is antifa | ronoico | | litional | toohn | iguag | Dotor | tion m | othoda | Ctro | togia (| ountor | | | i gital | | | | | | | | |
| idonco Manago | mont: | Funos d | ntional | al ovid | liques, | Detec | co gath | oring | s, stra | oration | Counter | measu | offoct | Data | | | | | | | | |
| security requir | ements | rypes (Pres | ervatio | n strat | terre, i terres | Fnter | orise la | or mar | agem | eration ent Di | oital F | orensia | readi | ness. | | | | | | | | |
| Forensic readin | ess. Co | st vers | us ben | efit. Te | n steps | s to for | ensic r | eadine | ss. Ach | ieving | forensi | ic read | iness. | ness. | | | | | | | | |
| Text Book | Text | Book 1 | :9 | , | P | | | | | | | | | | | | | | | | | |
| MODULE-5 | INCI | DENT | MANA | GEME | NT AN | ID RES | PONS | E | 2 | 2MCA2 | 262.5 | | 8 Hou | irs | | | | | | | | |
| Understanding | the Inc | ident F | Respon | se Wor | kflow, | The In | cident | Respor | nse Tea | am (IR' | T), Wha | at to ex | pect du | uring | | | | | | | | |
| an incident, Inv | estigat | ive tecl | hnique | s, Reve | rse En | gineeri | ing Mal | ware, 7 | Гimeliı | ne anal | ysis. | | | - | | | | | | | | |
| Electronic Disco | overy a | nd Liti | gation | : What | t is eDi | scover | y? Und | erstand | ding th | e work | kflow, N | /lanagi | ng litig | ation | | | | | | | | |
| discovery, disco | overing | electro | onicall | y store | d infor | matior | ı. | | | | | | discovery, discovering electronically stored information. | | | | | | | | | |

Information Security and Cyber security: Information security v.s. Cyber security, Digital Forensics and enterprise security, security investigations.

| Skill | Incident management case study : Human Vaccine facility, Bausch & Lomp |
|-------------|--|
| Development | |
| Activities | |

Text Book Text Book 1:12, 13 CIF Accession Three T

| | | Ň | Marks Distribution | | | | | | | | |
|----|------------|----------|--|----|--|--|--|--|--|--|--|
|] | RBT Levels | Test (s) | Test (s) Qualitative Assessment (s) | | | | | | | | |
| | | 25 | 15 | 10 | | | | | | | |
| L1 | Remember | 5 | 5 | 5 | | | | | | | |
| L2 | Understand | 10 | 5 | 5 | | | | | | | |
| L3 | Apply | 5 | 2 | - | | | | | | | |
| L4 | Analyze | 5 | 3 | - | | | | | | | |
| L5 | Evaluate | - | - | - | | | | | | | |
| L6 | Create | - | - | - | | | | | | | |

SEE Assessment Pattern(50 Marks – Theory)

| | RBT Levels | Exam Marks Distribution (50) |
|----|------------|---------------------------------|
| L1 | Remember | 10 |
| L2 | Understand | 20 |
| L3 | Apply | 10 |
| L4 | Analyze | 10 |
| L5 | Evaluate | - |
| L6 | Create | - |

Suggested Learning Resources:

Text Book:

- 1) Digital Forensics and Investigations: People, Process, and Technologies Jason Sachowski, CRC Press, 2018, ISBN: 978-1-138-72093, 2018.
- 2) A Practical Guide to Computer Forensics Investigations (2nd Edition). By Darren R. Hayes, 2019.

Reference Books:

1) Practical Cyber Forensics: An Incident-Based Approach to Forensic Investigations, Niranjan Reddy, A PRESS, 2019, ISBN: 978-1-4842-4459-3.

Web links and Video Lectures (e-Resources):

- https://onlinecourses.swayam2.ac.in/cec20_lb06/preview
- https://www.coursera.org/learn/digital-forensics-concepts
- https://www.geeksforgeeks.org/digital-forensics-in-information-security/
 https://www.geeksforgeeks.org/digital-forensics-in-information-security/
 - https://www.youtube.com/watch?v=_GDI8eGHLhk

Activity-Based Learning (Suggested Activities in Class)/ Practical Based learning

- Video demonstration of latest technology in Digital Forensic.
 - Contents related activities (Activity-based discussions)
 - > For active participation of students, instruct the students to do various case studies
 - > Organizing Group wise discussions on various applications
- Seminars

| CRYPTOGRAPHY AND NETWORK SECURITY | | | | | | | | | | | | | | |
|--|---|---|-------------------------------|-------------------|-------------|---------------------|--|--------------------|----------|--|-------------------|------------------|-------------|-------|
| Course Code | 22M0 | CA263 | | | | | | | CIE N | Aarks | 50 |) | | |
| L:T:P:S | 2:1:0 | :0 | | | | | | | SEE I | Marks | 50 |) | | |
| Hrs / Week | 4 | | | | | | | | Tota | l Mark | s 10 |)0 | | |
| Credits | 03 | | | | | | | | Exan | n Hour | s 03 | } | | |
| Course outcom | ies: | | | | | | | | | | | | | |
| At the end of th | e cours | e, the s | tuden | t will be | e able t | :0: | | | | | | | | |
| 22MCA263.1 | To stu | udv vai | tious s | ecuritv | metho | ds and | proce | dures. | | | | | | |
| 22MCA263.2 | To br | ief abo | ut diffe | erent ci | yptog | raphic | algorit | hms. | | | | | | |
| 22MCA263.3 | To lea | Γο learn hardware perspectives and optimization of wireless security. | | | | | | | | | | | | |
| 22MCA263.4 | To sh | To show how the public keys are distributed using Diffie Hellman method. | | | | | | | | | | | | |
| 22MCA262 E | To d | To discuss about interception and vulnerability of wireless systems and formulate | | | | | | | | | | | | |
| 22MCA203.5 | common techniques for implementing security models. | | | | | | | | | | | | | |
| Mapping of Co | urse O | utcom | es to P | rograi | n Outo | comes | and P | rogran | n Spec | ific Ou | tcome | s: | | |
| | P01 | P02 | P03 | P04 | P05 | P06 | P07 | P08 | P09 | P010 | P011 | P012 | PSO1 | PSO2 |
| 22MCA263.1 | 3 | - | 3 | 3 | | - | 3 | - | - | 3 | - | - | - | 3 |
| 22MCA263.2 | 3 | - | 3 | 3 | 3 | - | 3 | - | 1 | 3 | 3 | 2 | - | 3 |
| 22MCA263.3 | 3 | 2 | 3 | 2 | 3 | - | 3 | - | 1 | 3 | 3 | 2 | - | 3 |
| 22MCA263.4 | 3 | 2 | - | - | - | 3 | 3 | - | 1 | 3 | 3 | - | - | 3 |
| 22MCA263.5 | 3 | - | - | - | - | 3 | 3 | - | - | 3 | 3 | - | - | 3 |
| MODULE-1 | CLASSICAL CRYPTOSYSTEM22MCA263.18 Hours | | | | | | | | | | | | | |
| Security trends, Security Attacks and services, Symmetric cipher model- Classical Encryption Techniques, | | | | | | | | | | | | | | |
| LFSR sequence | es, Bas | sic Nu | mber | theor | у, С | ongrue | ence's, | Chine | se | Remai | nder t | heorer | n, Mo | dular |
| exponentiation, | , Ferma | it and E | luler's | theore | m, Leg | endre a | and Jac | obi syr | nbols, | Finite l | Field, G | alois F | ield. | |
| Skill | HANI | DS ON: | | | | | | | | | | | | |
| Development | • | The | progr | am imp | olemen | tation | of Cae | sar cipł | ner alg | orithm | | | | |
| Activities | • | The | progr | am imp | olemen | tation | of Trai | nsposit | ion cip | her alg | gorithm | ı | | |
| Text Book | Text | Book : | 1, 2, 8 | | | | | | | | | | | |
| MODULE-2 | BLO | CK CIP | HER | | | | | | 2 | 2MCA2 | 63.2 | | 8 Hou | ırs |
| Simple DES, DE | S, Mode | es of op | oeratio | n, Tripl | le DES, | AES, R | C4, RS | A, Atta | cks, Pr | imality | v test, fa | actorin | g. | |
| Skill | HANI | DS ON: | | | | | | | | | | | | |
| Development | Simp | le prog | ram in | ipleme | ntatior | of DE | S algor | ithm | | | | | | |
| Activities | - F | | 0.0 | F | | - | - 0- | - | | | | | | |
| Text Book | Text | Book : | 3, 9 | | | | | | | | | | 0.11 | |
| MODULE-3 | MESS | SAGE A | UTH | SNTIC/ | TTON | D:00 | 11 11 | 1 | 2 | 2MCA2 | <u>63.3</u> | 1 | 8 Hou | irs |
| Discrete Logar | Itnms, | Comp | uting | discret | e logs | , DIIII(athdorr | e-Hellr | nan Ke | ey exc | nange, | ElGar | nai | FICon | : кеу |
| | Hash I | uncuo | ns, sec | ure Ha | asn, bi | rtnuay | attack | s, MD5 | o, digi | tai sig | nature | s, KSA, | ElGan | naim, |
| Text Book | Text | Book | 12 13 | | | | | | | | | | | |
| MODULE-4 | | JCATI | $\frac{12, 15}{\text{ON SE}}$ | CURITY | 7 | | | | 2 | 2 MC A2 | 63.4 | | 8 Hoi | irs |
| Kerberos X 500 | | lectro | nic Mai | lsocur | ity PC | | curity | Woh S | | | | <u>י</u> ד | 0 1100 | |
| Tort Book | Tout 1 | Deels . | 10 10 | i secui | ity, i u | 1,11 30 | curity | , | ecuin | y, 55L, | 163, 36 | .1. | | |
| | | | 10, 19 NETM | | ECHD | ITV | | | 2 | 2MCA2 | 62 E | | 0 Uoi | 170 |
| MODULE-5 | | CLE33 | | | DECUR | <u></u> | | | 4 | | 103.5 | | <u>о по</u> | 115 |
| Application Pro | ork Sec tocol (V | curity- WAP) - | Proto | 302.11 col Ove | wirele | ess LAI - Wirel | $rac{1}{$ | rotocol ansport | t Layei | siew and security of the secur | na Sec ity (W1 | urity - TLS). | Wir | eless |
| Text Book | Text I | Book : 1 | 17 | | | | | | | | | | | |

| | | Ν | larks Distribution | | | | | | |
|----|------------|----------|--|----|--|--|--|--|--|
| | RBT Levels | Test (s) | Test (s)Qualitative Assessment (s)MCQ's | | | | | | |
| | | 25 | 15 | 10 | | | | | |
| L1 | Remember | 5 | 5 | 5 | | | | | |
| L2 | Understand | 10 | 5 | 5 | | | | | |
| L3 | Apply | 5 | 2 | - | | | | | |
| L4 | Analyze | 5 | 3 | - | | | | | |
| L5 | Evaluate | - | - | - | | | | | |
| L6 | Create | - | - | - | | | | | |

SEE Assessment Pattern(50 Marks – Theory)

|] | RBT Levels | Exam Marks Distribution (50) |
|----|------------|---------------------------------|
| L1 | Remember | 10 |
| L2 | Understand | 20 |
| L3 | Apply | 10 |
| L4 | Analyze | 10 |
| L5 | Evaluate | - |
| L6 | Create | - |

Suggested Learning Resources

Text Book:

- 1) William Stallings, "Cryptography and Network security Principles and Practices", Pearson/PHI,8th edition, 2023.
- 2) Wade Trappe, Lawrence C Washington, "Introduction to Cryptography with coding theory", 2nd ed, Pearson, 2007.

Reference Books:

- 1) W. Mao, "Modern Cryptography Theory and Practice", Pearson Education, Second Edition, 2007.
- 2) Charles P. Pfleeger, Shari Lawrence Pfleeger, "Security in computing", Third Edition Prentice Hall of India, 2006.

3) Douglas R. Stinson. "Cryptography, theory and practice", Second edition, CRS Press.

Web links and Video Lectures (e-Resources):

- https://www.tutorialspoint.com/cryptography/index.htm
- https://www.mygreatlearning.com/blog/cryptography-tutorial/
- https://onlinecourses.nptel.ac.in/noc22_cs90/preview
- https://onlinecourses.swayam2.ac.in/cec22_cs15/preview

Activity-Based Learning (Suggested Activities in Class)/ Practical Based learning

- Demonstration of working of classical encryption techniques
- Demonstration of RSA, DES algorithms
- Demonstration on Message Authentication methods like D-H key exchange, Digital signature
- Video demonstration of latest technology on web security
- Contents related activities (Activity-based discussions)
 - For active participation of students, instruct the students to analyze various encryption techniques
 - > Organizing Group wise discussions on various issues on network security
 - Seminars

| Course Code 22MCA264 CIE Marks 50 LT:P:S 21:10:0 SEE Marks 50 Hrs / Week 4 Total Marks 100 Credits 03 03 03 Course outcomes: At the end of the course, the student will be able to: 22MCA264.2 Be exposed to Link Analysis. 22MCA264.3 Understand Hadoop and Map Reduce. 22MCA264.4 Learn due information retrieval models and Be familiar with Web Search Engine. 22MCA264.4 Learn duerstand document text mining. POI [PO2] PO3 [PO4 PO5] PO6 PO7 PO8 PO9 [PO1]PO11[PO12]PS01 [PS02 22MCA264.4 1 3 - - - 1 - 1 - 3 22MCA264.3 3 - 2 - - - 1 - 1 - 3 22MCA264.3 3 - 2 1 - 3 2 2 1 - 3 2 2 1 - 2 1 - 3 2 2 1 2 1 </th <th colspan="12">INFORMATION RETRIEVAL</th> | INFORMATION RETRIEVAL | | | | | | | | | | | | | | | |
|---|--|------------|---|--------------|--------------------------------------|----------|-------------------|--------------|----------|----------|---------|---------|--------------|--------------|------------|--|
| LT:P:S 2:10:00 SEE Marks 50 Hrs / Week 4 Total Marks 100 Credits 03 Exam Hours 03 Course outcomes: At the end of the course, the student will be able to: 22MCA264.1 Learn the information retrieval models and Be familiar with Web Search Engine. 22MCA264.2 Be exposed to Link Analysis. 22MCA264.3 Understand Hadoop and Map Reduce. 22MCA264.3 Understand document text mining techniques. 22MCA264.3 Sa - 22MCA264.3 3 3 - 2 - 1 - 1 - 1 - 3 3 - 2 1 - 3 3 - 2 1 - 3 3 - 2 1 1 - 3 3 - 2 1 2 1 1 - 3 3 - 2 1 2 1 1 - 3 3 - 2 1 2 1 1 - 3 3 2 2 1 2 1 1 | Course Code | 22MC | A264 | | | | | | | CIE M | arks | 50 |) | | | |
| IHrs / Week 4 Total Marks 100 Credits 03 Exam Hours 03 Course outcomes: At the end of the course, the student will be able to: 22MCA264.2 Isam the information retrieval models and Be familiar with Web Search Engine. 22MCA264.2 Be exposed to Link Analysis. 22MCA264.4 Learn document text mining techniques. 22MCA264.4 Learn document text mining. Mapping of Course Outcomes to Program Outcomes and Program Specific Outcomes: POI POI PO2 PO3 PO4 PO5 PO6 PO7 PO8 PO9 PO10 PO11 PO1 PS01 PS02 22MCA264.2 3 3 - - - 1 1 1 - 3 22MCA264.3 3 3 - 2 1 2 1 1 - 3 22MCA264.4 3 3 - 2 1 2 1 1 - 3 22MCA264.5 1 3 - 2 2 1 | L:T:P:S | 2:1:0: | 0 | | | | | | | SEE M | larks | 50 |) | | | |
| Credits 03 Exam Hours 03 Course outcomes: At the end of the course, the student will be able to: 22MCA264.1 Learn the information retrieval models and Be familiar with Web Search Engine. 22MCA264.2 Be exposed to Link Analysis. - - - 22MCA264.3 Understand Hadoop and Map Reduce. - - 1 - 1 1 1 - 3 22MCA264.3 Understand til doop and Map Reduce. - - - 1 <t< td=""><td>Hrs / Week</td><td>4</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>Total</td><td>Mark</td><td>5 10</td><td>00</td><td></td><td></td></t<> | Hrs / Week | 4 | | | | | | | | Total | Mark | 5 10 | 00 | | | |
| Course outcomes: At the end of the course, the student will be able to: 22MCA264.1 Learn the information retrieval models and Be familiar with Web Search Engine. 22MCA264.2 Be exposed to Link Analysis. 22MCA264.4 Learn document text mining techniques. 22MCA264.5 Understand document text mining. Mapping of Course Outcomes to Program Outcomes and Program Specific Outcomes: POI PO2 22MCA264.3 3 3 - 22MCA264.3 3 3 - 22MCA264.3 3 3 - 22MCA264.3 3 3 - 2 22MCA264.5 3 3 - 2 22MCA264.5 3 3 3 - 2 1 2 1 - 1 - 1 1 - 3 2 2 1 - 3 22MCA264.5 3 3 - 2 1 - 2 1 1 - 3 22MCA264.5 <td< td=""><td>Credits</td><td>03</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>Exam</td><td>Hours</td><td>s 03</td><td>}</td><td></td><td></td></td<> | Credits | 03 | | | | | | | | Exam | Hours | s 03 | } | | | |
| At the end of the course, the student will be able to: 22MCA264.1 Learn the information retrieval models and Be familiar with Web Search Engine. 22MCA264.2 Be exposed to Link Analysis. 22MCA264.3 Understand Hadoop and Map Reduce. 22MCA264.4 Learn document text mining techniques. 22MCA264.5 Understand document text mining. Mapping of Course Outcomes to Program Outcomes and Program Specific Outcomes: PO1 PO2 PO3 PO4 PO5 PO6 PO7 PO8 PO1 PO1 PO3 PO4 PO5 PO6 PO7 PO8 PO1 PO1 PO1 PO3 PO4 PO5 PO6 PO7 PO8 PO1 PO1 PO3 PO4 PO5 PO6 PO7 PO8 PO1 PO1 PO1 PO3 PO3 PO4 PO3 PO3 PO4 PO3 PO3 PO4 PO3 | Course outcom | nes: | | | | | | | | | | | | | | |
| 22MCA264.1 Learn the information retrieval models and Be familiar with Web Search Engine. 22MCA264.2 Be exposed to Link Analysis. 22MCA264.3 Understand Hadoop and Map Reduce. 22MCA264.4 Learn document text mining techniques. 22MCA264.5 Understand document text mining. Mapping of Course Outcomes to Program Outcomes and Program Specific Outcomes: 22MCA264.1 3 3 - - 22MCA264.2 3 3 3 - 2 - 22MCA264.4 3 - 2 1 - 1 - 3 22MCA264.4 3 3 - 2 1 - 1 - 3 22MCA264.4 3 3 - 2 1 - 2 1 - 3 22MCA264.5 3 3 - 2 2 1 - 2 1 - 3 22MCA264.5 3 3 - 2 2 1 - 2 1 - 3 22MCA264.5 Bours </td <td>At the end of th</td> <td>e cours</td> <td>e, the s</td> <td>student</td> <td>t will b</td> <td>e able t</td> <td>to:</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> | At the end of th | e cours | e, the s | student | t will b | e able t | to: | | | | | | | | | |
| 22MCA264.2 Be exposed to Link Analysis. 22MCA264.3 Understand Hadoop and Map Reduce. 22MCA264.4 Learn document text mining. Mapping of Course Outcomes to Program Outcomes and Program Specific Outcomes: Variable Course Outcomes to Program Outcomes and Program Specific Outcomes: Variable Course Outcomes to Program Outcomes and Program Specific Outcomes: Variable Course Outcomes to Program Outcomes and Program Specific Outcomes: Variable Course Outcomes Outcomes and Program Specific Outcomes: Variable Course Outcomes Outcomes and Program Specific Outcomes: Variable Course Outcomes Outcomes Outcomes and Program Specific Outcomes: Variable Course Outcomes OutcomesOu | 22MCA264.1 | Learn | the inf | formati | on ret | rieval r | nodels | and B | e famili | iar wit | h Web | Search | ı Engin | e. | | |
| 22MCA264.3 Understand Hadoop and Map Reduce. 22MCA264.4 Learn document text mining techniques. 2ZMCA264.5 Understand document text mining. Mapping of Course Outcomes to Program Outcomes and Program Specific Outcomes: P01 P02 P03 P04 P05 P06 P07 P08 P09 P01 P11 P1 P1< | 22MCA264.2 | Be exp | oosed t | o Link | Analys | sis. | | | | | | | | | | |
| 22MCA264.4 Learn document text mining. Mapping of Course Outcomes to Program Outcomes and Program Specific Outcomes: PO1 PO2 PO3 PO4 PO5 PO6 PO7 PO8 PO9 PO10 PO12 PS02 22MCA264.1 3 3 - - - 1 - 1 - 3 22MCA264.2 3 3 - 2 1 2 1 1 - 3 22MCA264.3 3 3 - 2 2 1 - 2 1 1 - 3 22MCA264.5 3 3 - 2 2 1 - 2 1 1 - 3 22MCA264.1 8 Hours 1 It - 3 2 2 1 - 2 1 1 - 3 22MCA264.1 8 Hours 1 It - 3 2 1 < | 22MCA264.3 | Under | stand | Hadoo | p and N | Иар Re | duce. | | | | | | | | | |
| 22MCA264.5 Understand document text mining. Mapping of Course Outcomes to Program Outcomes and Program Specific Outcomes: PO1 PO2 PO1 2 2 2 1 2 1 2 1 2 1 2 1 2 1 1 1 1 1 1 1 1 1 1 1 1 1 1 <td cols<="" td=""><td>22MCA264.4</td><td>Learn</td><td>docum</td><td>nent te</td><td>xt mini</td><td>ng tecl</td><td>nnique</td><td>s.</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></td> | <td>22MCA264.4</td> <td>Learn</td> <td>docum</td> <td>nent te</td> <td>xt mini</td> <td>ng tecl</td> <td>nnique</td> <td>s.</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> | 22MCA264.4 | Learn | docum | nent te | xt mini | ng tecl | nnique | s. | | | | | | | |
| Mapping of Course Outcomes to Program Outcomes and Program Specific Outcomes: PO1 PO2 PO3 PO6 PO10 PO10 <th< td=""><td colspan="13">22MCA264.5 Understand document text mining.</td><td></td></th<> | 22MCA264.5 Understand document text mining. | | | | | | | | | | | | | | | |
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| MODULE-4WEB SEARCH - LINK ANALYSIS AND SPECIALIZED SEARCH22MCA264.48 HoursLink Analysis, hubs and authorities, Page Rank and HITS algorithms Searching and Ranking Relevance Scoring and ranking for Web Similarity, Hadoop & Map Reduce Evaluation Personalized search Collaborative filtering and content-based recommendation of documents and products handling "invisible" Web - Snippet generation, Summarization, Question Answering, Cross- Lingual Retrieval.8 HoursSkillCase studies on library data baseCase studies on library data base8 HoursDevelopment ActivitiesText Book 1, 4: 21 Text Book 4: 68 Hours8 HoursInformation filtering organization and relevance feedback Text Mining Text classification and clustering Categorization algorithms: naive Bayes decision trees and nearest neighbor Clustering algorithms: agglomerative clustering k-means expectation maximization (EM).6 Case study for the implementation of clustering algorithmsSkill• Case study on document classification Activities• Case study on document classification • Case study on document classification | Text Book | Text E | Book 1: | 5, 10, | 19 | | | | | | | | | | | |
| MODULE-4SEARCH22MCA264.48 HoursLink Analysis, hubs and authorities, Page Rank and HITS algorithms Searching and Ranking Relevance Scoring and ranking for Web Similarity, Hadoop & Map Reduce Evaluation Personalized search Collaborative filtering and content-based recommendation of documents and products handling "invisible" Web - Snippet generation, Summarization, Question Answering, Cross- Lingual Retrieval.SkillCase studies on library data baseDevelopment ActivitiesCase studies on library data baseText BookText Book 1, 4: 21 Text Book 4: 6MODULE-5DOCUMENT TEXT MINING22MCA264.5Information filtering organization and relevance feedback Text Mining Text classification and clustering Categorization algorithms: naive Bayes decision trees and nearest neighbor Clustering algorithms: agglomerative clustering k-means expectation maximization (EM).Skill•Case study for the implementation of clustering algorithms • Case study on document classificationDevelopment Activities*Case study on document classification | | WEB | SEARC | H – LII | NK AN | ALYSIS | SAND | SPECI | ALIZEI |) , | | 264.4 | | 0.11- | | |
| Link Analysis, hubs and authorities, Page Rank and HITS algorithms Searching and Ranking Relevance Scoring and ranking for Web Similarity, Hadoop & Map Reduce Evaluation Personalized search Collaborative filtering and content-based recommendation of documents and products handling "invisible" Web - Snippet generation, Summarization, Question Answering, Cross-Lingual Retrieval.SkillCase studies on library data baseDevelopmentCase studies on library data baseActivitiesText BookText BookText Book 1, 4: 21 Text Book 4: 6MODULE-5DOCUMENT TEXT MINING22MCA264.58 HoursInformation filtering organization and relevance feedback Text Mining Text classification and clustering categorization algorithms: naive Bayes decision trees and nearest neighbor Clustering algorithms: agglomerative clustering k-means expectation maximization (EM).Skill•Development Activities•Case study for the implementation of clustering algorithms•Case study on document classification•Case study on document classification•Text BookText BookText Book 1: 13 Text Book 2: 9 | MODULE-4 | SEAR | CH | | | | | | | 4 | | 204.4 | | 8 HU | ars | |
| Scoring and ranking for Web Similarity, Hadoop & Map Reduce Evaluation Personalized search Collaborative filtering and content-based recommendation of documents and products handling "invisible" Web - Snippet generation, Summarization, Question Answering, Cross- Lingual Retrieval.SkillCase studies on library data baseDevelopment ActivitiesCase studies on library data baseText BookText Book 1, 4: 21 Text Book 4: 6MODULE-5DOCUMENT TEXT MINING22MCA264.5Information filtering organization and relevance feedback Text Mining Text classification and clustering Categorization algorithms: naive Bayes decision trees and nearest neighbor Clustering algorithms: agglomerative clustering k-means expectation maximization (EM).Skill•Case study for the implementation of clustering algorithmsDevelopment Activities•Case study on document classificationText BookText Book 1: 13 Text Book 2: 9 | Link Analysis, | hubs ai | nd autl | horitie | s, Page | e Rank | and H | ITS al | gorithr | ns Sea | rching | and F | Ranking | g Rele | vance | |
| Collaborative filtering and content-based recommendation of documents and products handling "invisible"Web - Snippet generation, Summarization, Question Answering, Cross- Lingual Retrieval.SkillCase studies on library data baseDevelopmentActivitiesActivitiesText Book 1, 4: 21 Text Book 4: 6MODULE-5DOCUMENT TEXT MINING22MCA264.5Information filtering organization and relevance feedback Text Mining Text classification and clustering Categorization algorithms: naive Bayes decision trees and nearest neighbor Clustering algorithms: agglomerative clustering k-means expectation maximization (EM).Skill• Case study for the implementation of clustering algorithmsDevelopment Activities• Case study on document classificationText BookText Book 1: 13 Text Book 2: 9 | Scoring and ra | anking | for W | eb Sin | nilarity | , Hado | op 8 | a Map | Red | uce l | Evalua | tion P | ersona | lized s | earch | |
| Web - Snippet generation, Summarization, Question Answering, Cross- Lingual Retrieval. Skill Case studies on library data base Development Activities Text Book Text Book 1, 4: 21 Text Book 4: 6 MODULE-5 DOCUMENT TEXT MINING 22MCA264.5 Information filtering organization and relevance feedback Text Mining Text classification and clustering Categorization algorithms: naive Bayes decision trees and nearest neighbor Clustering algorithms: agglomerative clustering k-means expectation maximization (EM). Skill • Case study for the implementation of clustering algorithms Development • Case study on document classification Activities Text Book | Collaborative fi | ltering | and co | ntent-l | based r | ecomn | nendat | ion of | docum | ents ai | nd pro | ducts | handliı | ng "inv | isible" | |
| Skill Case studies on library data base Development Activities Text Book Text Book 1, 4: 21 Text Book 4: 6 MODULE-5 DOCUMENT TEXT MINING 22MCA264.5 Information filtering organization and relevance feedback Text Mining Text classification and clustering Categorization algorithms: naive Bayes decision trees and nearest neighbor Clustering algorithms: agglomerative clustering k-means expectation maximization (EM). Skill • Case study for the implementation of clustering algorithms Development • Case study on document classification Activities Text Book | Web – Snippet | generat | ion, Su | mmari | zation | , Ques | tion A | Answei | ring, (| ross- l | Lingua | Retrie | eval. | | | |
| Development Activities Information filtering organization and relevance feedback Text Mining Text classification and clustering Categorization algorithms: naive Bayes decision trees and nearest neighbor Clustering algorithms: agglomerative clustering k-means expectation maximization (EM). Skill • Case study for the implementation of clustering algorithms • Case study on document classification • Case study on document classification • Text Book • Text Book • Text Book | Skill | Case s | tudies | on libr | ary da | ta base |)) | | | | | | | | | |
| Activities Text Book Text Book 1, 4: 21 Text Book 4: 6 MODULE-5 DOCUMENT TEXT MINING 22MCA264.5 8 Hours Information filtering organization and relevance feedback Text Mining Text classification and clustering Categorization algorithms: naive Bayes decision trees and nearest neighbor Clustering algorithms: agglomerative clustering k-means expectation maximization (EM). Skill • Case study for the implementation of clustering algorithms • Case study on document classification Activities Text Book Text Book 1: 13 Text Book 2: 9 | Development | | | | | | | | | | | | | | | |
| MODULE-5 DOCUMENT TEXT MINING 22MCA264.5 8 Hours Information filtering organization and relevance feedback Text Mining Text classification and clustering Categorization algorithms: naive Bayes decision trees and nearest neighbor Clustering algorithms: agglomerative clustering k-means expectation maximization (EM). Skill • Case study for the implementation of clustering algorithms • Case study on document classification Activities Text Book Text Book 1: 13 Text Book 2: 9 | Toxt Book | Toyt F | Pools 1 | 1.217 | Covt Ro | olz A. 6 | : | | | | | | | | | |
| Information filtering organization and relevance feedback Text Mining Text classification and clustering Categorization algorithms: naive Bayes decision trees and nearest neighbor Clustering algorithms: agglomerative clustering k-means expectation maximization (EM). Skill • Case study for the implementation of clustering algorithms Development • Case study on document classification Activities Text Book | | | MENT | 4:21 TEVT | | OOK 4: C |) | | | 22 | мслэ | 64 5 | | 9 Hor | irc | |
| Categorization algorithms: naive Bayes decision trees and nearest neighbor Clustering algorithms: agglomerative clustering k-means expectation maximization (EM). Skill • Case study for the implementation of clustering algorithms • Case study on document classification Activities Text Book Text Book 1: 13 Text Book 2: 9 | Information fil | tering (| roaniz | ation : | and re | levance | e feedl | nack T | ovt Mi | ning T | evt cla | ssifica | tion ar | o no | tering | |
| agglomerative clustering k-means expectation maximization (EM). Skill Development Activities | Categorization | algorit | hms | naive | Baves | decisi | on tre | pes an | d near | rest n | eighho | r Clus | stering | algor | ithms. | |
| Skill • Case study for the implementation of clustering algorithms Development • Case study on document classification Activities Text Book Text Book Text Book 1: 13 Text Book 2: 9 | agglomerative | clusteri | ng k-m | ieans e | xpecta | tion m | aximiz | ation (| EM). | | | . oru: | | aigui | | |
| Development • Case study on document classification Text Book Text Book 1: 13 Text Book 2: 9 | Skill | • (| lase sti | udv for | the im | pleme | ntatio | 1 of clu | stering | g algori | ithms | | | | | |
| Activities | Development | • (| Lase sti | idy on | docum | ient cla | ssifica | tion | | | | | | | | |
| Text Book Text Book 1: 13 Text Book 2: 9 | Activities | | | <i>J</i> 4 | | | | | | | | | | | | |
| | Text Book | Tovt D | lool, 1. | 13 To | vt Rool | z 2. 0 | | | | | | | | | | |

| CIE As | E Assessment Pattern(50 Marks – Theory) | | | | | | | | | | |
|------------|---|----------|-------------------------------|-------|--|--|--|--|--|--|--|
| RBT Levels | | M | Marks Distribution | | | | | | | | |
| | | Test (s) | Qualitative Assessment (s) | MCQ's | | | | | | | |
| | | 25 | 15 | 10 | | | | | | | |
| L1 | Remember | 5 | 5 | 5 | | | | | | | |
| L2 | Understand | 10 | 5 | 5 | | | | | | | |
| L3 | Apply | 5 | 2 | - | | | | | | | |
| L4 | Analyze | 5 | 3 | - | | | | | | | |
| L5 | Evaluate | - | - | - | | | | | | | |
| L6 | Create | - | - | - | | | | | | | |

SEE Assessment Pattern(50 Marks – Theory)

| | RBT Levels | Exam Marks Distribution (50) |
|----|------------|---------------------------------|
| L1 | Remember | 10 |
| L2 | Understand | 20 |
| L3 | Apply | 10 |
| L4 | Analyze | 10 |
| L5 | Evaluate | - |
| 16 | Create | _ |

Suggested Learning Resources

Text Book:

- 1) C. Manning, P. Raghavan, and H. Schütze, Introduction to Information Retrieval , Cambridge University Press, 2008.
- 2) Ricardo Baeza -Yates and Berthier Ribeiro Neto, Modern Information Retrieval: The Concepts and Technology behind Search 2nd Edition, ACM Press Books 2011.
- 3) Bruce Croft, Donald Metzler and Trevor Strohman, Search Engines: Information Retrieval in Practice, 1st Edition Addison Wesley, 2009.
- 4) Mark Levene, An Introduction to Search Engines and Web Navigation, 2nd Edition Wiley, 2010.

Reference Books:

- 1) Stefan Buettcher, Charles L. A. Clarke, Gordon V. Cormack, Information Retrieval: Ophir Frieder "Information Retrieval: Algorithms and Heuristics: The Information Retrieval Series", Implementing and Evaluating Search Engines, The MIT Press, 2010. 2nd Edition, Springer, 2004.
- 2) Manu Konchady, "Building Search Applications: Lucene, Ling Pipe", and First Edition, Gate Mustru Publishing, 2008. iz

Web links and Video Lectures (e-Resources):

- https://nlp.stanford.edu/IR-book/pdf/irbookonlinereading.pdf
- https://ciir.cs.umass.edu/downloads/SEIRiP.pdf
- https://srikarthiks.files.wordpress.com/2016/07/t4-an-introduction-to-search-engines-and-web-navigation-2nd.pdf
- https://www.youtube.com/watch?v=U6KgqeJkhU0

Activity-Based Learning (Suggested Activities in Class)/ Practical Based learning

- Seminars
 - Hands-on Sessions

| WEB APPLICATION SECURITY | | | | | | | | | | | | | | |
|---|---|-----------------|----------|--------------------|--------------------|------------------|------------------|-----------|-------------------|-----------------|----------------|--------------------|------------------|-------------------|
| Course Code | 22M | CA265 | | | | | | | CIE M | arks | | 50 | | |
| L:T:P:S | 2:1:0 | :0 | | | | | | | SEE M | arks | | 50 | | |
| Hrs / Week | 3 | | | | | | | | Total | Marks | | 100 | | |
| Credits | 03 | | | | | | | | Exam | Hours | ; | 03 | | |
| Course outcome | es: | | | | | | | | | | | | | |
| At the end of the | course | , the st | udent | will be | able to |): | | | | | | | | |
| 22MCA265.1 | Unde | rstand | Web A | oplica | tion Se | curity | in a br | oader | Wav. | | | | | |
| 22MCA265.2 | To an | alvze | HTML i | niectic | on and | conten | t spoo | fing. | - 5 | | | | | |
| 22MCA265.3 | To an | alyze | SQL inj | ection | server | -side r | equest | forger | v. | | | | | |
| 22MCA265.4 | To ur | ndersta | nd file | upload | d vulne | erabilit | y. | 0 | , | | | | | |
| 22MCA265.5 | To im | pleme | nt seci | ire cod | ling pra | actices | | | | | | | | |
| Mapping of Course Outcomes to Program Outcomes and Program Specific Outcomes: | | | | | | | | | | | | | | |
| P01 P02 P03 P04 P05 P06 P07 P08 P09 P010 P011 P012 PS01 PS02 | | | | | | | | | | | | PSO2 | | |
| 22MCA265.1 | 3 | 3 | - | - | - | 2 | 1 | - | 2 | 1 | - | - | - | 3 |
| 22MCA265.2 | 3 | 3 | 2 | 2 | 2 | 2 | 1 | - | 2 | 1 | 2 | - | - | 3 |
| 22MCA265.3 | 3 | 3 | 2 | 2 | 2 | 2 | 1 | - | 2 | 1 | 2 | - | - | 3 |
| 22MCA265.4 | 3 | 3 | 2 | 2 | 2 | 2 | 1 | - | 2 | 1 | 2 | - | - | 3 |
| 22MCA265.5 | 3 | 3 | 2 | 2 | 2 | 2 | 1 | - | 2 | 1 | 2 | - | - | 3 |
| MODULE-1 | BUG | BOUN | TY BA | SICS | | | | | | 22MC / | 4265.1 | | 8 Hou | rs |
| Introduction, Vul | nerabi | lities a | nd Bug | g Bount | ties, Cli | ient an | d Serv | er, Wh | at Hap | pens V | Vhen Y | ou Visi | t a We | bsite, |
| HTTP Requests, HTTP Parameter Pollution, Server-Side HPP. Client-Side HPP. HackerOne Social Sharing | | | | | | | | | | | | | | |
| Buttons, Twitte | r Uns | subscri | be N | otificat | ions, | Twitte | er We | eb Int | ents. | Cross | -Site | Reque | st For | gery, |
| Authentication, | CSRF v | with G | ET Re | quests, | , CSRF | with | POST | Reque | ests, D | efense | s Agai | nst CS | RF At | tacks, |
| Shopify Twitter I | Disconr | nect, Cl | nange l | Jsers Ii | nstacai | rt Zone | s, Bado | oo Full | Accou | nt. | | | | |
| Text Book | Text | Book 1 | : 1.1 to | 1.4, 3. | 1 to 3. | 5, 4.1 t | o 4.7 | | | | | | | |
| MODULE-2 | HTM | L INJE | CTION | AND (| CONTE | NT SP | OOFIN | IG | | 22MC / | A265 .2 | | 8 Hou | I <mark>rs</mark> |
| Coinbase Comm | Coinbase Comment Injection Through Character Encoding, HackerOne Unintended HTML Inclusion, | | | | | | | | | | | | | |
| HackerOne Unin | tended | HTMI | Inclu | de Fix | Bypass | s, With | in Sec | urity C | onten | t Spoot | fing. Ca | arriage | returr | ı line |
| feed Injection - H | TTP Re | equest | Smugg | ling, R | espons | se Split | ting , C | Cross-S | ite scri | ipting l | basics | | | |
| Text Book | Text | Book | 1: 5.1 t | o 5.4, 6 | 5.1 to 6 | 5.3, 7.1 | - | | | | | | | |
| MODULE-3 | SQL I | NJECT | 'ION & | SERVI | ER-SID | E REQ | UEST | | | 22MC / | 4265.3 | 3 | 8 Hou | Irs |
| COL Databasas (| FUR | JEKY | | | COI : 1 | Zahaal | Cuent | Ding | | Ilhow | Dlind | | Junual | COI : |
| SQL Databases, C | Lounte | rneas | Domo | gainst netrotii | SQLI, 1 ng tho | Impac | spore t of So | s Billic | i SQLI, ida Pa | Uber Tuost I | Biina | SQLI, I v Invol | rupai zing CE | SQLI. |
| POST Requests | Porforr | ning R | lind SS | SRFc A | ing the ttackin | impac ig Ileo | re with | 1 SCRE | Resno | nces I | SEA S | SRF ar | nig ui nd Oue | rving |
| AWS Metadata G | oogle I | nterna | DNS 2 | SSRF I | nterna | l Port 9 | Scannii | ng Usir | ng Web | hooks | | Sivi ai | iu que | rying |
| Skill | Case | Study | on SSF | RF Vuli | nerahi | lity | Jeannin | 15 0 5 11 | 15 1100 | noons | | | | |
| Development | Guse | otuay | 011 001 | u vun | liciubi | ney | | | | | | | | |
| Activities | | | | | | | | | | | | | | |
| Text Book | Text | Book | l: 9.1 t | o 9.5. 1 | 10.2 to | 10.7 | | | | | | | | |
| MODULE-4 | FILE | UPLO | AD VU | LNERA | BILIT | Y | | | | 22MC / | 4265.4 | L. | 8 Hou | irs |
| LFI. RFI. securing | z a file | inclus | ion vul | nerabi | lity. Re | eauest | forger | v vuln | erabili | tv: Ser | ver-sid | le reau | lest for | gerv. |
| Client-side reque | est fore | gerv. | Cross- | site sci | ripting | attack | s: Refl | ected | XSS. St | ored X | (SS. se | curing | agains | t XSS |
| attacks. | | , , | | | 1 0 | | | | , | | , | 0 | 0 | |
| Text Book | Text | Book | 2: 20.1 | , 21.1 | to 21.4 | 1 | | | | | | | | |
| MODULE-5 | SECU | JRE W | EBSIT | E DES | IGN | | | | | 22MC / | A265 .5 | 5 | 8 Hou | rs |
| Architecture and | d Desi | gn Iss | ues fo | r Web | o Appl | ication | ıs, Dei | oloyme | ent Co | nsider | ations | Input | Valida | ation, |
| Authentication, | Autho | rizatio | n, Co | nfigura | ation | Manag | gement | , Sen | sitive | Data, | Sess | ion M | lanagei | ment, |
| Cryptography, Pa | aramet | er Mar | ipulati | ion, Ex | ceptio | n Mana | gemer | nt, Aud | iting a | and Lo | gging, | Design | Guide | lines, |
| Forms and valid | ity, Te | chnica | limpl | ementa | ation S | Secure | coding | g prac | tices - | black | isting, | white | listing, | user |
| input validation, | autom | <u>ated t</u> e | sting, s | <u>anitiz</u> i | ng HTI | ML. | | | | | | | | |
| Skill | Self-S | Study of | on Seci | ure Co | ding P | ractice | es | | | | | | | |
| Development | | | | | | | | | | | | | | |
| Activities | | | | | | | | | | | | | | |

CIE Assessment Pattern(50 Marks - Theory)

| 01214 | | | | |
|-------|------------|----------|-------------------------------|-------|
| | | Ν | larks Distribution | l |
|] | RBT Levels | Test (s) | Qualitative Assessment (s) | MCQ's |
| | | 25 | 15 | 10 |
| L1 | Remember | 5 | 5 | 5 |
| L2 | Understand | 10 | 5 | 5 |
| L3 | Apply | 5 | 2 | - |
| L4 | Analyze | 5 | 3 | - |
| L5 | Evaluate | - | - | - |
| L6 | Create | - | - | - |

SEE Assessment Pattern(50 Marks - Theory)

| | PRT Lovals | Exam Marks |
|----|------------|-------------------|
| L | ADI Levels | Distribution (50) |
| L1 | Remember | 10 |
| L2 | Understand | 20 |
| L3 | Apply | 10 |
| L4 | Analyze | 10 |
| L5 | Evaluate | - |
| L6 | Create | - |

Suggested Learning Resources

Text Book:

- 1) Peter Yaworski, "Real-World Bug Hunting: A Field Guide to Web Hacking", No Starch Press, 2019, ISBN-10: 1-59327-861-6
- 2) Andrew Hoffman, "Web Application Security Exploitation and Countermeasures for Modern Web Applications", O'Reilly Media, Inc., 2020, ISBN: 978-1-492-08796-0.

Reference Books:

- 1) Michal Zalewski, "The Tangled Web: A Guide to Securing Modern Web Applications", No Starch Press, 2011, ISBN: 9781593273880
- 2) Sullivan, Bryan, and Vincent Liu. Web Application Security, A Beginner's Guide. McGraw Hill Professional, 2012, ISBN: 978-0-07-177612-7

Web links and Video Lectures (e-Resources)

- https://www.youtube.com/live/8Vsyl5KJFZw
- https://youtu.be/Dp019cWu1cg

Activity-Based Learning (Suggested Activities in Class)/ Practical Based learning

• To learn the basics of ethical hacking and implementing it on a local Web Server

| DATA STRUCTURES AND ALGORITHMS LAB | | | | | | | | | | | | | | |
|--|--------------|---|---------|----------|---------|---------|----------|----------|-------------|---------|---------|--------|-------------|------|
| Course Code | 22MCAL27 CIE | | | | | | | | | | | | 50 | |
| L:T:P:S | 0:0:1 | .5:0 | | | | | | | SEE Marks 5 | | | | 50 | |
| Hrs / Week | 3 | | | | | | | | Total | Marks | | | 100 | |
| Credits | 1.5 | | | | | | | | Exam | Hours | | | 03 | |
| Course outcomes: | | | | | | | | | | | | | | |
| At the end of the course, the student will be able to: | | | | | | | | | | | | | | |
| 22MCAL27.1 | Imple | Implement string and array operations | | | | | | | | | | | | |
| 22MCAL27.2 | Analy | Analyse the functional aspects of stack in recursion. | | | | | | | | | | | | |
| 22MCAL27.3 | Analy | se the | operat | ional a | spects | of que | ue and | Linked | lists d | ata str | ucture | s. | | |
| 22MCAL27.4 | Const | ruct a | tree da | ta stru | cture t | o execı | ite vari | ious ty | pes of | travers | al tech | niques | | |
| 22MCAL27.5 | Select | t an ap | propria | ate data | a struc | ture fo | r a speo | cified a | pplicat | tion. | | | | |
| Mapping of Co | ourse (| Outcor | nes to | Progr | am O | utcom | es and | l Prog | ram Sj | pecific | Outco | omes: | | |
| | P01 | P02 | P03 | P04 | P05 | P06 | P07 | P08 | P09 | P010 | P011 | P012 | PSO1 | PSO2 |
| 22MCAL27.1 | - | I | - | - | - | - | 1 | - | - | • | 2 | 1 | - | 3 |
| 22MCAL27.2 | 2 | 2 | - | - | 1 | - | 1 | 1 | - | - | 2 | 1 | - | 3 |
| 22MCAL27.3 | 2 | 2 | - | - | 1 | 1 | 1 | 1 | - | - | 3 | 1 | - | 3 |
| 22MCAL27.4 | 2 | 2 | 2 | 1 | 2 | 1 | 1 | 1 | 1 | 1 | 3 | 1 | - | 3 |
| 22MCAL27.5 | 2 | 2 | 2 | 1 | 2 | 1 | 1 | 1 | 1 | 1 | 3 | 1 | - | 3 |
| | | | | | | | | | | | | | | |

| Exp. No. / Pgm. No. | List of Experiments / Programs | Hours | COs | |
|------------------------------|--|-------------|--------------------------|--|
| | Prerequisite Experiments / Programs / Demo | | | |
| | Data types and Operators in C++ Control Statements in C++ Conditional and Logical Operations Writing Functions and Function Calls | 3 | NA | |
| | PART-A | | I | |
| 1 | Example programs on arrays: a) Write a C++ program to find the largest element of a given array of integers. b) C++ program to sort an array in Ascending Order. c) C++ Program to Add Two Matrices using multi-dimensional arrays. | 3 | 22MCAL27.1 | |
| 2 | Write a C++ program on String operations. | | | |
| 3 | Define a STUDENT class with USN, Name, and Marks in 3 tests of a subject. Declare an array of 10 STUDENT objects. Using appropriate functions, find the average of the two better marks for each student. Print the USN, Name and the average marks of all the students. | 3 | 22MCAL27.1 22MCAL27.1 | |
| 4 | Write a C++ program that uses stack operations to convert a given infix expression into its postfix equivalent, Implement the stack using an array. | 3 | 22MCAL27.2 | |
| 5 | Simulating the working of linear queue. | 3 | 22MCAL27.3 | |
| 6 | Simulating the working of circular queue. | 3 | 22MCAL27.3 | |
| | PART-B | | ſ | |
| 7 | Write a C++ program that uses functions to perform the following Create a singly linked list of integers. Delete a given integer from the above linked list. Display the contents of the above list after deletion | 3 | 22MCAL27. 3 | |

| 8 | Write a C++ program that uses functions to perform the following Create a doubly linked list of elements. Delete a given element from the above doubly linked list. Display the contents of the above list after deletion. | 3 | 22MCAL27.3 |
|----|---|---|------------|
| 9 | Implement Linear and Binary search techniques. | 3 | 22MCAL27.5 |
| 10 | Implement Heap sort Technique. | 3 | 22MCAL27.5 |
| 11 | Write a C++ program that uses functions to perform the following Create a binary search tree of integers. Traverse the tree in in-order, pre-order and post-order. | 3 | 22MCAL27.4 |
| | PART-C | | |

Beyond Syllabus Virtual Lab Content

- 1. To gain a basic understanding of stacks as an abstract data type, understand operations on stack with their applications. Students to complete the learning objectives using virtual laboratory link: https://ds1-iiith.vlabs.ac.in/exp/stacks-queues/index.html.
- 2. To demonstrate understanding of the concepts of sorting a single dimensional array using any one of the sorting algorithms. Students to complete the learning objectives using virtual laboratory link: https://ds1-iiith.vlabs.ac.in/exp/bubble-sort/index.html.

| CIE Assessment Pattern (50 Marks – Lab) | | | | | | | | | | |
|---|------------|----------|-------------------|--|--|--|--|--|--|--|
| | DDT Lovele | Test (s) | Weekly Assessment | | | | | | | |
| | RD1 Levels | 40 | 10 | | | | | | | |
| L1 | Remember | - | - | | | | | | | |
| L2 | Understand | 10 | 2 | | | | | | | |
| L3 | Apply | 20 | 4 | | | | | | | |
| L4 | Analyze | 10 | 2 | | | | | | | |
| L5 | Evaluate | - | 2 | | | | | | | |
| L6 | Create | - | - | | | | | | | |

SEE Assessment Pattern (50 Marks - Lab)

| | RBT Levels | Exam Marks Distribution (50) |
|----|-------------------|---------------------------------|
| L1 | Remember | - |
| L2 | Understand | 5 |
| L3 | Apply | 20 |
| L4 | Analyze | 20 |
| L5 | Evaluate | 5 |
| L6 | Create | - |

Suggested Learning Resources: Reference Books:

- 1) Data Structures Through C++, 4th Edition, Yashavant Kanetkar, BPB Publications, 2022, ISBN: 978-9355511881.
- 2) Data Structure and Algorithms Using C++: A Practical Implementation, Wiley-Scrivener, 1st Edition, 2021, ISBN: 978-1119750543.

| ADVANCED JAVA LAB | | | | | | | | | | | | | | |
|--|------------------------|---|------------------------------|-------------------------------|----------------------------------|-----------------------------|-------------------------------|-----------------------------|------------------------|---------|--------|-----------|---------|------|
| Course Code | 22M | CAL28 | | | | , | | CIE Marks 50 | | | | | | |
| L:T:P:S | 0:0:1 | 5:0 | | | | | | SEE M | larks | 50 | | | | |
| Hrs / Week | 3 Total Marl | | | | | | | | | | 0 | | | |
| Credits | 1.5 | | | | | | | Exam | Hours | s 03 | | | | |
| Course outcomes: At the end of the course, the student will be able to: | | | | | | | | | | | | | | |
| 22MCAL16.1 | Dev | Develop programs to implement database operations using JDBC. | | | | | | | | | | | | |
| 22MCAL16.2 | Crea | ate dyn | amic w | eb pag | es usin | ıg Servl | et, Java | a Serve | r Pages | s and s | tandar | d tag lil | oraries | |
| 22MCAL16.3 | Desi | ign and | develo | op dyna | amic w | eb page | es usin | g Java ł | beans. | | | | | |
| 22MCAL16.4 | Dev | elop a d | lynami | c web | applica | tion us | ing An | gular a | nd Hib | ernate | | | | |
| 22MCAL16.5 | Ana | lyze an | d evalu | iate liv | e built- | in appl | ication | .S. | | | | | | |
| Mapping of Co | urse C |)utcon | nes to | Progr | am Ou | itcom | es and | Prog | ram Sj | pecific | Outc | omes: | | |
| | P01 | P02 | P03 | P04 | P05 | P06 | P07 | P08 | P09 | P010 | P011 | P012 | PSO1 | PSO2 |
| 22MCAL16.1 | 3 | 1 | 3 | - | - | - | - | - | - | - | - | - | - | 3 |
| 22MCAL16.2 | 3 | 1 | 3 | - | - | - | - | - | - | - | - | 1 | - | 3 |
| 22MCAL16.3 | 3 | 1 | 3 | - | 2 | - | - | 2 | - | 2 | - | 1 | - | 3 |
| 22MCAL16.4 | 3 | 1 | 3 | - | 2 | - | - | 2 | 1 | 2 | - | 1 | - | 3 |
| ZZMCALI0.5 | 3 | 1 | 3 | - | Z | - | - | Z | 1 | Ζ | - | 1 | - | 3 |
| Exp. No. / Pgm. No. | | | List of | f Expe | rimer | nts / P | rogra | ms | | I | Hours | | CO | 5 |
| | | P | rereq | uisite | Expe | rimen | ts / P | rograi | ms / I |)emo | | | | |
| | • | Bas Cor | ics of e Java | Object Progra | Orient mming | ed Prog g | gramm | ing | | | 2 | | NA | |
| | | | | | | PART | Г-А | | | | | | | |
| 1 | Write | e a JAV | A Prog | ram to | insert | data in | to Stu | lent DA | ATA | | 3 | 27 | 2MCAL | 161 |
| | BASE | and re | etrieve | info ba | ised on | i partic | ular qu | ieries. | nic | | 0 | | | |
| 2 | HTM | L using | Servle | et Prog et (user ML and | name d displa | and pa | isswor sing a S | d shou | ld be | | 3 | 22 | 2MCAL | 16.2 |
| 3 | Write meth | e a JAV od | A Serve | elet Pro | ogram | to impl | ement | get an | d post | | | 22 | 2MCAL | 16.2 |
| 4 | Write a par | e a JAV. ticular | A Serve user lo | elet Pro gin an | ogram † d displ | to impl ay a we | ement elcome | verific page. | ation o | of | 3 | 22 | 2MCAL | 16.2 |
| 5 | Write user | e a JAV Referei | A Servl nce. | et Prog | gram u | sing co | okies t | o reme | ember | | 3 | 22 | 2MCAL | 16.2 |
| | | | | | | PART | -B | | | | | | | |
| 6 | a) W n b) W | Vrite a umber Vrite a r not | JAVA JS JAVA JS | SP Prog SP Prog | gram to gram to | o print o the gi | 10 eve ven nu | n and 1 mber i | LO odd s prim | e | 3 | 22 | 2MCAL | 16.3 |
| 7 | Writ | e a JAV cular u | A JSP F | Program in and | n to im display | pleme v a wel | nt veri come p | fication age. | n of a | | 3 | 22 | 2MCAL | 16.3 |
| 8 | Write | e a JAV. ard act | A JSP P ion to c | rogran lisplav | n whicl a Web | h uses j page. | sp: inc | lude ai | nd jsp: | | 3 | 22 | 2MCAL | 16.3 |
| 9 | Write throu Bean | e a JAV igh a H and di | A JSP P TML ai splay t | rogran nd crea he sam | n to get ite a JA ie infor | t stude VA Bea matior | nt info in Clas i throu | rmatio s, popu gh ano | n Ilate other IS | SP. | 3 | 22 | 2MCAL | 16.3 |
| 10 | Write HTTF | e a JAV P Sessio | A Servl | et Prog rface). | gram to | o imple | ment s | ession | s (Usir | ıg | 3 | 22 | 2MCAL | 16.2 |

| | 11 | Write a JAV Dispatcher | iest iethods). | 3 | 22MCAL16.2 | | | | | | | | |
|--------|---|---------------------------|-------------------|--------------|---------------|--------------|--------------|-------------------|--|--|--|--|--|
| | | Develop a s | ngular and | _ | 22MCAL16.4 | | | | | | | | |
| | 12 | Hibernate. | inan ay nann | e web uppire | | ingului ullu | 3 | 22MCAL16.5 | | | | | |
| | | | | | | | | | | | | | |
| | Revond Syllahus Virtual Lah Content | | | | | | | | | | | | |
| | (To be done during Lab but not to be included for CIF or SFF) | | | | | | | | | | | | |
| | (10 be done during Lab but not to be included for LIE or SEE) | | | | | | | | | | | | |
| | | inceps.// wv | httns://w | www.educh | a com/isn-in | -iava/ | Jillation | | | | | | |
| CIF As | CIE Assessment Pattern (50 Marks – Lah) | | | | | | | | | | | | |
| | Jessmen | | Tost (s) | Wookly | scoremont |] | | | | | | | |
| | RBT Le | evels | Test (s) | Weekiy P | | | | | | | | | |
| 14 | D | | 40 | | 10 | | | | | | | | |
| | Reme | mber | 10 | | | | | | | | | | |
| | Understand 10 5 | | | | | | | | | | | | |
| | Apply 10 5 | | | | | | | | | | | | |
| | Analy | ze | 10 | | - | | | | | | | | |
| | Evalua | ate | - | | - | _ | | | | | | | |
| LO | create | | - | | - | | | | | | | | |
| SEE As | sessmen | t Pattern (5 | 0 Marks – La | ıb) | | | | | | | | | |
| | | vola | Exam N | larks | | | | | | | | | |
| | KD1 Le | veis | Distribut | ion (50) | | | | | | | | | |
| L1 | Remen | ıber | 5 | | | | | | | | | | |
| L2 | Unders | tand | 10 |) | - | | | | | | | | |
| L3 | Apply | | 20 |) | - | | | | | | | | |
| L4 | Analyz | e | 10 |) | | | | | | | | | |
| L5 | Evaluat | te | - | | | | | | | | | | |
| L6 | Create | | 5 | | | | | | | | | | |
| Sugge | sted Lea | rning Resou | irces | | | | | | | | | | |
| Refere | ence Boo | oks: | | | | | | | | | | | |
| 1) | Develop | oing Enterpri | se Java Comp | onents. Ent | terprise Java | Beans 3.1.0 | 'reilly. And | rew Lee Rubinger, | | | | | |
| | Bill Burke, O'Reilly Media, 2010. | | | | | | | | | | | | |

2) EJB 3 Developer Guide, A practical guide for developers and architects to the Enterprise Java Beans Standard, Michael Sikora, Shroff Publishers & Distributors PVT LTD. July 2008.

3) Advanced Java Programming, Prasanalakshmi B, 1st Edition, 2015, CBS Publishing, ISBN:9788123923833

| MINI PROJECT USING JAVA AND DBMS | | | | | | | | | | | | | | |
|--|--------|---|---------|---------|----------|---------|----------|----------|--------------|---------|---------|---------|-------------|------|
| Course Code | 22M | CAL29 | | | | CIE M | larks | 50 |) | | | | | |
| L:T:P:S | 0:0:2 | :0 | | | | | | | SEE Marks 50 | | | | | |
| Hrs / Week | - | | | | | | | | Tota | l Mark | s 1(| 100 | | |
| Credits | 2 | | | | | | | | Exan | n Hour | s 03 | 3 | | |
| Course outcomes: | | | | | | | | | | | | | | |
| At the end of the course, the student will be able to: | | | | | | | | | | | | | | |
| 22MCAL29.1 | Reca | Recall the concepts learnt in data base management system course. | | | | | | | | | | | | |
| 22MCAL29.2 | App | ly the r | equire | d tools | and te | chniqu | es for s | softwa | re deve | elopme | nt. | | | |
| 22MCAL29.3 | Exar | nine th | e requ | iremen | ts and | transfo | orm the | em to a | ı softw | are mo | dule. | | | |
| 22MCAL29.4 | Asse | ess the | valid a | rgumer | nts in c | ase stu | dy aga | inst th | e softv | are m | odule d | levelop | oed. | |
| 22MCAL29.5 | Form | nulate | the tes | t cases | and st | rategie | s for th | ne softv | ware m | odule | develo | ped. | | |
| Mapping of Co | urse O | utcom | es to P | rograi | n Outc | omes | and Pi | ogran | 1 Spec | ific Ou | tcome | s: | | |
| | P01 | P02 | P03 | P04 | P05 | P06 | P07 | P08 | P09 | P010 | P011 | P012 | PSO1 | PSO2 |
| 22MCAL29.1 | 3 | 3 | 3 | 2 | 2 | 1 | 2 | 2 | 2 | 1 | 2 | 1 | 2 | 2 |
| 22MCAL29.2 | 3 | 3 | 3 | 2 | 3 | 2 | 2 | 3 | 3 | 2 | 3 | 1 | 2 | 2 |
| 22MCAL29.3 | 3 | 3 | 3 | 2 | 2 | 1 | 2 | 3 | 3 | 1 | 3 | 2 | 2 | 2 |
| 22MCAL29.4 | 3 | 3 | 3 | 2 | 3 | 2 | 2 | 3 | 3 | 2 | 3 | 2 | 2 | 2 |
| 22MCAL29.5 | 3 | 3 | 3 | 2 | 3 | 2 | 2 | 3 | 3 | 2 | 3 | 2 | 2 | 2 |

The Mini Project is based on implementation of concepts and theory learnt in programming languages and DBMS. The sample project titles are listed as follows.

- 1. Barcode Generation
- 2. Bank software with ATM
- 3. Load shedding in mobile systems with Mobiqual
- 4. File security system
- 5. Project planning management
- 6. Library members information system
- 7. College Enrolment system
- 8. Resilient online coverage for surveillance applications
- 9. Employee information and payroll system
- 10. Harmful mail scanning
- 11. Online shopping catalogue system
- 12. Mobile tracking

Guidelines

- Project must be done individually.
- Final evaluation will be done through project demonstration.
- The marks of the mini project would be given on the basis of performance in CIE and SEE.

Evaluation:

During project work, the evaluation process will be divided into number of phases to assess the continuous progress (Minimum three phases).

- The project guides and project coordinator follows rubrics, which is set by the Department for evaluation and then submitted to the head of department.
- Each internal guide will verify the statement of project and literature of works and implementation details. The department will encourage students to make publications in standard conferences/journals.
| Rubrics for | Mini Pro | ject E | val | uatior | n CIE& | SEE: | | | | | | |
|---|---|------------------------|---------------------|--|----------------|------------------------|-----------------------------------|-----------------------------|----------------------|---------------------------|---|--|
| | Review # Review 1 Review 2 Review 3 Final Project Viva-Voce | | Agenda | | Assessment | | Review Assessment Weightage | | Overall Weightage | | | |
| | | | E | Project Synopsis Evaluation | | Rubrics1 | | 25 | | 25 (Avg of R1, R2, R3) | | |
| | | | N E | Mid-Term Project Evaluation | | Rubrics2 | | 25 | | | | |
| | | | E | Final Internal Project Evaluation | | Rubrics3 | | 25 | | | | |
| | | | | Enc | l-Seme Eval | ster Project uation | | 25 | | 25 | | |
| | Total | | | | | | | | | 50 | | |
| CIE Assessm | ent Patte | ern(5 | 0 M | arks - | - Lab) | 1 | | | | | 1 | |
| | | | | | | | Marks Distribution | | n | | - | |
| | | | RBT Levels | | Test (s) | Assessment (s) | | MCQ's | | | | |
| | | | | | | 50 | | | | | | |
| | L1 | | Remember | | ber | - | - | | | - | - | |
| L2 | | L2 | Understand | | - | - | | | - | - | | |
| | | L3 | Apply | | | 20 | - | | | - | - | |
| | | | Analyze | | - | 10 | - | | | - | - | |
| L5 | | L5 | Evaluate | | e | 10 | - | | | - | - | |
| L6 | | | Cr | eate | | 10 | - | | | - | | |
| SEE Assessment Pattern(50 Marks – La RBT | | | | | | evels | Ex Disti | xam Marks tribution (50) | | | | |
| | | | | L1 Rem | | ember | | - | | | | |
| | | | | L2 Understan | | erstand | - | | | | | |
| | | | | L3 Apply | | у | | 20 | | | | |
| | | | | L4 Analy | | yze | | 10 | | | | |
| | | | | L5 Evalu | | uate | | 10 | | | | |
| | | | | L6 Creat | | te | | 10 | | | | |
| Suggested L Web links: • http | earning I os://www | Resou 7.yout | u rce ube | s: .com/ [,] | watch? | v=-GwBNw? | ZOPU | S | | | | |

• https://www.youtube.com/watch?v=9PgZCJNzY9M

| LIFE SKILLS FOR PROFESSIONALS – 2 | | | | | | | | | | | | | | | |
|---|---|---|---------|--------|--------|-------|-------------|--------|-----------|---------------|-------|--------------|------------------|-----|--|
| Course Code | CIE | Marks | Į. | 50 | | | | | | | | | | | |
| L:T:P:S | 1:0:0:0 | | | | | | | | | Marks | 5 5 | 50 | | | |
| Hrs / Week | 2 | | | | | | | | Tot | al Mar | ks 1 | 100 | | | |
| Credits | 1 | | | | | | | | Exa | m Hou | rs (|)1 | | | |
| Course outcom | Course outcomes: | | | | | | | | | | | | | | |
| At the end of the | At the end of the course, the student will be able to: | | | | | | | | | | | | | | |
| 22HSSC210.1 | Relate "SMART GOALS" to Personal and Professional Life. | | | | | | | | | | | | | | |
| 22HSSC210.2 | Articulate and Communicate Ideas and Thoughts with Clarity and Focus. | | | | | | | | | | | | | | |
| 22HSSC210.3 | Inte | Interpret and manage one's emotions in work and life. | | | | | | | | | | | | | |
| 22HSSC210.4 | Develop critical and creative thinking skills for problem solving and decision making for leadership. | | | | | | | | | | | | | | |
| 22HSSC210.5 Analyze the importance of personality development and grooming in corporate life. | | | | | | | | • | | | | | | | |
| Mapping of Cou | ırse Oı | utcom | es to P | rograi | n Outo | comes | and P | rogran | n Spec | ific Ou | tcome | es: | | | |
| | P01 P02 P03 P04 P05 P06 P07 P08 | | | | | | | | P09 | P09 P010 P011 | | | I PO12 PSO1 PSO2 | | |
| 22HSSC210.1 | - | - | - | - | - | 2 | 3 | 2 | 3 | - | - | - | - | - | |
| 22HSSC210.2 | - | - | - | - | - | 2 | 2 | 1 | 3 | - | 2 | - | - | - | |
| 22HSSC210.3 | - | - | - | - | - | 1 | 3 | - | 1 | - | 2 | - | - | - | |
| 22HSSC210.4 | - | - | - | - | - | 2 | 3 | 1 | - | - | 1 | 1 | - | - | |
| 22HSSC210.5 | - | - | - | - | - | 2 | 3 | - | - | - | - | - | - | - | |
| MODULE-1 GOAL SETTING 22HSSC210.1 3 Hours | | | | | | | | | irs | | | | | | |
| Importance of Goals; Creating SMART goals, Mind Maps, and Job Satisfaction. | | | | | | | | | | | | | | | |
| Research on | search on Understand Industry Expectations, Evaluate Self and Set Goals. | | | | | | | | | | | | | | |
| industry | industry | | | | | | | | | | | | | | |
| expectations | | | | | | | | | | | | | | | |
| MODULE-2 | SELF-AWARENESS22HSSC210.23 Hours | | | | | | | | | | | | | | |
| Self-Awareness: Emotional Intelligence, SWOT Analysis, Johari Windows, Self-Management: Time and | | | | | | | | | | | | | | | |
| Stress Managem | lent | . 1 | C 10 | 100 | • | 1. | D (' | г | | 1. 5 | . 1 | XA7 1 | | • • | |
| Self- study | Self- study Understand Self and Others Around to Practice Empathy and to Develop Weaknesses into | | | | | | | | | sinto | | | | | |
| MODULE-3 | PERSONALITY DEVELOPMENT & GROOMING 22HSSC210.5 3 Hours | | | | | | | | | | | | | | |
| Expectations from the Industry, Basics of Professional Grooming: Email and Telephone Etiquette, Asking | | | | | | | | | | | | | | | |
| Relevant Questions to the Interviewer, and Building Confidence. | | | | | | | | | | | | | | | |
| Self-study, Understand Industry Expectations and Professional Etiquette | | | | | | | | | | | | | | | |
| MODULE-4 | THINKING SKILLS AND GROUP DYNAMICS 22HSSC210.4 | | | | | | | | 4 3 Hours | | | | | | |
| Creative Thinking, Critical Thinking, 6 Thinking Hats, Working in a Team, Leadership, Problem Solving Skills. | | | | | | | | | | | | | | | |
| Case study, | | | | | | | | | | | | | | | |
| Creative Understand Thinking Skills for Problem-Solving and Decision-Making. | | | | | | | | | | | | | | | |
| activity | | | | | | | | | | | | | | | |
| MODULE-5 | ARTICULATION AND GROUP DISCUSSION22HSSC210.23 Hours | | | | | | | | irs | | | | | | |
| Idea Generation, Stepping Out of Comfort Zone, Group Discussion Techniques. | | | | | | | | | | | | | | | |
| JAM Session, Understand Idea Generation and Speak with Confidence | | | | | | | | | | | | | | | |
| Group | • | | | | | | | | | | | | | | |
| Discussion, | | | | | | | | | | | | | | | |
| Expansion of | | | | | | | | | | | | | | | |
| Proverbs | | | | | | | | | | | | | | | |

| CIE As | CIE Assessment Pattern(50 Marks – Theory) | | | | | | | | |
|--|---|-------------------|---------------|----------|---|--|--|--|--|
| | | Mark | ks Distrib | ution | | | | | |
| RBT Levels | | Test (s) Quali | | itative | | | | | |
| | | 1630 (3) | Assess | ment (s) | | | | | |
| | | 25 | | 15 | | | | | |
| L1 | Remember | - | | - | | | | | |
| L2 | Understand | 7 | | 6 | | | | | |
| L3 | Apply | 8 | | 7 | - | | | | |
| L4 | Analyze | 10 | | 7 | | | | | |
| L5 | Evaluate | - | | 5 | | | | | |
| L6 | Create | | | - | | | | | |
| SEE Assessment Pattern(50 Marks – Viva-Voce) | | | | | | | | | |
| | DDT Lovele | Exam M | / arks |] | | | | | |
| RBT Levels | | Distribution (50) | | | | | | | |
| L1 | Remember | 10 |) | | | | | | |
| L2 | Understand | 10 |) | | | | | | |
| L3 | Apply | 20 |) | | | | | | |
| L4 | Analyze | 10 | | | | | | | |
| L5 | Evaluate | - | | | | | | | |
| L6 | Create | - | | | | | | | |
| Suggested Learning Resources | | | | | | | | | |
| Text Book: | | | | | | | | | |
| 1) The 7 – Habits of Highly Effective People, Stephen R Covey, Neha Publishers. | | | | | | | | | |
| 2) Seven Habits of Highly Effective Teens, Convey Sean, New York, Fireside Publishers, 1998. | | | | | | | | | |
| 3) Emotional Intelligence, Daniel Coleman, Bantam Book, 2006. | | | | | | | | | |
| 4) How to win friends and influence people, Dale Carnegie. | | | | | | | | | |
| Activity-Based Learning (Suggested Activities in Class)/ Practical Based learning | | | | | | | | | |
| Interviewing industry experts | | | | | | | | | |
| Interview Survey | | | | | | | | | |
| Mind mans | | | | | | | | | |
| | | | | | | | | | |
| | Kole play Creative activity | | | | | | | | |
| | creative activi | ly | | | | | | | |

APPENDICES

NHCE/MCA/2023-24

APPENDIX A

Outcome Based Education

Outcome-based education (OBE) is an educational theory that bases each part of an educational system around goals (outcomes). By the end of the educational experience, each student should have achieved the goal. There is no specified style of teaching or assessment in OBE; instead, classes, opportunities, and assessments should all help students achieve the specified outcomes.

There are three educational outcomes as defined by the National Board of Accreditation: Program Educational Objectives: The Educational Objectives of the Computer Applications program are the statements that describe the expected achievements of graduate in their career and in particular, what the graduates are expected to perform and achieve during the first few years after graduation. [nbaindia.org]

Program Outcomes: What the student would demonstrate upon graduation. Graduate attributes are separately listed in Appendix B

Course Outcome: The specific outcome/s of each course/subject that is a part of the program curriculum. Each subject/course is expected to have a set of Course Outcomes.

Mapping of Outcome:



APPENDIX B

The Graduate Attributes of NBA

- **PO1 Computational Knowledge:** Apply knowledge of computing fundamentals, computing specialization, mathematics, and domain knowledge appropriate for the computing specialization to the abstraction and conceptualization of computing models from defined problems and requirements.
- **PO2 Problem Analysis:** Identify, formulate, research literature, and solve complex computing problems reaching substantiated conclusions using fundamental principles of mathematics, computing sciences, and relevant domain disciplines.
- **PO3 Design /Development of Solutions:** Design and evaluate solutions for complex computing problems, and design and evaluate systems, components, or processes that meet specified needs with appropriate consideration for public health and safety, cultural, societal, and environmental considerations.
- **PO4 Conduct Investigations of Complex Computing 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.
- **PO5 Modern Tool Usage:** Create, select, adapt and apply appropriate techniques, resources, and modern computing tools to complex computing activities, with an understanding of the limitations.
- **PO6 Professional Ethics:** Understand and commit to professional ethics and cyber regulations, responsibilities, and norms of professional computing practice.
- **P07** Life-long Learning: Recognize the need, and have the ability, to engage in independent learning for continual development as a computing professional.
- **PO8 Project management and finance:** Demonstrate knowledge and understanding of the computing 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.
- **PO9 Communication Efficacy:** Communicate effectively with the computing community, and with society at large, about complex computing activities by being able to comprehend and write effective reports, design documentation, make effective presentations, and give and understand clear instructions.
- **PO10** Societal and Environmental Concern: Understand and assess societal, environmental, health, safety, legal, and cultural issues within local and global contexts, and the consequential responsibilities relevant to professional computing practice.
- **PO11** Individual and Team Work: Function effectively as an individual and as a member or leader in diverse teams and in multidisciplinary environments.
- **PO12 Innovation and Entrepreneurship:** Identify a timely opportunity and using innovation to pursue that opportunity to create value and wealth for the betterment of the individual and society at large.

APPENDIX C

BLOOM'S TAXONOMY

Bloom's taxonomy is a classification system used to define and distinguish different levels of human cognition—i.e., thinking, learning, and understanding. Educators have typically used Bloom's taxonomy to inform or guide the development of assessments (tests and other evaluations of student learning), curriculum (units, lessons, projects, and other learning activities), and instructional methods such as questioning strategies.



BLOOM'S TAXOMONY