Sri Indu
College of Engineering & Technology
UGC Autonomous Institution
Recognized under 2(f) & 12(B) of UGC Act 1956,
NAAC, Approved by AICTE &
Permanently Affiliated to JNTUH

Estd.2001

# HANDOUT

## III Year I Semester

DEPARTMENT OF INFORMATION TECHNOLOGY

**ACADEMIC YEAR 2024-2025**

# SRI INDU COLLEGE OF ENGINEERING & TECHNOLOGY

**(An Autonomous Institution under UGC, New Delhi)**

**(Permanently Affiliated to JNTUH, Approved by AICTE, New Delhi and Accredited by NBA, NAAC)**
**Sheriguda Village, Ibrahimpatnam Mandal, Ranga Reddy Dist. – 501 510**

## DEPARTMENT OF INFORMATION TECHNOLOGY

# HANDOUT- INDEX

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# SRI INDU COLLEGE OF ENGINEERING & TECHNOLOGY
## B. TECH –INFORMATION TECHNOLOGY

### INSTITUTION VISION

To be a premier Institution in Engineering & Technology and Management with competency, valuesand social consciousness.

### INSTITUTION MISSION

**IM1** Provide high quality academic programs, training activities and research facilities.

**IM2** Promote Continuous Industry-Institute Interaction for Employability, Entrepreneurship, Leadership and Research aptitude among stakeholders.

**IM3** Contribute to the Economical and technological development of the region, state and nation.

### DEPARTMENT VISION

To be a recognized knowledge center in the field of Information Technology with self - motivated, employable engineers to society.

### DEPARTMENT MISSION

The Department has following Missions:

**DM1** To offer high quality student centric education in Information Technology.

**DM2** To provide a conducive environment towards innovation and skills.

**DM3** To involve in activities that provide social and professional solutions.

**DM4** To impart training on emerging technologies namely cloud computing and IOT with involvement of stake holders.

### PROGRAM EDUCATIONAL OBJECTIVES (PEOs)

**PEO1:** **Higher Studies:** Graduates with an ability to apply knowledge of Basic sciences and programming skills in their career and higher education.

**PEO2:** **Lifelong Learning:** Graduates with an ability to adopt new technologies for ever changing IT industry needs through Self-Study, Critical thinking and Problem solving skills.

**PEO3:** **Professional skills:** Graduates will be ready to work in projects related to complex problems involving multi-disciplinary projects with effective analytical skills.

**PEO4:** **Engineering Citizenship:** Graduates with an ability to communicate well and exhibitsocial, technical and ethical responsibility in process or product.

# PROGRAM OUTCOMES (POs) & PROGRAM SPECIFIC OUTCOMES (PSOs)

| PO | Description |
|---|---|
| PO 1 | **Engineering Knowledge:** Apply knowledge of mathematics, natural science, computing, engineering fundamentals and an engineering specialization as specified in WK1 to WK4 respectively to develop to the solution of complex engineering problems. |
| PO 2 | **Problem Analysis:** Identify, formulate, review research literature and analyze complex engineering problems reaching substantiated conclusions with consideration for sustainable development. (WK1 to WK4) |
| PO 3 | **Design/Development of Solutions:** Design creative solutions for complex engineering problems and design/develop systems/components/processes to meet identified needs with consideration for the public health and safety, whole-life cost, net zero carbon, culture, society and environment as required. (WK5) |
| PO 4 | **Conduct Investigations of Complex Problems:** Conduct investigations of complex engineering problems using research-based knowledge including design of experiments, modelling, analysis & interpretation of data to provide valid conclusions. (WK8). |
| PO 5 | **Engineering Tool Usage:** Create, select and apply appropriate techniques, resources and modern engineering & IT tools, including prediction and modelling recognizing their limitations to solve complex engineering problems. (WK2 and WK6) |
| PO 6 | **The Engineer and The World:** Analyze and evaluate societal and environmental aspects while solving complex engineering problems for its impact on sustainability with reference to economy, health, safety, legal framework, culture and environment. (WK1, WK5, and WK7). |
| PO 7 | **Ethics:** Apply ethical principles and commit to professional ethics, human values, diversity and inclusion; adhere to national & international laws. (WK9) |
| PO 8 | **Individual and Collaborative Team work:** Function effectively as an individual, and as a member or leader in diverse/multi-disciplinary teams. |
| PO 9 | **Communication:** Communicate effectively and inclusively within the engineering community and society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations considering cultural, language, and learning differences |
| PO 10 | **Project Management and Finance:** Apply knowledge and understanding of engineering management principles and economic decision-making and apply these to one's own work, as a member and leader in a team, and to manage projects and in multidisciplinary environments. |
| PO 11 | **Life-Long Learning:** Recognize the need for, and have the preparation and ability for i) independent and life-long learning ii) adaptability to new and emerging technologies and iii) critical thinking in the broadest context of technological change. (WK8) |
| **Program Specific Outcomes** | |
| PSO 1 | **Software Development:** To apply the knowledge of Software Engineering, Data Communication, Web Technology and Operating Systems for building IOT and Cloud Computing applications. |
| PSO 2 | **Industrial Skills Ability:** Design, develop and test software systems for world-wide network of computers toprovide solutions to real world problems. |
| PSO 3 | **Project implementation:** Analyze and recommend the appropriate IT Infrastructure required for the implementationof a project. |

## COs MAPPING WITH POs & PSOs

### (R22CSE2215)SOFTWARE ENGINEERING

At the end of the course student will be able to:

| | |
|---|---|
| C313.1. | Analyze the knowledge of Software Engineering principles of large scale software systems, and the process models that are used to build them(analyze) |
| C313.2. | Differentiate the functional and non-functional requirements, user and system requirements with respect to preparing the SRS document and perform feasibility study, validation of the gathering requirements(Understanding) |
| C313.3. | Illustrate various system models with respect to the nature of software to be developed(Remembering) |
| C313.4. | Design software Architecture for the Specified application o problem(Create) |
| C313.5. | Develop and Apply testing strategies for software application (Apply) |
| C313.6 | Evaluate Quality control and how to ensure good quality software(Evaluate) |

*Course Articulation Matrix*

| CO | PO 1 | PO 2 | PO 3 | PO 4 | PO 5 | PO 6 | PO 7 | PO 8 | PO 9 | PO 10 | PO 11 | PO 12 | PSO 1 | PSO 2 | PSO 3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| C322.1 | 3 | 3 | - | - | - | - | - | - | - | - | - | - | 3 | 3 | 3 |
| C322.2 | 3 | - | 3 | - | - | 2 | - | - | 3 | 3 | - | - | 3 | 3 | 3 |
| C322.3 | 3 | - | 2 | -- | - | 3 | - | | 3 | 3 | - | - | 3 | 3 | 3 |
| C322.4 | 3 | 3 | - | 3 | 2 | - | - | - | - | - | - | - | 3 | 3 | 3 |
| C322.5 | 3 | - | - | 2 | 2 | 3 | - | - | - | - | - | - | 3 | 3 | 3 |
| C322.6 | 3 | 3 | 2 | 2 | 2 | 3 | - | - | 3 | 3 | - | - | 3 | 3 | 3 |
| | 3 | 3 | 2.5 | 2.5 | 2 | 4 | 0 | 0 | 3 | 3 | 0 | 0 | 3 | 3 | 3 |

# SOFTWARE ENGINEERING

# SRI INDU COLLEGE OF ENGINEERING & TECHNOLOGY

## (An Autonomous Institution under UGC, New Delhi)

**B.Tech. -III Year–I Semester**

| L | T | P | C |
|---|---|---|---|
| 3 | 0 | 0 | 3 |

### (R22CSE2215)SOFTWARE ENGINEERING

**Course Objectives**

- The aim of the course is to provide an understanding of the working knowledge of the techniques for estimation, design, testing and quality management of large software development projects.
- Topicsincludeprocessmodels,softwarerequirements,softwaredesign,softwaretesting,software process/product metrics, risk management, quality management and UML diagrams

**Course Outcomes**

- Abilitytotranslateend-userrequirementsintosystemandsoftwarerequirements,usinge .g. UML, and structure the requirements in a Software Requirements Document (SRD).
- Identifyandapplyappropriatesoftwarearchitecturesandpatternstocarryouthighleveldesignofa system and be able to critically compare alternative choices.
- Willhaveexperienceand/orawarenessoftestingproblemsandwillbeabletodevelopasimpletestingreport

**UNIT-I**

**Introduction to Software Engineering**: The evolving role of software, changing nature of software, software myths. **A Generic view of process**: Software engineering- a layered technology, a process framework, the capability maturity model integration (CMMI). **Process models**: The waterfall model, Spiral model and Agile methodology

**UNIT-II**

**Software Requirements:** Functional and non-functional requirements, user requirements, system requirements, interface specification, the software requirements document.

**Requirements engineering process**: Feasibility studies, requirements elicitation and analysis, requirements validation, requirements management.

**UNIT-III**

**Design Engineering:** Design process and design quality, design concepts, the design model. Creating an architectural design: software architecture, data design, architectural styles and patterns, architectural design, conceptual model of UML, basic structural modeling, class diagrams, sequence diagrams, collaboration diagrams, use case diagrams, component diagrams.

**UNIT-IV**

**Testing Strategies:** A strategic approach to software testing, test strategies for conventional software,black-box and white-box testing, validation testing, system testing, the art of debugging. Metrics for Process and Products: Software measurement, metrics for software quality.

**UNIT-V**

**Risk management**: Reactive Vs proactive risk strategies, software risks, risk identification, risk projection, risk refinement, RMMM. Quality Management: Quality concepts, software quality assurance, software reviews, formal technical reviews, statistical software quality assurance, software reliability, the ISO 9000 quality standards.

**TEXTBOOKS:**

1. SoftwareEngineering,Apractitioner‟sApproach-RogerS.Pressman,6thedition,McGrawHill International Edition.
2. SoftwareEngineering-Sommerville,7thedition,PearsonEducation.

**REFERENCEBOOKS:**

1. The unified modeling language user guide Grady Booch, James Rambaugh, Ivar Jacobson,Pearson Education.
2. Software Engineering, an Engineering approach-James F. Peters, Wi told Pedrycz, John Wiley.
3. Software Engineering principles and practice- Waman S Jawadekar, The McGraw-Hill Companies.
4. FundamentalsofobjectorienteddesignusingUMLMeilerpage-Jones:PearsonEducation.

| | SRIINDUCOLLEGEOFENGNEERING&TECHNOLOGY LESSON PLAN<br>(Regulation:R22)<br>DEPARTMENTOFINFORMATIONTECHNOLOGY | Preparedon<br>Rev1:<br>Page: 1of8 |
|---|---|---|
| | **Sub.Code &Title** | **(R22CSE2215)Software Engineering** |
| | **AcademicYear:2024-25** | **Year/Sem** **III/I** |
| | **Faculty Name& Designation** | **K.Priyanka &Assistant Professor** |

| Unit/ Item No. | Topic (s) | Book Reference | Page (s) From | Page (s) To | Teaching Methodology | Proposed No. of Periods | ActualDate ofHandled | CO/RBT |
|---|---|---|---|---|---|---|---|---|
| | **UNIT–I** | | | | | | | |
| I | Introduction to Software Engineering | | | | | **14** | | **CO/RBT** |
| 1.1 | The evolving role of software | T1 | 34 | 39 | Blackboard | 02 | | CO1/L3 |
| 1.2 | Changing Nature of Software | T1 | 40 | 41 | Blackboard | 02 | | CO1/L3 |
| 1.3 | Software myths | T1 | 45 | 47 | Blackboard | 02 | | CO1/L3 |
| 1.4 | A Generic view of process: Software engineering | T1 | 50 | 53 | Blackboard | 02 | | CO1/L3 |
| 1.5 | A layered technology, | T1 | 53 | 54 | Blackboard | 01 | | C01/L3 |
| 1.6 | A process framework | T1 | 54 | 56 | Blackboard | 01 | | CO1/L3 |
| 1.7 | The Capability Maturity Model Integration(CMMI) | T1 | 59 | 62 | Blackboard | 01 | | CO3/L3 |
| 1.8 | Process models:<br>The waterfall model, | T1 | 78 | 80 | Presentation seminar | 01 | | CO3/L3 |
| 1.9 | Spiral model | T1 | 86 | 88 | Presentation | 01 | | CO3/LL3 |
| 1.10 | Agile Methodology | T1 | 109 | 110 | Presentation seminar | 01 | | CO3/L3 |
| | **Review** | **Signature of the HOD/Coordinator** | | | | | | |
| **Unit/ Item No.** | **Topic (s)** | **Book Reference** | **Page (s) From** | **Page (s) To** | **Teaching Methodology** | **Proposed No. of Periods** | **Actual Date of Handled** | **CO/RBT** |
| | **UNITII** | | | | | | | |
| II | Software Requirements: | | | | | 9 | | **CO/RBT** |
| 2.1 | Functional and non-functional requirements | T2 | 141 | 145 | Blackboard | 01 | | CO2/L3 |
| 2.2 | User requirements | T2 | 149 | 151 | Blackboard | 01 | | CO2/L3 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 2.3 | System requirements, Interface specification | T2 | 151 | 157 | Blackboard | 01 | | CO2/L3 |
| 2.4 | The software requirements document | T2 | 158 | 161 | Blackboard | 01 | | CO2/L3 |
| 2.5 | **Requirements engineering process:** Feasibility studies | T2 | 166 | 168 | Blackboard | 01 | | CO2/L3 |
| 2.6 | Requirements elicitation and analysis | T2 | 168 | 170 | Blackboard | 01 | | CO2/L3 |
| 2.7 | Requirements validation | T2 | 180 | 182 | Blackboard | 01 | | CO2/L3 |
| 2.8 | Requirements management. | T2 | 183 | 183 | Blackboard | 02 | | CO3/L3 |
| | **Review** | **Signature of the HOD/Coordinator** | | | | | | |
| **Unit/ Item No.** | **Topic (s)** | **Book Reference** | **Page (s)** From | To | **Teaching Methodology** | **Proposed No. of Periods** | **Actual Date of Handled** | **CO/RBT** |
| **UNIT-III** | | | | | | | | |
| III | **Design Engineering:** | | | | | **13** | | **CO/RBT** |
| 3.1 | Design process and Design quality, Design concepts, | T1 | 261 | 273 | NPTEL | 02 | | CO4/L3 |
| 3.3 | The design model. Creating an architectural design: software architecture, | T2 | 274 | 280 | Blackboard | 1 | | CO4/L3 |
| 3.4 | Data design, Architectural styles and patterns, | T1 | 290 | 297 | Blackboard | 1 | | CO4/L3 |
| 3.5 | Architectural Design, | T1 | 298 | 298 | Blackboard | 1 | | CO4/L3 |
| 3.6 | Conceptual model of UML, basic structural modeling | R1 | 39 | 52 | Blackboard | 1 | | CO4/L3 |
| 3.7 | Class Diagrams | T1 | 290 | 296 | Blackboard | 1 | | CO4/L3 |
| 3.8 | Sequence Diagrams | T2 | 297 | 297 | Blackboard | 1 | | CO4/L3 |
| 3.9 | Collaboration Diagrams, Use Case Diagrams | T2 | 391 | 395 | Blackboard | 1 | | CO4/L3 |
| 3.10 | Component Diagrams | T2 | 415 | 415 | Blackboard | 1 | | CO4/L3 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 3.11 | Performing User interface design: Golden rules, User interface analysis and design, | T2 | 69 | 71 | Blackboard | 1 | | CO4/L3 |
| 3.12 | Interface analysis, | T2 | 72 | 73 | Blackboard | 1 | | CO1/L3 |
| 3.13 | Interface design steps, Design evaluation. | T2 | 74 | 75 | Blackboard | 1 | | CO1,CO4/L1 |
| | **Review** | **Signature of the HOD/Coordinator** | | | | | | |
| **Unit/ Item No.** | **Topic (s)** | **Book Reference** | **Page (s)** From | To | **Teaching Methodology** | **Proposed No. of Periods** | **Actual Date of Handled** | **CO/RBT** |
| | **UNIT-IV** | | | | | | | |
| IV | **Testing Strategies** | | | | | **8** | | **CO/RBT** |
| 4.1 | A strategic approach to software testing, | T1 | | 77 | Blackboard | 1 | | CO5/L3 |
| 4.2 | Test strategies for conventional software, | T1 | 78 | 79 | Blackboard | 1 | | CO5/L3 |
| 4.3 | Black-Box and White-Box testing, Validation testing,. | T1 | 80 | 81 | Blackboard | 2 | | CO5/L3 |
| 4.4 | System testing, the art of Debugging | T1 | 82 | 83 | Blackboard | 1 | | CO5/L3 |
| 4.5 | Product metrics: Software Quality, Frame work for Product metrics, Metrics for Analysis Model, Metrics for Design Model, | T1 | 84 | 85 | Blackboard | 2 | | CO6/L3 |
| 4.6 | Metrics for source code, Metrics for testing, | T1 | 86 | 87 | Blackboard | 1 | | CO5/L3 |
| 4.7 | Metrics for maintenance. Metrics for Process and Products: Software Measurement, | T1 | 88 | 81 | Blackboard | 1 | | CO5/L3 |
| 4.8 | Metrics for software quality. | T1 | 92 | 93 | Blackboard | 1 | | CO6/L3 |
| | **Review** | **Signature of the HOD/Coordinator** | | | | | | |
| **Unit/ Item No.** | **Topic (s)** | **Book Reference** | **Page (s)** From | To | **Teaching Methodology** | **Proposed No. of Periods** | **Actual Date of Handled** | **CO/RBT** |
| | **UNIT-V** | | | | | | | |
| V | Risk Management: | | | | | **10** | | CO/RBT |
| 5.1 | Reactive vs Proactive Risk strategies, software risks, | T1 | 94 | 96 | Blackboard | 1 | | CO5/L3 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 5.2 | Risk identification, Risk projection, | T1 | 97 | 98 | Black board | 1 | | CO2/L3 |
| 5.3 | Risk refinement, RMMM, RMMM Plan. | T1 | 99 | 101 | Black board | 2 | | CO3/L3 |
| 5.4 | Quality Management: Quality concepts, | T1 | 102 | 103 | Black board | 1 | | CO6/L3 |
| 5.5 | Software quality assurance, Software Reviews, | T1 | 104 | 106 | Black board | 1 | | CO1/L3 |
| 5.6 | Formal technical reviews, Statistical Software quality Assurance, | T1 | 107 | 108 | Black board | 2 | | CO6/L3 |
| 5.7 | Software reliability, The ISO9000quality standards. | T1 | 109 | 111 | Black board | 1 | | CO6/L3 |
| | **Review** | **Signature of the HOD/Coordinator** | | | | | | |

## LISTOFTEXTBOOKSANDREFERENCES

### TextBooks:


1. SoftwareEngineeringApractitioner'sApproach,RogerSPressman,6thedition. McGrawHill International Edition.
2. SoftwareEngineering,IanSommerville,7thedition,Pearsoneducation.


### ReferenceBooks:


1. Software Engineering, A Precise Approach, Pankaj Jalote,Wiley India, 2010.
2. SoftwareEngineering:APrimer,WamanSJawadekar,TataMcGraw-Hill,2008
3. Fundamentals of Software Engineering, Rajib Mall, PHI, 2005
4. Software Engineering, Principles and Practices, Deepak Jain, Oxford University Press.
5. SoftwareEngineering1: Abstraction and modeling, Diner Bjorner, Springer International edition, 2006.


### Weblinks

W1: https://nptel.ac.in/courses/106101061/2W2:https://elsmar. com/pdf_files/cmmi-overview05.pdfW3:www.tutorialspoint.com/uml/uml_basic _notations.htm

## CONTENTBEYONDTHESYLLABUS

| S.No | Topics | Proposed Actions | Date | Resource Person/Mode | POs | PSOs |
|---|---|---|---|---|---|---|
| 1. | Software equality assurance metrics | Classroom (2Periods) | | Blackboard | POs1, POs2 | PSOs1, PSOs2, PSOs4 |
| 2. | Software quality assurance standardization | Classroom (2Periods) | | Blackboard | POs4, POs9, POs 11 | - |
| 3 | Learning testing tools | Classroom (2Periods) | | Blackboard | POs1, POs2, POs3, POs4, POs5 | PSOs3 |

## ASSIGNMENT

| S.No. | Assignment Questions | Course Outcome | Books To be Referred | Date Of Announcement | Date Of Submission |
|---|---|---|---|---|---|
| 1. | A. Explain software myths? B. Explain the classical lifecycle model with real time scenario | CO1 | T1 | | |
| 2. | A. Elaborate on related patterns. B. Illustrates RAD process model with an example | CO5,CO3 | T1 | | |
| 3. | Draw and explain the sequence diagram representing various Consequences during withdraw from ATM system.) | CO4 | T1 | | |
| 4. | A. Explain in detail object model. B. Explain in detail requirement elicitation process | CO3 | T1 | | |
| 5. | What is software architecture? Explain about structured chart with An example. | CO4 | T1 | | |
| 6. | What do What do you mean by | CO4 | T1 | | |

| | | | | | |
|---|---|---|---|---|---|
| | Architecture? Give the functioning of various architectural designs. | | | | |
| 7. | Discuss the MOOD metrics unit. | CO1 | T1 | | |
| 8. | Explain in detail about validation testing and system testing. | CO5 | T1 | | |
| 9. | Discus about Reactive vs. Proactive Risk strategies | CO6 | T1 | | |
| 10 | Explain in detail about RMMM and RMMM Plan. | CO6 | T1 | | |

| Preparedby | RecommendedandApproved by |
|---|---|
| (Signature &Name) | HOD/IT |

| | | |
|---|---|---|
| | **SRIINDUCOLLEGEOFENGINEERING&TECHN OLOGY**<br>**QUESTIONBANK**<br>**Department of Information Technology** | **(Regulation:R22)** |

| | | |
|---|---|---|
| **Sub. Code& Title** | **(R22CSE2215)SOFTWARE ENGINEERING** | |
| **AcademicYear:2024-25** | **Year/Sem.** | **III–I** |
| **Faculty Name& Designation** | **K.PRIYANKA, Assistant Professor** | |

**QUESTION BANK WITH BLOOMS TAXONOMY LEVEL(BTL)**

(1.Remembering 2.Understanding3.Applying4.Analyzing 5.Evaluating6. Creating)

| **UNIT-1:Introduction To Software Engineering** | | | |
|---|---|---|---|
| | **Multiple Choice Questions** | **BT Level** | **Course Outcome** |
| 1C-1 | Software is defined as _____<br>a) Set of programs, documentation & configuration of data<br>b) Set of programs<br>c) Documentation and configuration of data<br>d) None of the mentioned | L4 | CO1 |
| 1C-2 | Which of the following is not the characteristic of a software**?**<br>a) Software does not wear out<br>b) Software is not manufactured<br>c) Software is always correct<br>d) Software is flexible | L1 | CO1 |
| 1C-3 | Which one of the following models is not suitable for accommodating any change?<br>a) Build &Fix Model<br>b) Prototyping Model<br>c) RAD Model<br>d) Waterfall Model | L1 | CO1 |
| 1C-4 | Select the incorrect statement:“ Software engineers should<br>a) Not knowingly accept work that is outside your competence.”<br>b) Not use your technical skills to misuse other people’s computers.”<br>c) Be dependent on their colleagues.”<br>d) Maintain integrity and independence in their professional judgment.” | L2 | CO1 |
| 1C-5 | Select the option that suits the Manifesto for Agile Software Development<br>a) Individuals and interactions<br>b) Working software<br>c) Customer collaboration<br>d) All of the mentioned | L4 | CO1 |
| 1C-6 | Which of the following is not a phase of CMMI**?**<br>a) Initial<br>b) Quantitatively managed<br>c) Integrated<br>d) Defined | L1 | CO1 |

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| | **SRIINDUCOLLEGEOFENGINEERING&TECHN OLOGY**<br>**QUESTIONBANK**<br>**Department of Information Technology** | **(Regulation:R22)** |

| | | |
|---|---|---|
| **Sub. Code& Title** | **(R22CSE2215)SOFTWARE ENGINEERING** | |
| **AcademicYear:2024-25** | **Year/Sem.** | **III–I** |
| **Faculty Name& Designation** | **K.PRIYANKA, Assistant Professor** | |

| | | | |
|---|---|---|---|
| 1C-7 | How is plan driven development different from agile development?<br>a) Outputs are decidedthroughaprocessofnegotiationduringthesoftware development process<br>b) Specification, design,implementationandtestingareinterleaved<br>c) Iterationoccurswithin activities<br>d) Allofthementioned | L4 | CO1 |
| 1C-9 | Whichofthesearethe5genericsoftwareengineeringframeworkactivities?<br>a). Communication,riskmanagement,measurement,production,reviewing<br>b). Communication,planning,modeling,construction,deployment<br>c). Analysis,designing,programming,debugging,maintenance<br>d). Analysis,planning,designing,programming, testing | L1 | CO1 |
| 1C-10 | Theprocessofdevelopingasoftwareproductusingsoftwareengineeringprinciples and methods is referred to as _____?<br>a). Software Engineering<br>b). SoftwareEvolution<br>c). SystemModels<br>d). SoftwareModels | L2 | CO1 |
| 1C-11 | Softwareevolutiondoes not comprises:<br>a) Developmentactivities<br>b) Negotiatingwith client<br>c) Maintenance activities<br>d) Re-engineeringactivities | L5 | CO1 |
| 1C-12 | WhichistheLayered TechnologyinBedrockthat supportsSoftware Engineering?<br>a. Methods<br>b. Tools<br>c. Process<br>d. QualityFocus | L1 | CO1 |
| 1C-13 | Thetwodimensions ofspiralmodel are<br>a) diagonal,angular<br>b) radial,perpendicular<br>c) radial,angular<br>d) diagonal,perpendicular | L1 | CO1 |
| 1C-14 | Whichofthefollowingactivitiesofagenericprocessframeworkprovidesafeedback report?<br>a) Communication<br>b) Planning<br>c) Modeling&Construction<br>d) Deployment | L1 | CO1 |
| 1c-15 | AgileSoftwareDevelopment isbased on whichof thefollowingtype?<br>a) IterativeDevelopment | L2 | CO1 |

| | | |
|---|---|---|
| | **SRIINDUCOLLEGEOFENGINEERING&TECHN OLOGY**<br>**QUESTIONBANK**<br>**Department of Information Technology** | **(Regulation:R22)** |

| | | | |
|---|---|---|---|
| **Sub. Code& Title** | **(R22CSE2215)SOFTWARE ENGINEERING** | | |
| **AcademicYear:2024-25** | **Year/Sem.** | **III–I** | |
| **Faculty Name& Designation** | **K.PRIYANKA, Assistant Professor** | | |

| | | | |
|---|---|---|---|
| | b) IncrementalDevelopment<br>c) BothIncrementalandIterativeDevelopment<br>d) LinearDevelopment | | |
| 1C-16 | WhatarethefeaturesofSoftware Code?<br>a) Simplicity<br>b) Accessibility<br>c) Modularity<br>d) Allofthe above | L1 | CO1 |
| 1C-17 | AgileSoftwareDevelopmentisbased on<br>a) IncrementalDevelopment<br>b) IterativeDevelopment<br>c) LinearDevelopment<br>d) BothIncrementalandIterativeDevelopment | L1 | CO1 |
| 1C-18 | 12. Attributes of good software is _____<br>a) Development<br>b) Maintainability& functionality<br>c) Functionality<br>d) Maintainability | L1 | CO1 |
| 1C-19 | WhatarethefeaturesofSoftware Code?<br>a) Simplicity<br>b) Accessibility<br>c) Modularity<br>d) Allofthe above | L5 | CO1 |
| 1C-20 | WhatisSoftware Engineering?<br>a) Designinga software<br>b) Testinga software<br>c) Applicationof engineeringprinciplestothedesigna software<br>d) Noneofthe above | L6 | CO1 |
| **Fillintheblanks** | | | |
| 1F-1 | Actual programmingof software code is done duringthe _____step inthe SDLC. | L1 | CO1 |
| 1F-2 | _____areappliedthroughoutthesoftware process. | L1 | CO1 |
| 1F-3 | In XP Increments aredelivered to customers every_____weeks. | L2 | CO1 |
| 1F-4 | _____frameworksactivitiesarepresentinAdaptiveSoftwareDevelopment(ASD) | L1 | CO1 |
| 1F-5 | AgileSoftwareDevelopmentisbased on_____ | L1 | CO1 |

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|---|---|---|---|
| 1F-6 | _____Is the first step in the software development life cycle. | L1 | CO1 |
| 1F-7 | _____Is the major drawback of the Spiral Model. | L1 | CO1 |
| 1F-8 | _____Is a set of programs that are built by software engineers. | L2 | CO1 |
| 1F-9 | _____Is a collection of programs written to service other program. | L2 | CO1 |
| 1F-10 | _____Makes use ofnon-numericalalgorithmatosolvecomplexproblemsthatare notamenable tocomputationorstraightforwareanalaysis | L1 | CO1 |
| 1F-11 | _____istheprocess of changingasystemafterithasbeendelivered andisin use. | L1 | CO1 |
| 1F-12 | _____residesonlyin read-onlymemoryandisused tocontrol productsandsystems forthe consumer and industrial markets. | L1 | CO1 |
| 1F-13 | The_____and_____arethetwomajordimensionsencomposedinthespiral model. | L5 | CO1 |
| 1F-14 | CMMIstandsfor_____ | L1 | CO1 |
| 1F-15 | _____activitiesofaGenericProcessframeworkprovide afeedback report. | L1 | CO1 |
| 1F-16 | SDLCstandsfor_____ | L2 | CO1 |
| IF-17 | _____ suitstheManifesto forAgileSoftware Development. | L1 | CO1 |
| 1F-18 | _____ isnot a fundamental activityfor softwareprocesses in software development. | L6 | CO1 |
| 1F-19 | _____isnotsuitablefor accommodatinganychange. | L4 | CO1 |
| 1F-20 | _____isasoftwaredevelopmentlifecyclemodelthatischosenifthe development team has less experience on similar projects. | L1 | CO1 |

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## Match the following

| | | | |
|---|---|---|---|
| 1M-1 | a) System software — i)c, java<br>b) Application software — ii)Gps Devices<br>c) Embedded software — iii)Compiler Aided design<br>d) Scientific/Engineering software — iv) Operating system | L1 | CO1 |
| 1M-2 | a) Waterfall — i)Continuous collaboration& improvement<br>b) Spiral/Iterative system — ii)Inflexible Partitioningoftheprojectinto<br>c) Agile — iii)Frame work for agile development<br>d) Scrum — iv)Explicit Recognition of risk | L1 | CO1 |
| 1M-3 | a) Level1 — i)Work is quantitatively<br>b) Level2 — ii)Work is based upon continuous improvement<br>c) Level3 — iii)Work is performed informally<br>d) Level4 — iv)Work is planned and Tracked<br>e) Level5 — v)Work is well defined | L1 | CO1 |
| 1M-4 | a) Quality focus — i)Technical Question<br>b) Process — ii)Supports automated &semi-automated<br>c) Tools — iii)Bedrock support<br>d) Method — iv)Foundation layer | L1 | CO1 |
| 1M-5 | a) Planning& Analysis — i)Implementation of design<br>b) Define Requirements — ii)Unit, Integration process<br>c)Testing — iii)Identification of the risks<br>d) Designing — iv)Defines architectural modules of the product<br>e) Developing — v)SRS document | L1 | CO1 |

## 5-MARKSQUESTIONS

| | | | |
|---|---|---|---|
| 1D-1. | What is meant by software? Discuss in detail the evolving role of software. | L1 | CO1 |
| 1D-2. | What is software myth? Explain the management myths, the Practitioners myths, and Customers myths along with the realities. | L1 | CO1 |
| 1D-3. | Explain in detail various software engineering layers. | L2 | CO1 |
| 1D-4. | Explain in detail the capability Maturity Model Integration (CMMI) | L2 | CO1 |

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| 1D-5. | With the help of a diagram discuss on software process framework. What are the five generic process frame work activities? | L2 | CO1 |
| 1D-6. | Withthehelpofthediagramdiscussindetailwaterfallmodel.Givecertainreasons for its failure. | L2 | CO1 |
| 1D-7. | Explain the Spiral model in detail? | L2 | CO1 |
| 1D-8 | Explain in detail about Agile methodology. | L2 | CO1 |
| 1D-9 | Explain changing nature of software in detail. | L2 | CO1 |
| 1D-10 | Define software. Explain various types of software available. | L1 | CO1 |
| 1D-11 | a. Explainsoftware myths?<br>b. Explaintheclassical lifecyclemodelwith realtimescenario. | L1 | CO1 |
| 1D-12 | ExplainvaluesandprinciplesofAgileMethodologies. | L2 | CO1 |
| 1D-13 | Writedowntheadvantages anddisadvantagesof water-fall model. | L1 | CO1 |
| 1D-14 | Writeabout Changingnatureofsoftwareand Characteristics ofsoftware. | L1 | CO1 |
| 1D-15 | WhatdoyoumeanbysoftwareEngineering?Explainthesoftwareengineeringlayers. | L1 | CO1 |

## Unit-II Software Requirements &Requirements Engineering Process

### Multiple Choice Questions

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|---|---|---|---|
| 2C-1 | Whichoneof thefollowingisnot a step ofrequirement engineering?<br>a) elicitation<br>b) design<br>c) analysis<br>d) documentation | L1 | CO2 |
| 2C-2 | Theuser systemrequirements aretheparts ofwhich document ?<br>a) SDD<br>b) SRS<br>c) DDD<br>d) SRD | L1 | CO2 |

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| 2C-3 | Whichoneof thefollowingisa requirementthatfitsin adeveloper'smodule?<br>a) Availability<br>b) Testability<br>c) Usability<br>d) Flexibility | L1 | CO2 |
| 2C-4 | "Considerasystemwhere,aheatsensordetectsanintrusionandalertsthesecurity company."<br>What kind of a requirement the system is providing?<br>a) Functional<br>b) Non-Functional<br>c) KnownRequirement<br>d) Noneofthe mentioned | L1 | CO2 |
| 2C-5 | Whatisthefirststepofrequirementelicitation?<br>a) IdentifyingStakeholder<br>b) Listingout Requirements<br>c) RequirementsGathering<br>d) Allofthe mentioned | L1 | CO2 |
| 2C-6 | _____and _____arethetwoviewpointsdiscussedinControlled Requirements Expression (CORE).<br>a) Functional,Non-Functional<br>b) User,Developer<br>c) Known, Unknown<br>d) Allofthe mentioned | L2 | CO2 |
| 2C-7 | WhatisaFunctionalRequirement?<br>a) specifiesthetasksthe programmustcomplete<br>b) specifiesthetasksthe programshouldnot complete<br>c) specifiesthetasksthe programmustnot work<br>d) Allofthe mentioned | L2 | CO2 |
| 2C-8 | Whichofthe followingstatementsabout SRS is/are true?<br>i. SRSis written bycustomer<br>ii. SRSis written bya developer<br>iii. SRSservesasacontractbetweencustomer anddeveloper<br>a) Onlyiistrue<br>b) Bothiiandiiiaretrue<br>c) Allaretrue<br>d) Noneofthe mentioned | L1 | CO2 |
| 2C-9 | WhichtworequirementsaregivenpriorityduringRequirementManagementofa product?<br>a) UserandDeveloper<br>b) FunctionalandNon-functional | L1 | CO2 |

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| | c) EnduringandVolatile<br>d) Allofthe mentioned | | |
| 2C-10 | Which ofthe followingis NOT afeasibilityanalysis criterion?<br>a) Technicalfeasibility<br>b) Resource feasibility<br>c) Operationalfeasibility<br>d) Economicfeasibility | L1 | CO2 |
| 2C-11 | Whyis Requirements Elicitation adifficulttask?<br>a) Problemof scope<br>b) Problemof understanding<br>c) Problemof volatility<br>d) Allofthe mentioned | L1 | CO2 |
| 2C-12 | RequirementsAnalysisisanIterative Process.<br>a) True<br>b) False | L2 | CO2 |
| 2C-13 | ArrangethegivensequencetoformaSRSPrototypeoutlineasperIEEESRS Standard.<br>i. Generaldescription<br>ii. Introduction<br>iii. Index<br>iv. Appendices<br>v. SpecificRequirements<br>a) iii, i, ii,v, iv<br>b) iii, ii, i, v, iv<br>c) ii, i, v, iv, iii<br>d) iii, i, ii | L1 | CO2 |
| 2C-14 | Whichis trueforSRS?<br>a) SRSis themain inputofthesoftwareproduct design process<br>b) SRSisthemainoutput tothe engineeringdesign process<br>c) SRSisalsothemain outputoftherequirementsspecification activity<br>d) Allofthe mentioned | L1 | CO2 |
| 2C-15 | Whichofthesearetruefor non-functional requirements?<br>a) Anon-functionalrequirementisalsocalledbehavioralrequirements<br>b) Anon-functionalrequirementisastatementthatasoftwareproductmusthave certain properties | L2 | CO2 |

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| | c) ItconsistsofDevelopmentandoperationalrequirements<br>d) Allofthe mentioned | | |
| 2C-16 | SRSconsistsof?<br>a) Problemstatement<br>b) Productdesign<br>c) Problemstatement&Productdesign<br>d) Noneofthe mentioned | L1 | CO2 |
| 2C-17 | Whichoneof thefollowingis a functional requirement ?<br>a) Maintainability<br>b) Portability<br>c) Robustness<br>d) Noneofthe mentioned | L2 | CO2 |
| 2C-18 | Requirementsanalysisiscriticaltothesuccessof adevelopmentproject.<br>a) True<br>b) False | L1 | CO2 |
| 2C-19 | TheSRS is said to beconsistentif and only if<br>a) itsstructureandstylearesuchthatanychangestotherequirementscanbemade easily while retaining the style and structure<br>b) everyrequirementstatedtherein isonethat the softwareshall meet<br>c) everyrequirementstated thereinis verifiable<br>d) nosubsetofindividualrequirementsdescribed initconflictwitheach other | L1 | CO2 |
| 2C-20 | WhichtworequirementsaregivenpriorityduringRequirementManagementofa product ?<br>a) UserandDeveloper<br>b) FunctionalandNon-functional<br>c) EnduringandVolatile<br>d) Allofthe mentioned | L5 | CO2 |
| 2C-21 | Requirementsshouldspecify‘what’butnot‘how’.<br>a) True<br>b) False | L2 | CO2 |
| 2C-22 | Arrangethetasksinvolvedinrequirementselicitationinanappropriatemanner.<br>a) Consolidation<br>b) Prioritization<br>c) RequirementsGathering<br>d) Evaluation | L1 | CO2 |

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| 2C-23 | Validationmechanismisa,<br>a) Technicalreview<br>b) Designoverview<br>c) Testingmechanism<br>d) Noneofthementionedabove | L3 | CO2 |
| | **Fillintheblanks** | | |
| 2F-1 | Requirementengineering establishesasolidbasefor _____ | L1 | CO2 |
| 2F-2 | Theuser, systemrequirements arethe parts of_____document. | L1 | CO2 |
| 2F-3 | Which is focused towards the goal of the organization_____ | L1 | CO2 |
| 2F-4 | _____isreferredto astheheartofrequirementmanagement. | L2 | CO2 |
| 2F-5 | _____writestheSRS document. | L2 | CO2 |
| 2F-6 | _____isthefirststepofrequirementelicitation | L1 | CO2 |
| 2F-7 | _____tworequirements are given priorityduringRequirementManagement ofa product. | L1 | CO2 |
| 2F-8 | _____feasibilitystudiesareconductedinRequirementAnalysis. | L2 | CO2 |
| 2F-9 | Theprocessofdevelopingasoftwareproductusingsoftwareengineeringprinciple methods is referred to as_____ | L1 | CO2 |
| 2F-10 | _____designthesystemto meettheuser'srequirements. | L1 | CO2 |
| 2F-11 | Thegoalofrequirementsengineeringistodevelopandmaintainsophisticatedand descriptive_____document. | L1 | CO2 |
| 2F-12 | Functionalrequirementsdescribe about_____ | L1 | CO2 |
| 2F-13 | Exampleofnon-functionalrequirementsare_____ | L1 | CO2 |
| 2F-14 | Completedescriptionaboutbehaviorofthesystemtobedeveloped is___ | L1 | CO2 |
| 2F-15 | _____and _____arethe twoissues of Requirement Analysis. | L1 | CO2 |
| 2F-16 | SRS stands for_____ | L1 | CO2 |
| 2F-17 | Whichtheprocess togatherthesoftwarerequirementsfrom theclient,analyzeand | L4 | CO2 |

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| | documentthem is known as_____ | | |
| 2F-18 | Thedistincttasksencompassesbyrequirementsengineeringareinception,elicitation, elaboration, negotiation, specification, **_____.** | L6 | CO2 |
| | **Matchthe following** | | |
| 2M-1 | a) RequirementsSpecification — i) Documentingthe Requirements<br>b) RequirementElicitation — ii) Managingtherequirementsthroughout the SDLC<br>c) RequirementsAnalysis — iii) Gatheringinformationaboutneeds& expectations of stake holders<br>d) RequirementManagement — iv) Scrutinizethegatheredrequirementsto make consistent & unambiguous requirements. | L1 | CO2 |
| 2M-2 | a) User Requirements — i) describes what the software will doand howit will beexpected to perform<br>b) System requirements — ii) systemoperatewithothersystem<br>c)InterfaceSpecification — iii) specify the technical characteristics of the software system<br>d)Softwarespecification — iv) describe what the end-software system | L1 | CO2 |
| 2M-3 | a) Requirementsreview — i) checkingexpectedandactualoutputs<br>b) Testcasegeneration — ii) Checking whether the requirements will be done in real world<br>c) Consistencycheck — iii) Tocheckanyconstrainsintherequirements<br>d) Realismcheck — iv) Groupofpeoplediscussingaboutrequirements | L1 | CO2 |
| 2M-4 | Usersofrequirementdocument<br>a) Managers — i) use the requirement to understand what system is to be developed<br>b) system test engineers — ii) specifythe requirements and specify changes to the requirements.<br>c) system engineers — iii) use the requirements document to plan a bid for the system<br>d)systemcustomers — iv)usetherequirementtounderstandwhat systemistobedeveloped | L1 | CO2 |
| 2M-5 | a) Productcomplexity — i) softwarerequirementsdefinition<br>b) Structuredsystemanalysis — ii) softwaredesign<br>c) CouplingandCohesion — iii) ValidationTechnique<br>d) SymbolicExecution — iv) Softwarecostestimation | L1 | CO2 |

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## 5-MARKS QUESTIONS

| | | | |
|---|---|---|---|
| 2D-1 | WhatarefunctionalandNonfunctionalrequirementsofsoftware?Discussindetail. | L1 | CO2 |
| 2D-2 | Writeshortnotes onuserrequirements. Whatisrequirements amalgamation? | L1 | CO2 |
| 2D-3 | Discussindetailthesystemrequirementsalongwithlocationsforrequirementsspecification. | L5 | CO2 |
| 2D-4 | Elaborateonsoftwarerequirementsdocument. | L6 | CO2 |
| 2D-5 | Elaborateonrequirementsmanagement. | L6 | CO2 |
| 2D-6 | Elaborateonrequirementselicitationandanalysisprocess.<br>OR<br>Explaintherequirementsanalysis techniques. | L6 | CO2 |
| 2D-7 | Whatis feasibilitystudy?Describethefeasibilitystudyprocess.<br>Writeashortnotes on feasibilityreport. | L1 | CO2 |
| 2D-8 | Discusstheproblemofusingnaturallanguagesfordefineduserandsystem requirements. | L2 | CO2 |
| 2D-9 | Definesoftware requirementsdocument. Explainthestructureofit in detail. | L1 | CO2 |
| 2D-10 | Explaintherequirementsanalysis techniques. | L2 | CO2 |
| 2D-11 | Explainindetail oninterfacespecification. | L2 | CO5 |
| 2D-12 | DoesRequirementsValidationhaveanimportantroleinRequirementsEngineering Process?Explain in detail. | L2 | CO2 |
| 2D-13 | Discussindetailthesystemrequirementsalongwiththenotationsforrequirements specifications with suitable examples. | L2 | CO2 |
| 2D-14 | ExplainSoftwarerequirementdocumentandexplainalongwithitscontents. | L2 | CO2 |
| 2D-15 | Explainviewpointsandtypesofviewpoints? or<br>Requirementsdiscovery(or)Elicitationapproaches:interviewing,use-cases,scenarios. | L2 | CO2 |

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## Unit-IIIDesignEngineering

### MultipleChoiceQuestions

| | | | |
|---|---|---|---|
| 3C-1 | Whichoftheseare followed incaseofsoftwaredesign process?<br>a) Analysisoccursatstartofproductdesignwithaproductidea<br>b) Analysisoccurs attheendofengineeringdesignwiththeSRS<br>c) Productdesignresolutionproducesthedesigndocument<br>d) EngineeringdesignresolutionproducestheSRS | L1 | CO3 |
| 3C-2 | InDesignphase,whichistheprimaryareaof concern ?<br>a) Architecture<br>b) Data<br>c) Interface<br>d) Allofthe mentioned | L1 | CO3 |
| 3C-3 | Actualprogrammingofsoftware codeis doneduringthe stepin theSDLC.<br>a) MaintenanceandEvaluation<br>b) Design<br>c) Analysis<br>d) DevelopmentandDocumentation | L1 | CO3 |
| 3C-4 | Debugging is:<br>a) creatingprogramcode<br>b) findingandcorrectingerrorsintheprogramcode<br>c) identifyingthetask tobecomputerized<br>d) creatingthealgorithm | L1 | CO3 |
| 3C-5 | Thecomponent-leveldesigntransformsstructuralelementsofthesoftware architecture,<br>a) True<br>b) False | L1 | CO3 |
| 3C-6 | Theprimarywork product produced duringsoftwaredesign is /are<br>a) Architecturaldesign<br>b) Interfacedesign<br>c) Creationof componentsand deployment<br>d) All of thementioned above | L1 | CO3 |
| 3C-7 | Whichofthefollowingisnot includedin Architecturaldesign decisions?<br>a) typeof application<br>b) distribution of thesystem<br>c) architecturalstyles<br>d) testingthesystem | L1 | CO3 |

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| 3C-8 | Data-Flow Architecturesissuitabletoapply when,<br>a) Inputdatatransformedthroughaseriesofcomputationalormanipulative components<br>b) Inputdatatransformed throughrecursive process<br>c) Inputdatadoesnottransformthroughdefinedprocess<br>d) Noneofthementionedabove | L2 | CO3 |
| 3C-9 | Which ofthefollowingdiagram is timeoriented?<br>a) Collaboration<br>b) Sequence<br>c) Activity<br>d) Noneofthe mentioned | L1 | CO4 |
| 3C-10 | Accordingto components of FURPS+, which ofthefollowingdoes not belongto S?<br>a) Testability<br>b) Speed Efficiency<br>c) Service ability<br>d) Installability | L1 | CO3 |
| 3C-11 | Whicharchitecturalstylegoalistoachieve Integraability?<br>a) DataFlow Architecture<br>b) CallandReturnArchitecture<br>c) DataCentered Architectures<br>d) Noneofthe mentioned | L1 | CO3 |
| 3C-12 | Whicharchitecturalstyle goalistoachieveModifiabilitywithScalability?<br>a) DataFlow Architecture<br>b) CallandReturnArchitecture<br>c) VirtualMachineArchitecture<br>d) Noneofthe mentioned | L1 | CO3 |
| 3C-13 | Whatarethe notations fortheUsecaseDiagrams?<br>a) Usecase<br>b) Actor<br>c) Prototype<br>d) UsecaseandActor | L1 | CO4 |
| 3C-14 | Whatarethedifferentinteractiondiagramnotationsdoes UMLhave?<br>a) Asequencediagram<br>b) Acommunicationdiagram<br>c) Aninteractionoverviewdiagram<br>d) Allofthe mentioned | L1 | CO4 |
| 3C-15 | Accordingto componentsof FURPS+,which of thefollowingdoesnot belongto S?<br>a) Testability<br>b) Speed Efficiency<br>c) Service ability<br>d) Installability | | |

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| 3C-16 | What is multiplicityfor anassociation?<br>a) Themultiplicityatthetargetclassendofanassociationisthenumberofinstances that can be associated with a single instance of source class<br>b) Themultiplicityatthetargetclassendofanassociationisthenumberofinstances that can be associated with a number instance of source class<br>c) Allofthe mentioned<br>d) Noneof the mentioned | L1 | CO4 |
| 3C-17 | Whichofthefollowingisnot includedin Architecturaldesign decisions?<br>a) typeof application<br>b) distribution of thesystem<br>c) architecturalstyles<br>d) testingthesystem | L4 | CO3 |
| 3C-18 | Whichviewinarchitecturaldesignshowsthekeyabstractionsinthesystemasobjects or object classes?<br>a) physical<br>b) development<br>c) logical<br>d) process | L1 | CO3 |
| 3C-19 | Whichofthefollowingisatypeof Architectural Model?<br>a) Staticstructuralmodel<br>b) Dynamicprocessmodel<br>c) Distribution model<br>d) Allofthe mentioned | L1 | CO3 |
| 3C-20 | 7. Architectureonceestablishedcanbeappliedto otherproductsaswell.<br>a) True<br>b) False | L2 | CO3 |
| | **Fillintheblanks** | | |
| 3F-1 | _____ isameasureof thedegreeof interdependencebetweenmodules. | L1 | CO3 |
| 3F-2 | Design develops a representation or _____ | L1 | CO3 |
| 3F-3 | Design provides the representations of softwarethat can be assessedfor_____ | L1 | CO3 |
| 3F-4 | Theprocess of abstraction can also be referred to as _____ | L5 | CO3 |
| 3F-5 | Architecturaldesigndescribesaboutthe_____ | L1 | CO3 |
| 3F-6 | Data-centeredarchitecturespromote_____ | L2 | CO3 |

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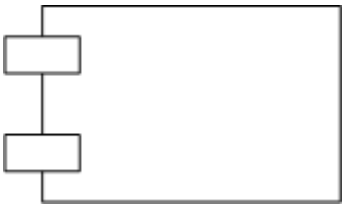
| 3F-7 | _____arethe taxonomyofarchitecturalstyles | L2 | CO3 |
| 3F-8 | WhichcoreelementofUMLisbeingshownin the figure  | L4 | CO4 |
| 3F-9 | InteractionDiagramisacombinedtermfor_____ | L4 | CO4 |
| 3F-10 | Classesandinterfacesareapart of_____ | L4 | CO4 |
| 3F-11 | Whatis aphysical element thatexists atruntime in UML | L4 | CO4 |
| 3F-12 | Which things in UML_____aretheexplanatoryparts ofUML models | L1 | CO4 |
| 3F-13 | Software Design consists of _____ | L1 | CO3 |
| 3F-14 | UMLstandsfor_____ | L2 | CO4 |
| 3F-15 | Usecasediagramdescribesabout_____ | L1 | CO4 |
| 3F-16 | Actual programmingof software code is done duringthe _____step inthe SDLC. | L2 | CO3 |
| 3F-17 | InDesignphase,_____areaisaprimaryconcern | L1 | CO3 |
| 3F-18 | Software Design consists of _____ | L1 | CO3 |

## Match the following

| | | | |
|---|---|---|---|
| 3M-1 | a) Functionality i)Configurability,Testability, Adaptability<br>b) Usability ii)Mean TimebetweenFailures<br>c) Reliability iii)Capabilityofprogram<br>d) Performance iv)Userfriendly,Consistency,Documentation<br>e) Supportability v)Responsetime,Processing speed | L1 | CO3 |

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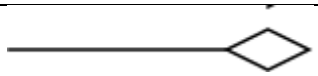
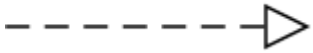
|---|---|---|---|
| 3M-2 | a) Abstraction i)Degreeof relationshipbetweenelementsofthesamemodule<br>b) Refactoring ii)Process of elaboration<br>c) Cohesion iii)Processof changingasoftware system<br>d) Refinement iv)Degreeofinterdependent betweenthe modules<br>e) Coupling v)Backgrounddetails orunnecessaryimplementation | L1 | CO3 |
| 3M-3 | Matchthefollowing:<br>(a) StateDiagram (i)Describehowthe externalentitiescaninteractwiththe system<br>(b) Usecase Diagram (ii)Usedto describethe staticor structuralview ofa system<br>(c) Class diagram (iii)Usedto showtheflowofbusiness process, thesteps of a use case or the logic of an object behavior<br>(d)Activitydiagram (iv)Usedto describethedynamicbehaviorofobjects and couldalsobeusedtodescribetheentiresystem behavior | L1 | CO4 |
| 3M-4 | a) Generalization i)  <br>b) Association ii)  <br>c) Composition iii)  <br>d) Realization iv)  <br>e) Aggregation v)  | L1 | CO4 |
| 3M-5 | a) Structural model i)increasesthelevelofdesignabstractionby identifyingarchitecturaldesign<br>b) Framework model ii)Usedtorepresentfunctionalhierarchyofthe system<br>c) Dynamic model iii)Focusesondesignofbusinessortechnical process<br>d) Process model iv) Organized collection of program components<br>e)Functional model v)Addressesthebehavioralaspectsoftheprogram architecture | L1 | CO4 |

## 5-MARK QUESTIONS

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| 3D-1 | Discussbrieflyondatadesignatthearchitecturallevelandatadesignatthe componentlevel. | L2 | CO3 |
| 3D-2 | Whatarearchitecturalstyles?Explain briefly. | L1 | CO3 |
| 3D-3 | Writeshortnotesonarchitecturalpatterns. | L1 | CO3 |
| 3D-4 | Explainthefollowingtermswithrespecttothearchitecturalpatterns (a)Concurrency(b)Persistence(c) Distribution | L2 | CO3 |
| 3D-5 | Explaindesignconceptsindetail. | L2 | CO3 |
| 3D-6 | ExplainConceptualModelof UMLin detail. | L2 | CO4 |
| 3D-7 | Whatissoftwarearchitecture?Explainaboutstructuredchartwithanexample. | L1 | CO3 |
| 3D-8 | Whatarethe elementsindatadesign?Givetheguidelinesfordata design | L1 | CO3 |
| 3D-9 | a) Explainuse-casemodellingwith anexample?purposeof use-case<br>b) Whatarethe use cases? Draw theusecasesforlibrarysystem. | L2 | CO4 |
| 3D-10 | Explaindesignprocess anddesign qualityin detail. | L2 | CO3 |
| 3D-11 | ExplainBasicStructural Modeling | L2 | CO4 |
| 3D-12 | Whatdoyoumeanbyarchitecture?Givethefunctioningofvariousarchitectural designs. | L1 | CO3 |
| 3D-13 | DrawaninteractiondiagramforATMwithdrawal. | L2 | CO4 |
| 3D-14 | WriteaproblemstatementforLibrarymanagementsystem.DrawtheUMLUseCase, Activitydiagram,Classdiagram,Sequencediagram,StateChart diagram,Component diagram | L1 | CO4 |
| 3D-15 | ExplaintheConceptsofComponentandDeploymentDiagramandDrawcomponent and deployment diagrams for Book bank system. | L2 | CO4 |
| | **Unit-IV Testing Strategies** | | |
| | **Multiple Choice Questions** | | |
| 4C-1 | Inthemaintenancephasetheproductmustbetestedagainstprevioustestcases.This is known as _____testing. | L2 | CO5 |
| 4C-2 | Whichtypeoftestingistypicallyassociatedwithsoftwareverification?<br>(A) Regressiontesting<br>(B) Usabilitytesting<br>(C) Alphatesting<br>(D) Useracceptancetesting | L1 | CO5 |

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| 4C-3 | SoftwareDebuggingisasetofactivitiesthatcanbeplannedinadvanceandconducted systematically.<br>a) True<br>b) False | L1 | CO5 |
| 4C-4 | Whichofthe followingis notasoftwaretestinggeneric characteristics?<br>a) Differenttestingtechniquesareappropriateatdifferentpointsintime<br>b) Testingis conducted bythedeveloperof thesoftwareoran independent test group<br>c) Testinganddebuggingaredifferentactivities,butdebuggingmustbe accommodated in any testing strategy<br>d) Noneofthe mentioned | L2 | CO5 |
| 4C-5 | Testcasesshoulduncovererrorslike<br>a) Nonexistentlooptermination<br>b) Comparisonofdifferentdatatypes<br>c) Incorrectlogicaloperatorsor precedence<br>d) Allofthe mentioned | L1 | CO5 |
| 4C-6 | Thetestingin whichcodeischecked<br>a) Blackboxtesting<br>b) Whiteboxtesting<br>c) Redboxtesting<br>d) Greenboxtesting | L1 | CO5 |
| 4C-7 | Acceptancetestingis also known as<br>a) Greyboxtesting<br>b) Whiteboxtesting<br>c) Alpha Testing<br>d) Betatesting | L1 | CO5 |
| 4C-8 | Whichofthe followingis notadirect measureofSE process?<br>a) Efficiency<br>b) Cost<br>c) EffortApplied<br>d) Allofthe mentioned | L5 | CO5 |
| 4C-9 | Agraphicaltechniqueforfindingifchangesandvariationinmetricsdataare meaningful is known as<br>a) DRE(DefectRemovalEfficiency)<br>b) Functionpoints analysis<br>c) Control Chart<br>d) Allofthe mentioned | L1 | CO5 |
| 4C-10 | WhatdoyouunderstandbyV&Vinsoftware testing?<br>a) Verified Version<br>b) VersionValidation<br>c) Verificationand Validation<br>d) VersionVerification | L1 | CO5 |

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| 4C-11 | Whichofthe followingis black boxtesting<br>a) Basicpathtesting<br>b) Boundaryvalueanalysis<br>c) Codepath analysis<br>d) Noneofthe mentioned | L4 | CO5 |
| 4C-12 | Defectsremovalefficiency(DRE)dependson:<br>a) E– errorsfound beforesoftwaredelivery<br>b) D– defects found after deliveryto user<br>c) BothEandD<br>d) Varieswith project | L4 | CO5 |
| 4C-13 | Whichofthe followingis non-functional testing?<br>a) Blackboxtesting<br>b) Performancetesting<br>c) Unit testing<br>d) Noneofthe mentioned | L5 | CO5 |
| 4C-14 | Testshould beconductedforeverypossible<br>a) data<br>b) case<br>c) variable<br>d) allofthe mentioned | L1 | CO5 |
| 4C-15 | Whichofthefollowingdoesnotaffectthesoftwarequalityandorganizational performance?<br>a) Market<br>b) Product<br>c) Technology<br>d) People | L1 | CO5 |
| | **FillintheBlanks** | | |
| 4F-1 | ValidationTestingisalsoknownas_____ | L1 | CO5 |
| 4F-2 | isameasureof thefilteringabilityof qualityassuranceandcontrol activitiesas theyareappliedthroughout allprocess framework activities. | L1 | CO5 |
| 4F-3 | _____ istheprocessofcheckingthatsoftwareachievesitsgoalwithoutany bugs. | L2 | CO5 |
| 4F-4 | Indirect measures of the product include _____ | L1 | CO5 |
| 4F-5 | _____Testingfocuseson the validityof loop constructs. | L1 | CO5 |

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| 4F-6 | Behavioraltestingisalsoknownas_____ | L1 | CO5 |
| 4F-7 | Themostcommonmeasureforcorrectnessis_____ | L3 | CO5 |
| 4F-8 | Processofexecution ofaprogramwith theintentionof findingerrors isknown as_____ | L2 | CO5 |
| 4F-9 | VerificationTestingisalsoknownas_____ | L1 | CO5 |
| 4F-10 | _____ referstoadifferentsetofactivities thatensuresthat thesoftwareis traceabletothecustomer requirements. | L1 | CO5 |
| 4F-11 | Inthemaintenancephasetheproductmustbetestedagainstprevioustestcases.Thisis known as _____testing. | L1 | CO5 |
| 4F-12 | In size oriented metrics, metrics aredeveloped based on the _____ | L2 | CO5 |
| 4F-13 | _____useameasureof thefunctionalitydelivered bythe application asa normalizationvalue | L2 | CO5 |
| 4F-14 | Agraphicaltechniqueforfindingifchangesandvariationinmetricsdataare meaningful is known as_____ | L1 | CO5 |
| 4F-15 | KLOCalsoknownas_____ | L1 | CO5 |

## Matchthe following

| | | | | |
|---|---|---|---|---|
| 4M-1. | a) Verification<br>b) Validation<br>c) Whiteboxtesting<br>d) Blackboxtesting | i)Dynamictesting<br>ii)Statictesting<br>iii)Behavioraltesting<br>iv)Glassboxtesting | L1 | CO5 |
| 4M-2 | a) Unit testing<br>b) Integration testing<br>c) Systemtesting<br>d) Regression testing | i)atypeofsoftwaretestingconductedaftera code update to ensure that the update introduced no new bugs.<br>ii) To validate that each unit of the software works as intended and meets the requirements<br>iii)Processoftestingtheinterface betweentwosoftwareunitsormodules.<br>iv) To evaluate the compliance of the system with the corresponding requirements. | L1 | CO5 |

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| 4M-3. | a) Size-Oriented Metrics<br>b) Function-OrientedMetrics<br>c) UsecaseOrientedMetrics:<br>d) WebEngineeringProjectMetrics | i) Describe user-visible functions and featuresthatarebasicrequirementsfora system.<br>ii)Useameasureof the functionality deliveredbytheapplicationasa normalization value<br>iii)Tobuild aWebapplication that deliversacombinationofcontentand functionality to the end-user<br>iv) Derivedbynormalizingqualityand/or productivitymeasuresbyconsidering thesizeofthesoftwarethathasbeen produced. | L1 | CO5 |
| 4M-4. | i.Determiningwhetheryouhavebuilttheright system is called _____.<br>ii.Determiningwhetheryouhavebuiltthesystem right is called _____.<br>iii. _____istheprocessofdemonstrating.<br>iv. _____istheprocessofdiscoveringthecause of a defect and fixing it. | A.SoftwareTesting<br>B.SoftwareVerification<br>C.Softwaredebuggingtheexistenceof defects<br>D.SoftwareValidation | L1 | CO5 |
| | (A) i–B,ii –D,iii –A,iv– C<br>(B) i–B,ii–D,iii – C,iv– A<br>(C) i–D,ii–B,iii – C,iv– A<br>(D) i–D,ii –B,iii –A,iv– C | | | |
| 4M-5. | a) Threat<br>b) Security<br>c) Correctness<br>d)Maintainablity | i)thedegreetowhichthesoftwareperformsitsrequired function<br>ii)theeasewithwhichaprogramcanbecorrectedifan error is encountered<br>iii)Theprobability(which can beestimated orderived fromempiricalevidence)thatanattackofaspecific type will occur within a given time.<br>iv) Theprobability(whichcanbeestimatedorderived from empiricalevidence)thattheattackofaspecifictypewill be repelled. | L1 | CO5 |

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| 4D-1. | a) CompareSystemTestingandValidation Testing.<br>b) ExplainDebuggingStrategiesinbrief. | L2 | CO5 |
| 4D-2. | ExamineBlack-Box Testinginanalysismode. | L1 | CO5 |
| 4D-3. | Demonstratethetеststrategiesforconventionalsoftware. | L3 | CO5 |
| 4D-4 | Describevarioustypesoftesting. | L1 | CO5 |
| 4D-5. | Explainindetail artofdebuggingprocess. | L2 | CO5 |
| 4D-6 | Explainabout Product metrics? | L4 | CO5 |
| 4D7. | Describethemetric forsoftware quality. | L1 | CO5 |
| 4D-8 | Explainindetailprocessmetricsandsoftwareprocess improvement. | L2 | CO5 |
| 4D-9 | Explainindetailaboutsoftwaremeasurement. | L4 | CO5 |
| 4D-10 | Whatarethedifferencesbetweenblackboxandwhiteboxtesting? | L5 | CO5 |
| 4D-11 | a) DiscussMetricsforSoftware Qualityin detail<br>b) Whyteststrategies areneededforConventionalSoftware? | L2 | CO5 |
| 4D-12 | ExamineWhite-Box Testinginanalysismode. | L1 | CO5 |
| 4D-13 | Explainstrategicapproachtosoftwaretesting? | L1 | CO5 |
| 4D-14 | CompareSystemTestingandValidationTesting. | L2 | CO5 |
| 4D-15 | Explainaboutverificationandvalidationwithexamples? | L1 | CO5 |

## Unit-VRiskManagement

### MultipleChoice Questions

| | | | |
|---|---|---|---|
| 5C-1 | Whichoneof thefollowingis not a softwareprocessquality?<br>a) Productivity<br>b) Portability<br>c) Timeliness<br>d) Visibility | L5 | CO6 |

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| 5C-2 | Whichofthefollowingtermisbestdefinedbythestatement:"Therewill bea change of organizational management with different priorities."?<br>a) Staffturnover<br>b) Technologychange<br>c) Managementchange<br>d) Product competition | L5 | CO6 |
| 5C-3 | Whatassesstheriskandyourplansforriskmitigationandrevisethesewhenyou learn more about the risk?<br>a) Risk monitoring<br>b) Risk planning<br>c) Risk analysis<br>d) Risk identification | L2 | CO6 |
| 5C-4 | Whichofthefollowingrisksarederivedfromtheorganizationalenvironmentwhere the software is being developed?<br>a) Peoplerisks<br>b) Technologyrisks<br>c) Estimationrisks<br>d) Organizationalrisks | L5 | CO6 |
| 5C-5 | Whichoneisnot ariskmanagement activity?<br>a) Riskassessment<br>b) Risk generation<br>c) Risk control<br>d) Noneofthe mentioned | L5 | CO6 |
| 5C-6 | WhichisthelatestISO9001versionin the ISO9000 family?<br>a) ISO9001:1994<br>b) ISO9001:2000<br>c) ISO9001:2008<br>d) ISO9001:2015 | L5 | CO6 |
| 5C-7 | Ifasoftwareproductiongetsbehindschedule,onecanaddmoreprogrammersand catch up.<br>a) True<br>b) False | L1 | CO6 |
| 5C-8 | Whoperformstechnicalreviews?<br>a) Softwareengineer<br>b) Networkengineer<br>c) System administrator<br>d) All of thementioned above | L1 | CO6 |
| 5C-9 | Whichrequirements arethefoundationfrom which qualityis measured?<br>a)Hardware | L5 | CO6 |

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| | b) Software<br>c) Programmers<br>d) Noneofthe mentioned | | |
| 5C-10 | Whichofthe followingis not aSQAplan for a project?<br>a) evaluationstobeperformed<br>b) amountoftechnicalwork<br>c) auditsandreviews tobeperformed<br>d) documents to beproduced bythe SQAgroup | L5 | CO6 |
| 5C-11 | Whichofthefollowingrisksarederivedfromthesoftwareorhardwaretechnologies that are used to develop the system?<br>a) Managerialrisks<br>b) Technologyrisks<br>c) Estimationrisks<br>d) Organizationalrisks | L3 | CO6 |
| 5C-12 | Software process and improvement are assessed by_____?<br>a) ISO 9000<br>b) ISO9001<br>c) SPICE(ISO/IEC15504)<br>d) Both BandC | L3 | CO6 |
| | **Fillintheblanks** | | |
| 5F-1 | Efforts taken to specifythreats to the project planis known as _____ | L1 | CO6 |
| 5F-2 | Strategythatbeginsbeforethetechnicalactivitybyconsideringtheprobable risk _____ | L2 | CO6 |
| 5F-3 | RMMMstands _____ | L2 | CO6 |
| 5F-4 | Therisk that affect qualityand timelines oftheproject known as_____ | L1 | CO6 |
| 5F-5 | Thedegreeofuncertaintythattheprojectschedulewillbemaintainedandthatthe product will be delivered on time. _____ | L1 | CO6 |
| 5F-6 | TheobjectiveofISO-9000 familyofqualitymanagement is_____ | L2 | CO6 |
| 5F-7 | Softwarerisk always involves two characteristics_____ | L2 | CO6 |
| 5F-8 | Thedegreeofuncertaintythattheproject budgetwillbemaintained_____ | L4 | CO6 |

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| 5F-9 | Risktablesaresortedby_____ | L2 | CO6 |
| 5F-10 | Degreeofuncertaintythattheproductwillsatisfythecustomers'requirementsis known as_____ | L5 | CO6 |
| 5F-11 | _____isanapproachof debugging | L2 | CO6 |
| 5F-12 | Threecategoriesofriskare_____ | L1 | CO6 |
| 5F-13 | statisticalqualityassuranceinvolves_____ | L1 | CO6 |
| 5F-14 | AccordingtoPareto'sprinciple,x%ofdefectscanbetracedtoy%ofallcauses. What are the values of x and y? | L1 | CO6 |
| 5F-15 | Non-conformancetosoftwarerequirementsisknownas_____ | L2 | CO6 |
| | **Matchthe following** | | |
| 5M-1 | a) projectrisk — i) Threatenthequalityandtimelinessofsoftware produced<br>b) Technicalrisk — ii) Riskcanberecovered fromcarefulevaluation<br>c) Businessrisk — iii) Threatentheprojectplanandaffectscheduleand resultant cost<br>d) knownrisk — iv) Threaten theviabilityof softwareto bebuilt | L1 | CO6 |
| 5M-2 . | Matchthefollowing<br>A) Risk Mitigation — i) processtoidentify,analyze,evaluate,andtreatloss exposures and monitor risk control<br>B) Risk Monitoring — ii) Removing causes that are the reason for risk Creation.<br>C) Risk Management — iii) documentthatoutlinesallriskanalysisactivities.<br>D) RMMMplan — iv) To ensure proper application of risk aversion steps defined for risk. | L1 | CO6 |
| 5M-3 | ISOCertification<br>a) Application: — i) ISOcertificationafterthesuccessfulcompletionof all the phases<br>b) ComplianceAudit: — ii) tomonitor theorganization time bytime.<br>c) Registration: — iii) theregistrarcheckswhethertheorganizationhas compiled | L1 | CO6 |

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| | e)ContinuedInspection iv)itappliestotheregistrarforregistration. | | |
| 5M-4 | a) performancerisk i)thedegreeofuncertaintythatthe resultantsoftwarewill beeasytocorrect<br>b) Cost risk ii)thedegreeofuncertaintythattheproductwillmeetits requirements<br>c) Supportrisk iii)thedegreeofuncertaintythattheprojectschedule will bemaintained<br>d) Schedule risk iv)thedegreeofuncertaintythattheprojectbudgetwillbe maintained. | L1 | CO6 |
| 5M-5 | a) Qualityofdesign i)Series ofinspections, reviews, andtests used to ensureconformance<br>b) Qualityofconformance ii)setofauditingandreporting functionsthatassess theeffectivenessandcompleteness<br>c) Qualitycontrol iii)Referstocharacteristicsthatdesignersspecify fortheend product<br>d) Qualityassurance iv)Degreetowhichdesignspecificationsare followedinmanufacturingtheproduct | L1 | CO6 |
| | **5-MARK QUESTIONS** | | |
| 5D-1 | DiscusaboutReactivevs.ProactiveRiskstrategies | L2 | CO6 |
| 5D-2 | Explainindetailaboutsoftware Risk. | L2 | CO6 |
| 5D-3 | Explainindetail aboutRiskIdentification. | L4 | CO6 |
| 5D-4 | DescribeRiskProjection | L5 | CO6 |
| 5D-5 | Explainin detail about RMMM | L2 | CO6 |
| 5D-6 | Discuss ISO9000QualityStandardsindetail. | L2 | CO6 |
| 5D-7 | Writeimportantpoints onthe following<br>a. FormalTechnicalReviews.<br>b. RMMM Model. | L6 | CO6 |
| 5D-8 | Writenotes onthe followinga) Reactiveand ProactiveRisk Strategies.<br>b)Software QualityAssurance | L6 | CO6 |
| 5D-9 | a) ExplainStatisticalSoftwareQuality Assurance.<br>b) Whatdoyou meanbyRisk Projection. | L4 | CO6 |
| 5D-10. | WhyRisk Refinementisneeded? | L5 | CO6 |

| | | |
|---|---|---|
| | **SRIINDUCOLLEGEOFENGINEERING&TECHN OLOGY**<br>**QUESTIONBANK**<br>**Department of Information Technology** | **(Regulation:R22)** |

| | | |
|---|---|---|
| **Sub. Code& Title** | **(R22CSE2215)SOFTWARE ENGINEERING** | |
| **AcademicYear:2024-25** | **Year/Sem.** | **III–I** |
| **Faculty Name& Designation** | **K.PRIYANKA, Assistant Professor** | |

| | | | |
|---|---|---|---|
| 5D-11. | Explainwith an exampledata collection forstatistical softwarequalityassurance. | L2 | CO6 |
| 5D-12. | Explain various activitiesperformed bysoftwarequalityassuranceor SQAgroup. | L4 | CO6 |
| 5D-13. | Explainsoftwarereliabilityalongwithits terms? | L4 | CO6 |
| 5D-14. | Explain about Qualityconcepts? | L2 | CO6 |
| 5D-15. | Explain thefollowing:<br>a) Costof quality<br>b) Software reviews<br>c) TheISO9000qualitystandards<br>d) Review guidelines. | L2 | CO6 |

## COs MAPPING WITH POs & PSOs

## Data communications and Computer Networks (C313)

At the end of the course student will be able to:

| | |
|---|---|
| **C313.1** | Describe the seven layers of OSI Protocol hierarchy(Remembering) |
| **C313.2** | Differentiate wireless communication satellite and cellular radio satellite(Analyzing) |
| **C313.3** | Define cradles telephone , basic telephone procedures and standard telephone set(Remembering) |
| **C313.4** | Explain the terminology and concepts of the OSI reference model and the TCP-IP reference model.(Understanding) |
| **C314.5** | Describe various networking concepts.(Understanding) |
| **C315.6** | Illustrate various Internet Transport Protocols.(Understanding) |

### Course Articulation Matrix

| Course Outcome | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **C313.1** | 3 | - | 1 | - | 2 | - | - | - | - | - | - | - | 1 | - |
| **C313.2** | 3 | - | 1 | 2 | 2 | - | - | - | - | - | - | - | - | - |
| **C313.3** | - | 3 | 3 | - | - | - | - | - | - | - | - | - | - | - |
| **C313.4** | - | - | - | 3 | 1 | - | - | - | - | - | - | - | - | - |
| **C313.5** | 3 | 1 | 1 | 1 | 2 | - | - | - | - | - | - | 1 | 2 | 1 |
| **C313.6** | 2 | - | 2 | - | 3 | - | - | - | - | - | - | 1 | 2 | 1 |
| **C313** | **2.75** | **2** | **1.6** | **2** | **2** | **-** | **-** | **-** | **-** | **-** | **-** | **1** | **1.66** | **1** |

# Sri Indu College of Engineering and Technology

(An Autonomous Institution under UGC)

**Sheriguda (V), Ibrahimpatnam (M), Ranga Reddy (Dist) – 501 510**

## Department of Information Technology

**w.e.f: 22/7/2024**

| Days/Time | 9:40 – 10:40 | 10:40 – 11:40 | 11:40 – 12:40 | 12:40 To 1:20 | 1:20 – 2:15 | 2:15 – 3:10 | 3:10 – 4:00 |
|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | | 4 | 5 | 6 |
| **Monday** | SE | DD | ML | LUNCH | DCCN | IPR | COUN |
| **Tuesday** | DCCN | ML | SE | | DD | PPL | SE |
| **Wednesday** | DD | PPL | ML | | ACS LAB | | |
| **Thursday** | SE & CN LAB | | | | PPL | DD | DCCN |
| **Friday** | SE | ML | DCCN | | ML LAB | | |
| **Saturday** | ML | SE | PPL | | IPR | SDC LAB | |

| SUBJECT CODE | SUBJECT NAME | NAME OF THE FACULTY |
|---|---|---|
| R22CSE2215 | SOFTWARE ENGINEERING | MRS.K. PRIYANKA |
| R22INF3112 | DATACOMMUNICATION&COMPUTER NETWORKS(DCCN) | MRS.HEMALATHA. J |
| R22CSM3112 | MACHINE LEARNING(ML) | MRS.S.VARSHA REDDY |
| R22CSE3143 | PRINCIPLES OF PROGRAMMING LANGUAGES(PPL) | MRS.P.SWATHI |
| R22CSE3146 | DISTRIBUTED DATABASES(DD) | MRS.J.SASIREKHA |
| R22CSE3126 | COMPUTER NETWORKS LAB(CN LAB) | MRS. K. PRIYANKA & MRS. HEMALATHA. J |
| R22CSM3126 | MACHINE LEARNING LAB(ML LAB) | MRS.J.S.RADHIKA & MRS.S.VARSHA REDDY, |
| R22HAS3128 | ADVANCED COMMUNICATION SKILLS LAB(ACS LAB) | MRS.N.SHARMILA |
| R22MAC3110 | INTELLECTUAL PROPERTY RIGHTS(IPR) | MR.M.SATYAM |
| R22CSE3121 | SKILL DEVELOPMENT COURSE(UI DESIGN-FLUTTER)(SDC LAB) | MRS.K.PRIYANKA& MRS.J.SASIREKHA |
| COUN | COUNSELLING | MRS.J. S. RADHIKA, MRS. Y. HARATHI, MRS. HEMALATHA. J |

**CLASS CO-ORDINATOR** **HOD**

MRS. K. PRIYANKA

# Sri Indu College of Engineering & Technology
## Department of Information Technology

## FACULTY INDIVIDUAL TIME

**Name of the Faculty: Mrs. HEMALATHA. J**
**Designation: Assistant Professor**
**Year Semester: III/I** **AY: 2024-2025**

| Time | 9:40 – 10:40 | 10:40 –11:40 | 11:40 – 12:40 | 12:40 To 1:20 | 1:20- 2:15 | 2:15-3:10 | 3:10 – 4:00 |
|---|---|---|---|---|---|---|---|
| Days | 1 | 2 | 3 | | 4 | 5 | 6 |
| Monday | | | | L U N C H | DCCN(IT) | | |
| Tuesday | DCCN(IT) | | | | | | |
| Wednesday | | | | | | | |
| Thursday | DCCN LAB | | | | | | DCCN(IT) |
| Friday | | | DCCN(IT) | | | | |
| Saturday | | | | | | | |

| S.NO. | SUBJECT CODE | SUBJECT | CLASS | NO OF HOURS IN A WEEK | ADDITIONAL WORK LOAD |
|---|---|---|---|---|---|
| 1 | R22INF3112 | DATA COMMUNICATION & COMPUTER NETWORKS | III-IT | 4 | |
| 2 | R22CSE3126 | COMPUTER NETWORKS LAB(CN LAB) | III-IT | 3 | |
| 3 | R20CSE4102 | DATA MINING | IV-IT | 4 | |
| 4 | R20CSE4102 | DATA MINING | IV-CSIT | 4 | MENTOR FOR III-IT |
| | TOTAL HOURS IN A WEEK | 5 | | 15 | |

**Faculty Signature** **Head of the Department**

# DATA COMMUNICATION & COMPUTER NETWORKS

# SRI INDU COLLEGE OF ENGINEERING & TECHNOLOGY

## (An Autonomous Institution under UGC, New Delhi)

**B.Tech. - III Year – I Semester**

| L | T | P | C |
|---|---|---|---|
| 3 | 1 | 0 | 3 |

**(R22INF3112) Data Communication & Computer NetworksCourse Objectives:**

- To introduce the fundamental various types of computer networks.
- To demonstrate the TCP/IP and OSI models with merits and demerits.
- To explore the various layers of OSI Model.
- To introduce UDP and TCP Models.

**UNIT – I:**

**Data Communications:** Components – Direction of Data flow – Networks – Components and Categories – Types of Connections – Topologies –Protocols and Standards – ISO / OSI model, Example Networks such as ATM, Frame Relay, ISDN Physical layer: Transmission modes, Multiplexing, Transmission Media, Switching, Circuit Switched Networks, Datagram Networks, and Virtual Circuit Networks.

**UNIT – II:**

**Data link layer:** Introduction, Framing, and Error – Detection and Correction – Parity – LRC – CRC Hamming code, Flow and Error Control, Noiseless Channels, Noisy Channels, HDLC, Point to Point Protocols. 111 Medium Access sub layer: ALOHA, CSMA/CD, LAN – Ethernet IEEE 802.3, IEEE 802.5 – IEEE 802.11, Random access, Controlled access, Channelization.

**UNIT – III:**

**Network layer:** Logical Addressing, Internetworking, Tunneling, Address mapping, ICMP, IGMP, Forwarding, Uni-Cast Routing Protocols, Multicast Routing Protocols.

**UNIT – IV:**

**Transport Layer:** Process to Process Delivery, UDP and TCP protocols, Data Traffic,Congestion, Congestion Control, QoS, Integrated Services, Differentiated Services, QoS in Switched Networks.

**UNIT – V:**

**Application Layer:** Domain name space, DNS in internet, electronic mail, SMTP, FTP,WWW, HTTP, SNMP.

**TEXT BOOKS:**

1. Data Communications and Networking, Behrouz A. Forouzan , Fourth Edition TMH, 2006.
2. Computer Networks, Andrew S Tanenbaum, 4th Edition. Pearson Education, PHI.

**REFERENCES:**

- Data communications and Computer Networks, P.C .Gupta, PHI.
- An Engineering Approach to Computer Networks, S. Keshav, 2nd Edition, Pearson Education Ross, 3 rd Edition, Pearson Education.
- Data and Computer Communication.

- Understanding communications and Networks, 3rd Edition, W.A. Shay, Cengage Learning.
- Computer Networking: A Top-Down Approach Featuring the Internet. James F. Kurose & Keith W.
- William Stallings, Sixth Edition, Pearson Education, 2000

| | | |
|---|---|---|
| | **SRI INDU COLLEGE OF ENGG & TECH**<br>**LESSON PLAN**<br>**(Regulation: R22)**<br>**Department of Information Technology** | **Prepared on**<br>**Rev1:**<br>**Page: 1 of 6** |

| | | | |
|---|---|---|---|
| **Sub. Code & Title** | **R22INF3112 & Data Communication & Computer Networks** | | |
| **Academic Year: 2024-25** | **Year/Sem.** | **III-I** | |
| **Faculty Name & Designation** | **MRS. HEMALATHA. J, Assistant Professor** | | |

| Unit / Item No. | Topic (s) | Book Reference | Page (s) From | Page (s) To | Teaching Methodology | Proposed No. of Periods | Actual Date of Handling | CO/RBT |
|---|---|---|---|---|---|---|---|---|
| | **UNIT-I** | | | | | | | |
| **I** | INTRODUCTION TO DATA COMMUNICATIONS | | | | | **13** | | |
| 1.1 | Introduction to Data Communications with examples | T1 | 1.1 | 1.1 | Black board | 01 | | CO1/L3 |
| 1.2 | Components , Direction of Data flow | T1 | 1.1.1 | 1.1.3 | Black board | 01 | | CO1/L3 |
| 1.3 | Networks Components & Categories | T1, R 5 | 1.2 | 1.2 | Black board | 01 | | CO1/L1 |
| 1.4 | Types of Connections | T1, R 5 | 1.2.2 | 1.2.2 | Presentation | 01 | | CO1/L1 |
| 1.5 | Topologies | T1, R 5 | 1.2.2 | 1.2.2 | Presentation | 01 | | CO1/L1 |
| 1.6 | Protocols and Standards | T1 | 1.5 | 1.5 | Black board | 01 | | CO1/L1 |
| 1.7 | ISO / OSI model | T1 | 2.3 | 2.3 | Black board | 02 | | CO1/L4 |
| 1.8 | Example Networks such as ATM, Frame Relay | W1 | 2.3.2 | 2.5 | Black board | 01 | | CO1/L1 |
| 1.9 | ISDN Physical layer: Transmission modes, Multiplexing | W2 | 2.6 | 2.8 | Black board | 02 | | CO1/L1 |
| 1.10 | Transmission Media, Switching, Circuit Switched Networks | T1 | 8.1 | 8.2 | Black board | 01 | | CO1/L1 |
| 1.11 | Datagram Networks, and Virtual Circuit Networks. | T1 | 8.3.1 | 8.3.2 | Black board | 01 | | CO1/L1 |
| | **Review** | **Signature of the HOD/Coordinator** | | | | | | |

| Unit / Item No | Topic (s) | Book Reference | Page (s) From | Page (s) To | Teaching Methodology | Proposed No. of Periods | Actual Date of Handling | CO/RBT |
|---|---|---|---|---|---|---|---|---|
| | **UNIT-II** | | | | | | | |
| **II** | DATA LINK LAYER | | | | | **12** | | |
| 2.1 | **Data link layer:** Introduction | T1 | 9.1 | 9.2 | Black board | 01 | | CO2/L2 |
| 2.2 | Framing, and Error ,Detection and Correction | T1 | 10.1 | 10.2 | Black board | 02 | | C02/L2 |
| 2.3 | Parity ,LRC ,CRC | T1 | 10.3 | 3.48 | Black board | 01 | | CO2/L2 |
| 2.4 | Hamming code, Flow and Error Control | T1 | 10.5 | 10.6 | Black board | 01 | | CO2/L2 |
| 2.5 | Noiseless Channels, Noisy Channels, HDLC. | T1 | 11.3 | 11.3.2. | Black board | 02 | | CO2/L2 |
| 2.6 | Point to Point Protocols | T1 | 11.4 | 11.4.4 | Black board | 01 | | CO2/L2 |
| 2.7 | Medium Access sub layer | T1 | 12.1 | 12.1.1 | Black board | 01 | | CO3/L2 |
| 2.8 | ALOHA,CSMA/CD | T1 | 12.1 | 12.1.2 | Black board | 01 | | CO3/L2 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 2.9 | LAN- Ethernet IEEE 802.3,IEEE802.5 | T1 | 13.1 | 13.1.12 | Black board | 01 | | CO3/L2 |
| 2.10 | IEEE 802.11,Random access, Channelization | T1 | 15.2 | 15.2.4 | Black board | 01 | | CO3/L2 |
| | **Review** | **Signature of the HOD/Coordinator** | | | | | | |
| Unit/ Item No. | Topic(s) | Book Reference | Page (s) From | Page (s) To | Teaching Methodology | Proposed No. of Periods | Actual Date of Handled | CO/RBT |
| | UNIT-III | | | | | | | |
| **III** | NETWORK LAYER | | | | | **09** | | |
| 3.1 | Logical Addressing | T1 | 18.4 | 18.4.5 | Black board | 01 | | CO3/L2 |
| 3.2 | Internetworking | T1 | 19.1 | 19.1.2 | Black board | 01 | | CO3/L2 |
| 3.3 | Tunneling | T1 | 19.1 | 19.1.4 | Black board | 01 | | CO3/L2 |
| 3.4 | Address Mapping | T1 | 19.3.1 | 19.3.4 | Presentation | 01 | | CO3/L2 |
| 3.5 | ICMP | T1 | 19.2 | 19.2.3 | Black board | 01 | | CO3/L2 |
| 3.6 | IGMP | T1 | 21.5 | 21.5.3 | Black board | 01 | | CO3/L2 |
| 3.7 | Forwarding | T1 | 22.1 | 22.3 | Black board | 01 | | CO3/L2 |
| 3.8 | Uni-Cast Routing Protocols | T1 | 20.3 | 20.3.4 | Black board | 01 | | CO3/L2 |
| 3.9 | Miltcast Routing Protocols | T1 | 22.4 | 22.2.4 | Black board | 01 | | CO3/L2 |
| | **Review** | **Signature of the HOD/Coordinator** | | | | | | |
| Unit / Item No | Topic(s) | Book Reference | Page (s) From | Page (s) To | Teaching Methodology | Proposed No. of Periods | Actual Date of | CO/RBT |
| | **UNIT-IV** | | | | | | | |
| **IV** | **TRANSPORT LAYER** | | | | | **12** | | |
| 4.1 | Introduction to Transport Layer | T1 | 6.1 | 6.5 | Black board | 01 | | CO4/L2 |
| 4.2 | Process to Process Delivery | T1 | 6.11 | 6.14 | Black board | 01 | | CO4/L2 |
| 4.3 | UDP and TCP protocols | T1 | 6.30 | 6.58 | Black board | 01 | | CO4/L2 |
| 4.4 | Data Traffic | T1 | 6.27 | 6.70 | Black board | 01 | | CO4/L2 |
| 4.5 | Congestion,Congestion Control | T1 | 24.3.9 | 24.3.10 | Black board | 02 | | CO5/L2 |
| 4.7 | Qos,Integrated Services | T1 | 30.3 | 30.3.5 | Black board | 02 | | CO5/L2 |
| 4.8 | Differentiated Services | T1 | 30.4 | 30.4.3 | Black board | 02 | | CO5/L2 |
| 4.9 | Qos in Switched Networks | W4 | 40.2 | 40.1.3 | Black board | 02 | | CO5/L2 |
| | **Review** | **Signature of the HOD/Coordinator** | | | | | | |

| | SRI INDU COLLEGE OF ENGG & TECH<br>LESSON PLAN<br>(Regulation: R22)<br>Department of Information Technology | | Prepared on<br>Rev1:<br>Page: 3 of 6 |
|---|---|---|---|
| | **Sub. Code & Title** | **R22INF3112 & Data Communication & Computer Networks** | |
| | **Academic Year: 2024-24** | **Year/Sem.** | **III-I** |
| | **Faculty Name & Designation** | **MRS. HEMALATHA. J, Assistant Professor** | |

| Unit/ item No | Topic(s) | Book Reference | Page (s) | | Teaching Methodology | Proposed No of Periods | Actual Date of Handled | CO/RBT |
|---|---|---|---|---|---|---|---|---|
| | | | From | To | | | | |
| | **UNIT-V** | | | | | | | |
| **V** | **Application Layer** | | | | | **10** | | |
| 5.1 | Domain name space | **T1** | 26.6 | 26.6.1 | Black board | 01 | | CO6/L 2 |
| 5.2 | DNS in internet | T1 | 26.6.2 | 26.6.3 | Black board | 01 | | CO6/L 2 |
| 5.3 | Electronic mail | T1 | 26.3 | 26.3.3 | Black board | 01 | | CO6/L 2 |
| 5.4 | SMTP,FTP | T1 | 26.2 | 26.2.4 | Black board | 02 | | CO6/L 2 |
| 5.5 | WWW,HTTP | T1 | 26.1 | 26.1.2 | Black board | 02 | | CO6/L 2 |
| 5.6 | SNMP | T1 | 27.2 | 27.2.6 | Black board | 03 | | CO6/L 2 |
| | **Review** | **Signature of the HOD/Coordinator** | | | | | | |

## LIST OF TEXT BOOKS AND REFERENCES

### TEXT BOOKS:


1. Data Communications and Networking, Behrouz A. Forouzan , Fourth Edition TMH, 2006.
2. Computer Networks, Andrew S Tanenbaum, 4th Edition. Pearson Education, PHI.


### REFERENCES:


- Data communications and Computer Networks, P.C .Gupta, PHI.
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- Data and Computer Communication.
- Understanding communications and Networks, 3rd Edition, W.A. Shay, Cengage Learning.
- Computer Networking: A Top-Down Approach Featuring the Internet. James F. Kurose & Keith W.
- William Stallings, Sixth Edition, Pearson Education, 2000

## Weblinks

W-1.https://www.tutorialspoint.com/data_communication_computer_network/index.htm

W2.https://www.javatpoint.com/data-link-layer

W3.https://www.cloudflare.com/learning/network-layer/what-is-the-network-layer/

W4.https://www.studytonight.com/computer-networks/osi-model-transport-layer

W5.https://networkencyclopedia.com/application-layer/

## List of Power Point Presentations

| S.No | Topic Name | No. Of Slides |
|---|---|---|
| 1 | Topologies | 18 slides(PPT-1) |
| 2 | Address mapping | 31 slides(PPT-2) |

## CONTENT BEYOND THE SYLLABUS

| S.No | Topics | Proposed Actions | Date | Resource Person/Mode | Pos | PSOs |
|---|---|---|---|---|---|---|
| 1 | FTP Protocol | Class room(2 Periods) | | Dr. P. Subramanyan | PO1,PO2,PO3 | PSO1,PSO2 |
| 2 | DES Algorithm | Class room(2 Periods) | | Dr. S. Kumaresan | PO1,PO2,PO3 | PSO1,PSO2 |

| | SRI INDU COLLEGE OF ENGG & TECH<br>LESSON PLAN<br>(Regulation: R22)<br>Department Of Information Technology | | Prepared on<br>Rev1:<br>Page: 5 of 6 |
|---|---|---|---|
| | **Sub. Code & Title** | **R22INF3112 & Data Communication & Computer Networks** | |
| | **Academic Year: 2024-25** | **Year/Sem.** | **III-I** |
| | **Faculty Name & Designation** | **MRS. HEMALATHA. J, Assistant Professor** | |

## ASSIGNMENT QUESTIONS MID-I & II

| S.No | Assignment Questions | Course Outcome | Books to be Referred | Date Of Announcement | Date Of Submission |
|---|---|---|---|---|---|
| 1 | Explain in detail about OSI Model? | CO1 | T1 | | |
| 2 | Describe the FDM and CDM? | CO1 | T1 | | |
| 3 | Discuss various Error Control Mechanism in detail? | CO2 | T1 | | |
| 4 | Explain briefly about CSMA/CD and CSMA/CA? | CO2 | T1 | | |
| 5 | Explain the Distance Vector Routing Algorithm? | CO3 | T1 | | |
| 6 | Write about IPV4 and IPV6 Addressing? | CO3 | T1 | | |
| 7 | Explain Uni-cast Routing Protocol? | CO4 | T1 | | |
| 8 | Explain briefly about UDP and TCP? | CO4 | T1 | | |
| 9 | Explain briefly about Integrated services and Differentiated services? | CO4 | T1 | | |
| 10 | Explain about SNMP? | CO5 | T1 | | |
| 11 | Describe the techniques for address resolution in DNS. | CO5 | T1 | | |

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| | **SRI INDU COLLEGE OF ENGG & TECH**<br>**LESSON PLAN**<br>**(Regulation: R22)**<br>**Department of Information Technology** | **Prepared on**<br>**Rev1:**<br>**Page: 6 of 6** |

| | | | |
|---|---|---|---|
| **Sub. Code & Title** | **R22INF3112 & Data Communication & Computer Networks** | | |
| **Academic Year: 2024-25** | | **Year/Sem.** | **III-I** |
| **Faculty Name & Designation** | | **MRS. HEMALATHA. J, Assistant Professor** | |

SELF STUDY TOPICS

| **S.No** | **Topics** | **Books & Journals** | **Course Outcome** |
|---|---|---|---|
| 1 | Network Programming | Forouzan | CO5 |
| 2 | Information Security | William Stallings | CO5 |

| **Prepared by** | **Recommended and Approved by** |
|---|---|
| **HEMALATHA. J**<br>**( Signature & Name)** | **HOD/IT** |

| | | |
|---|---|---|
| | **SRI INDU COLLEGE OF ENGG & TECHOLOGY**<br>**QUESTION BANK (Regulation :R22)**<br>**Department of Information Technology** | **Prepared on Rev1:**<br>**Pages: 12** |

| | | | |
|---|---|---|---|
| **Sub. Code & Title** | **R22INF3112/Data Communication and Computer Networks** | | |
| **Academic Year: 2024-25** | | **Year/Sem.** | **III B. TECH, I-SEM** |
| **Faculty Name & Designation** | | **MRS. HEMALATHA. J, Assistant Professor** | |

## QUESTION BANK

QUESTION BANK WITH BLOOMS TAXONOMY LEVEL (BTL)

(1. Remembering 2. Understanding 3. Applying 4. Analyzing 5. Evaluating 6. Creating)

| **UNIT-I DATA COMMUNICATIONS** | | | |
|---|---|---|---|
| **Multiple Choice Questions** | | **BT Level** | **Course Outcome** |
| MC-1 | The data link layer takes the packets from _____and encapsulates them into frames for transmission.<br>a) network layer<br>b) physical layer<br>c) transport layer<br>d) application layer | **I** | **CO1** |
| MC-2 | Which of the following tasks is not done by data link layer?<br>a) framing<br>b) error control<br>c) flow control<br>d) channel coding | **IV** | **CO1** |
| MC-3 | Which sublayer of the data link layer performs data link functions that depend upon the type of medium?<br>a) logical link control sublayer<br>b) media access control sublayer<br>c) network interface control sublayer<br>d) error control sublayer | **III** | **CO1** |
| MC-4 | Header of a frame generally contains _____<br>a) synchronization bytes<br>b) addresses<br>c) frame identifier<br>d) all of the mentioned | **I** | **CO1** |
| MC-5 | Automatic repeat request error management mechanism is provided by _____<br>a) logical link control sublayer<br>b) media access control sublayer<br>c) network interface control sublayer | **III** | **CO1** |

| | | | |
|---|---|---|---|
| | d) application access control sublayer | | |
| MC-6 | When 2 or more bits in a data unit has been changed during the transmission, the error is called _____<br>a) random error<br>b) burst error<br>c) inverted error<br>d) double error | **II** | **CO1** |
| MC-7 | CRC stands for_____<br>a) cyclic redundancy c heck<br>b) code repeat check<br>c) code redundancy check<br>d) cyclic repeat check | **I** | **CO1** |
| MC-8 | Which of the following is a data link protocol?<br>a) ethernet<br>b) point to point protocol<br>c) hdlc<br>d) all of the mentioned | **VI** | **CO1** |
| MC-9 | Which of the following is the multiple access protocol for channel access control?<br>a) CSMA/CD<br>b) CSMA/CA<br>c) Both CSMA/CD & CSMA/CA<br>d) HDLC | **II** | **CO1** |
| MC-10 | The technique of temporarily delaying outgoing acknowledgements so that they can be hooked onto the next outgoing data frame is called _____<br>a) piggybacking<br>b) cyclic redundancy check<br>c) fletcher's checksum<br>d) parity check | **I** | **CO1** |
| MC-11 | Which category of HDLC frames undergoes error and flow control mechanisms by comprising send and receive sequence numbers?<br>a. U-frames<br>b. I-frames<br>c. S-frames<br>d. All of the above | **I** | **CO1** |
| MC-12 | What are the frames issued by the secondary station of HDLC ,known as?<br>a.Link<br>b.Command<br>c.Response | **II** | **CO1** |

| | | | |
|---|---|---|---|
| | d. None of the above | | |
| MC-13 | Which among the following represents the objectives/requirements of Data Link Layer?<br>a. Frame Synchronization<br>b. Error & Flow Control<br>c. Both a & b<br>d. None of the above | **III** | **CO1** |
| MC-14 | Which consequences are more likely to occur during the frame transmission in Stop-and-Wait ARQ mechanism?<br>a. Loss of frame or an acknowledgement<br>b. Delay in an acknowledgement<br>c. Normal operation<br>d. All of the above | **I** | **CO1** |
| MC-15 | Which type of S-frame in HDLC exhibit the correspondence of last three bits [N(R)] by defining the negative acknowledgement (NAK) number with the code value of '01'?<br>a. Receive ready<br>b. Receive not ready<br>c. Reject<br>d. Selective Reject | **IV** | **CO1** |
| | **Filling The Blank Questions** | | |
| #1F-1 | _____is the information to be communicated. | **II** | **CO1** |
| #1F-2 | _____is the set of rules that govern data communication. | **IV** | **CO1** |
| #1F-3 | The _____medium is the physical path by which a message travels from sender to receiver. | **I** | **CO1** |
| #1F-4 | In _____mode, the communication is unidirectional, as on one-way street. | **I** | **CO1** |
| #1F -5 | _____ networks are privately-owned networks with in single building or campus. | **III** | **CO1** |
| #1F -6 | A _____network covers a city. | **I** | **CO1** |
| #1F -7 | A _____spans a large geographical area, often a country or continent. | **I** | **CO1** |
| #1F -8 | A _____connection provides a dedicated link between two devices. | **II** | **CO1** |
| #1F -9 | In _____topology, every device has a dedicated point-to-point link to every other device. | **VI** | **CO1** |
| #1F -10 | In _____topology, each device has a dedicated point-to-point link only to a central controller called hub. | **I** | **CO1** |
| #1F -11 | TCP/IP stands for _____. | **III** | **CO1** |
| #1F -12 | A _____network is a cross between a circuit-switch network and a datagram network. | **V** | **CO1** |
| #1F -13 | In a Computer Network, the communication between two ends is done in blocks of data called _____. | **I** | **CO1** |
| #1F -14 | WDM stands for _____ | **II** | **CO1** |

| | | | |
|---|---|---|---|
| #1F -15 | _____means sender transforms the original message to coded form and sends it over the network. | **II** | **CO1** |

**Match The Following Questions**

#1M-1

| | | | |
|---|---|---|---|
| 1. Delivery | A. The system must deliver data accurately | **II** | **CO1** |
| 2. Timeliness | B. The system must deliver data to correct destination. | | |
| 3. Accuracy | C. It refers to the variation in the packet arrival time. | | |
| 4. Jitter | D. The system must deliver data in a timel manner. | | |

#1M-2

| | | | |
|---|---|---|---|
| 1. Mesh | A. Every device is linked only to its immediate device in the network. | **III** | **CO1** |
| 2. Star | B. One long cable links all the devices in a network. | | |
| 3. Bus | C. Every device has dedicated point-to-poin link with each other. | | |
| 4. Ring | D. Every device has dedicated point-to-poi link to central controller | | |

#1M-3

| | | | |
|---|---|---|---|
| 1. Physical Layer | A. Data is transmitted from source to destination computers. | **II** | **CO1** |
| 2. Network Layer | B. It ensures point-to-point delivery of data across a network. | | |
| 3. Data-Link Layer | C. This layer is responsible for creating connections between source and destination computers. | | |
| 4. Transport Layer | D. This layer is responsible physical connections across the network. | | |

#1M-4

| | | | |
|---|---|---|---|
| 1. Message | A. It is a device that sends the data message. | **I** | **CO1** |
| 2. Sender | B. It is the set of rules that governs the data communication. | | |
| 3. Receiver | C. The information to be communicated. | | |
| 4. Protocol | D. It is the device that receives the data message | | |

#1M-5

| | | | |
|---|---|---|---|
| 1. LAN | A. Wide Area Network | **II** | **CO1** |
| 2. MAN | B. Transmission control protocol | | |
| 3. WAN | C. Metropolitan Area Network | | |
| 4. TCP | D. Local Area Network | | |

**5 MARKS QUESTIONS**

| | | | |
|---|---|---|---|
| 1. | Explain in detail about OSI Model? | II | CO1 |

| | | | |
|---|---|---|---|
| 2. | Explain about Various Categories and Topologies of Networks? | II | CO1 |
| 3. | Compare OSI and TCP reference Model? | IV | CO1 |
| 4. | Compare all Switching techniques and explain each? | IV | CO1 |
| 5. | Discuss about the various Transmission Media? (R18-FEB-2022) | VI | CO1 |
| 6. | What is Multiplexing? Explain in detail different types of Multiplexing (R16-MAR-2021) | I | CO1 |
| 7. | Discuss the Protocols and Standards? | II | CO1 |
| 8. | Describe the FDM and WDM? | II | CO1 |
| 9. | Explain the ATM reference model and describe the functions performed by each layer (R18-FEB-2022) | II | CO1 |
| 10. | Discuss about the ISDN physical layer. | II | CO1 |
| 11. | Explain about TDM and FDM? | I | CO1 |
| 12. | Explain Simplex, Half duplex and Full duplex? | II | CO1 |
| 13. | Explain Network Topologies? | I | CO1 |
| 14. | What is Data Communication and Components of it?(R16-MAR-2021) | II | CO1 |
| 15. | Write down Types of Connections? (R16-MAR-2021) | II | CO1 |

## UNIT-II DATA LINK LAYER

| Multiple Choice Questions | | BT Level | Course Outcome |
|---|---|---|---|
| #2C-1 | 1. The data link layer takes the packets from _____and encapsulates them into frames for transmission.<br>a) network layer<br>b) physical layer<br>c) transport layer<br>d) application layer | II | CO2 |
| #2C-2. | Which of the following tasks is not done by data link layer?<br>a)framing<br>b)errorcontrol<br>c)flowcontrol<br>d) channel coding | II | CO2 |
| #2C-3. | 2. Which sublayer of the data link layer performs data link functions that depend upon the type of medium?<br>a) logical link control sublayer<br>b) media access control sublayer<br>c) network interface control sublayer<br>d) error control sublayer | I | CO2 |
| #2C-4. | Header of a frame generally contains _____<br>a) synchronization bytes<br>b) addresses | V | CO2 |

| | | | |
|---|---|---|---|
| | c) frame identifier<br>d) all of the mentioned | | |
| #2C-5. | Automatic repeat request error management mechanism is provided by<br><br>a) logical link control sublayer<br>b) media access control sublayer<br>c) network interface control sublayer<br>d) application access control sublayer | **III** | **CO2** |
| #2C-6. | When 2 or more bits in a data unit has been changed during the transmission, the error is called _____<br>a) random error<br>b) burst error<br>c) inverted error<br>d) double error | **II** | **CO2** |
| #2C-7. | CRC stands for _____<br>a) cyclic redundancy check<br>b) code repeat check<br>c) code redundancy check<br>d) cyclic repeat check | **VI** | **CO2** |
| #2C-8. | Which of the following is a data link protocol?<br>a) ethernet<br>b) point to point protocol<br>c) hdlc<br>d) all of the mentioned | **IV** | **CO2** |
| #2C-9. | Which of the following is the multiple access protocol for channel access control?<br>a) CSMA/CD<br>b) CSMA/CA<br>c) Both CSMA/CD & CSMA/CA<br>d) HDLC | **V** | **CO2** |
| #2C-10. | The technique of temporarily delaying outgoing acknowledgements so that they can be hooked onto the next outgoing data frame is called _____<br>a) piggybacking<br>b) cyclic redundancy check<br>c) fletcher's checksum<br>d) parity check | **III** | **CO2** |
| #2C-11. | Which category of HDLC frames undergoes error and flow control mechanisms by comprising send and receive sequence numbers?<br>a. U-frames<br>b. I-frames<br>c. S-frames<br>d. All of the above | **II** | **CO2** |
| #2C-12. | What are the frames issued by the secondary station of HDLC , known as?<br>a. Link | **I** | **CO2** |

| | | | |
|---|---|---|---|
| | b. Command<br>c. Response<br>d. None of the above | | |
| #2C-13. | Which among the following represents the objectives/requirements of Data Link Layer?<br>a. Frame Synchronization<br>b. Error & Flow Control<br>c. Both a & b<br>d. None of the above | **III** | **CO2** |
| #2C-14. | Which consequences are more likely to occur during the frame transmission in Stop-and-Wait ARQ mechanism?<br>a. Loss of frame or an acknowledgement<br>b. Delay in an acknowledgement<br>c. Normal operation<br>d. All of the above | **IV** | **CO2** |
| #2C-15 | Which type of S-frame in HDLC exhibit the correspondence of last three bits [N(R)] by defining the negative acknowledgement (NAK) number with the code value of '01'?<br>a. Receive ready<br>b. Receive not ready<br>c. Reject<br>d. Selective Reject | **V** | **CO2** |
| | **Filling The Blank Questions** | | |
| #2F-1 | Transmission of data as a stream of bits in the physical layer from source to destination is called as _____ | **II** | **CO2** |
| #2F-2 | The two types of errors are _____and _____. | **II** | **CO2** |
| #2F-3 | A _____is an error detection technique in the concept of redundancy. | **I** | **CO2** |
| #2F-4 | _____ codes are special linear block codes with one extra property. | **I** | **CO2** |
| #2F-5 | CRC stands for _____ | **IV** | **CO2** |
| #2F-6 | _____is an 8-bit sequence that marks beginning and end of the frame. | **I** | **CO2** |
| #2F-7 | _____carries the data from network layer. Its length may vary from network to network. | **V** | **CO2** |
| #2F-8 | _____ is a technique used to improve the efficiency of bidirectional protocols. | **VI** | **CO2** |
| #2F-9 | HDLC stands for _____ | **III** | **CO2** |
| #2F-10 | _____is the most common protocol used for point-to-point access. | **I** | **CO2** |
| #2F-11 | _____is the transition phrase which means link is not used or is not active to carry the data in physical layer. | **II** | **CO2** |
| #2F-12 | _____is a special bit pattern or small message that circulates from one station to next in some pre-defined order. | **II** | **CO2** |
| #2F-13 | _____is multiple access method in which available bandwidth of | **IV** | **CO2** |

| | | | |
|---|---|---|---|
| | a link is shared in time, frequency or through code between the stations. | | |
| #2F-14 | In _____each band is reserved for specific station and it belongs to that station all the time. | **IV** | **CO2** |
| #2F-15 | CSMA/CD stands for _____ | **II** | **CO2** |
| | **Match The Following Questions** | | |
| #2M-1 | List I: 1. Fixed size framing; 2. Variable size framing; 3. Single-Bit Error; 4. Burst Error<br>List II: A. Only one bit of given data unit is changed from 1 to 0 or 0 to 1.; B. Two or more bits of given data unit are changed from 1 to 0 or 0 to 1.; C. There is no need to define the boundaries of the frame.; D. End and beginning to the frames need to be defined. | **II** | **CO2** |
| #2M-2 | List I: 1. I-Frames; 2. U-Frames; 3. S-Frames; 4. Payload<br>List II: A. These frames are used for miscellaneous functions like link management; B. Frames that carry the user information from network layer.; C. Carries the data from the network layer.; D. Frames are used for flow and error control. | **I** | **CO2** |
| #2M-3 | List I: 1. Dead; 2. Establish; 3. Open; 4. Terminate<br>List II: A. Phrase in which all the work is done and connection gets terminated.; B. Phrase in which exchange of data takes place; C. Phrase in which nodes start working; D. Phrase in which link is not used or not active to carry data. | **II** | **CO2** |
| #2M-4 | List I: 1. Data Link Layer device that connects multiple segments; 2. Purpose of Frame Check Sequence; 3. Type of Data Link Layer protocol; 4. Function of Data-Link-Layer in WANs<br>List II: A. Framing; B. Repeater; C. Error detection; D. Connection-Oriented | **I** | **CO2** |

| | | | |
|---|---|---|---|
| #2M-5 | <table><tr><th>List I</th><th>List II</th></tr><tr><td>1. Data link layer sub layer that manages multiple protocols.</td><td>A. Header-Data-Trailer</td></tr><tr><td>2. Data Link Layer frame format.</td><td>B. LLC</td></tr><tr><td>3. Function of Data link layer in WANs</td><td>C. Synchronization</td></tr><tr><td>4. Purpose of Preamble in Ethernet frames</td><td>D. Error Detection</td></tr></table> | III | CO2 |

| | | | |
|---|---|---|---|
| **5 MARKS QUESTIONS** | | | |
| 1 | Discuss various Error Control Mechanism in detail? | II | CO2 |
| 2. | What is HDLC? Explain HDLC frame and its types in detail. (R16-MAR-2021) | I | CO2 |
| 3. | Explain the Error Detection methods with suitable examples. | II | CO2 |
| 4. | Describe briefly about Random access and Controlled access. | II | CO2 |
| 5. | Explain about Medium Access sub layer? | II | CO2 |
| 6. | Explain about ALOHA and its types? | II | CO2 |
| 7. | Explain briefly about CSMA/CD and CSMA/CA?(R18-FEB-2022) | II | CO3 |
| 8. | What are the types of Ethernet? Generalize the differences between wired and wireless LANs by using IEEE 802.3 and IEEE 802.11 standards. (R16-MAR-2021) | I | CO3 |
| 9. | Describe briefly Noiseless and Noisy Channels? | II | CO3 |
| 10. | Describe briefly about Channelization. | II | CO3 |
| 11. | What is Frame relay and and its Layers? | I | CO2 |
| 12. | Explain various types of Data Link Protocol? | II | CO2 |
| 13. | What is Flow and Error Control? | I | CO2 |
| 14. | What is CSMA/CD and explain it? | I | CO2 |
| 15. | What is CSMA/CA and explain it? | I | CO2 |
| **UNIT-III NETWORK LAYER** | | | |
| **Multiple Choice Questions** | | **BT Level** | **Course Outcome** |
| #3C-1 | The network layer is concerned with _____of data.<br>a) bits<br>b) frames<br>c) packets<br>d) bytes | I | CO3 |
| #3C-2 | Which one of the following is not a function of network layer?<br>a) routing<br>b) inter-networking<br>c) congestion control<br>d) error control | II | CO3 |
| #3C-3 | A 4 byte IP address consists of _____<br>a) only network address | I | CO3 |

| | | | |
|---|---|---|---|
| | b) only host address<br>c) network address & host address<br>d) network address & MAC address | | |
| #3C-4 | In virtual circuit network each packet contains _____<br>a) full source and destination address<br>b) a short VC number<br>c) only source address<br>d) only destination address | II | **CO3** |
| #3C-5 | Which of the following routing algorithms can be used for network layer design?<br>a) shortest path algorithm<br>b) distance vector routing<br>c) link state routing<br>d) all of the mentioned | I | **CO3** |
| #3C-6 | Which of the following is not correct in relation to multi-destination routing?<br>a) is same as broadcast routing<br>b) contains the list of all destinations<br>c) data is not sent by packets<br>d) there are multiple receivers | II | **CO3** |
| #3C-7 | A subset of a network that includes all the routers but contains no loops is called<br>a) spanning tree<br>b) spider structure<br>c) spider tree<br>d) special tree | I | **CO3** |
| #3C-8 | Which one of the following algorithm is not used for congestion control?<br>a) traffic aware routing<br>b) admission control<br>c) load shedding<br>d) routing information protocol | II | **CO3** |
| #3C-9 | The network layer protocol for internet is _____<br>a) ethernet<br>b) internet protocol<br>c) hypertext transfer protocol<br>d) file transfer protocol | I | CO3 |
| #3C-10 | ICMP is primarily used for _____<br>a) error and diagnostic functions<br>b) addressing<br>c) forwarding<br>d) routing | III | **CO4** |
| #3C-11 | A packet used for the transmission purpose is basically a combination of _____<br>a. group of bits<br>b. source & destination addresses<br>c. both a & b | IV | **CO4** |

| | | | |
|---|---|---|---|
| | d. none of the above | | |
| #3C-12 | ICMP is primarily used for _____<br>a) error and diagnostic functions<br>b) addressing<br>c) forwarding<br>d) routing | III | **CO4** |
| #3C-13 | A 4 byte IP address = _____+ _____<br>(a) network address + mac address<br>(b) host address + mac address<br>(c) network address + host address<br>(d) mac address + ip address | IV | **CO4** |
| #3C-14 | _____is not a function of network layer.<br>(a) routing<br>(b) inter-networking<br>(c) congestion control<br>(d) error control | III | **CO4** |
| #3C-15 | Find the broadcast address for a Class B network ID with help of the default sub net mask.<br>(a) 172.16.10.255<br>(b) 255.255.255.255<br>(c) 172.16.255.255<br>(d) 172.255.255.255 | V | **CO4** |
| | **Filling The Blank Questions** | | |
| #3F-1 | The Primary function of the Network Layer is to provide _____ between devices on network. | I | **CO3** |
| #3F-2 | The Network layer uses _____to Identify devices on a network | I | **CO3** |
| #3F-3 | The Network layer provides _____to prevent congestion. | II | **CO3** |
| #3F-4 | The Network layer supports both _____and connection-oriented communication. | II | **CO3** |
| #3F-5 | The Network layer uses _____to detect and discard corrupted packets | I | **CO3** |

| | | | |
|---|---|---|---|
| #3F-6 | The Network layer provides _____to ensure packets are delivered in the correct order | II | **CO3** |
| #3F-7 | The _____field in IP header indicates where the packet should be delivered. | I | **CO3** |
| #3F-8 | The Network layer uses _____to fragment packets into smaller segments. | II | **CO3** |
| #3F-9 | The _____protocol is used for error-reporting and diagnostic functions. | I | **CO4** |
| #3F-10 | _____ is the communication between one sender and one receiver | III | **CO4** |
| #3F-11 | _____ is the communication between one sender and many receivers. | IV | **CO4** |
| #3F-12 | A message can be Unicast, Multi-cast, or _____. | III | **CO4** |
| #3F-13 | In _____communication, relationship between source and destination is one-to-all. | IV | **CO4** |
| #3F-14 | The process of optimal inter domain routing results in finding the _____tree. | III | **CO4** |
| #3F-15 | DVMRP stands for _____ | VI | **CO4** |
| | **Match The Following Questions** | | |
| #3M-1 | 1) Protocol used for error reporting and diagnostics. — Destination IP address<br>2) Field in IP header indicating packet's destination. — ICMP<br>3) Device that connects multiple networks. — Source IP Address<br>4) Field in IP address indicating source network. — Router | I | **CO3** |
| #3M-2 | 1) Protocol assigning IP address Dynamically. — RIP<br>2) Routing protocol that uses distance-vector algorithm. — DHCP<br>3) Technique used to map logical addresses to physical. — TTL<br>4) Field in the IP header indicating packet's life time. — ARP | II | **CO3** |
| #3M-3 | 1) Unicast — One- to-all.<br>2) Multicast — One-to-One.<br>3) Broadcast — Optimal inter domain routing.<br>4) Shortest Path Tree. — One-to-Many | I | **CO4** |

| | | | |
|---|---|---|---|
| #3M-4 | 1) Core-Based-Tree. — Router involved in dense mode multicasting.<br>2) PIM-DM — Group-shared protocol that uses core as root of the tree.<br>3) PIM-SM — Transmitting data with in private to public network.<br>4) Tunneling — Router involved in sparse mode multicasting. | V | **CO4** |
| #3M-5 | 1) IP Address — Unit of transfer associated with networking.<br>2) Datagram — Its numerical label assigned to each device connected in the network.<br>3) Class full addressing — Also called as slash notation.<br>4) Class-less addressing — The address space is divided into 5 classes. | VI | **CO4** |
| | | | |
| 1. | Explain the Distance Vector Routing Algorithm? | II | CO3 |
| 2 | How will you define Packets in Network Layer? | I | CO3 |
| 3. | Explain about Network Address Transition? | II | CO3 |
| 4. | Write about IPV4 and IPV6 Addressing? | I | CO3 |
| 5. | Explain Uni-cast Routing Protocol? | II | CO3 |
| 6. | Explain About Multicast Routing Protocol? | II | CO3 |
| 7. | What are the design issues of the network layer? Explain ICMP messages. (R16-MAR-2021) | I | CO3 |
| 8. | Explain why routing is very important in networking. And illustrate any one of the Routing Algorithms. | II | CO3 |
| 9. | What is a multicast IP address? Describe two types of multicast routing protocols(R16- MAR-2021) | I | CO3 |
| 10. | Explain briefly about Tunneling. | II | CO3 |
| 11. | Explain about ARP and ICMP? | II | CO3 |
| 12. | Explain IPV4 Addressing? | II | CO3 |
| 13. | What is Data Traffic? | I | CO3 |
| 14. | What is Formating and its Techniques? | I | CO3 |
| 15. | List Unicast Routing Protocol and Multicast Routing Protocol? | I | CO3 |
| | **UNIT IV TRANSPORT LAYER** | | |
| | **Multiple Choice Questions** | | **Course Outcome** |
| #4C-1 | Transport layer aggregates data from different applications into a single stream before passing it to _____ | I | **CO3** |

| | | | |
|---|---|---|---|
| | a) network layer<br>b) data link layer<br>c) application layer<br>d) physical layer | | |
| #4C-2 | Which of the following are transport layer protocols used in networking?<br>a) TCP and FTP<br>b) UDP and HTTP<br>c) TCP and UDP<br>d) HTTP and FTP | II | **CO3** |
| #4C-3 | User datagram protocol is called connectionless because _____<br>a) all UDP packets are treated independently by transport layer<br>b) it sends data as a stream of related packets<br>c) it is received in the same order as sent order<br>d) it sends data very quickly | I | **CO3** |
| #4C-4 | Transmission control protocol _____<br>a) is a connection-oriented protocol<br>b) uses a three way handshake to establish a connection<br>c) receives data from application as a single stream<br>d) all of the mentioned | II | **CO3** |
| #4C-5 | An endpoint of an inter-process communication flow across a computer network is called _____<br>a) socket<br>b) pipe<br>c) port<br>d) machine | I | **CO3** |
| #4C-6 | Socket-style API for windows is called _____<br>a) wsock<br>b) winsock<br>c) wins<br>d) sockwi | II | **CO3** |
| #4C-7 | Which one of the following is a version of UDP with congestion control?<br>a) datagram congestion control protocol<br>b) stream control transmission protocol<br>c) structured stream transport<br>d) user congestion control protocol | I | **CO3** |
| #4C-8 | A _____is a TCP name for a transport service access point.<br>a) port<br>b) pipe<br>c) node<br>d) protocol | II | **CO3** |
| #4C-9 | Transport layer protocols deals with _____<br>a) application to application communication<br>b) process to process communication<br>c) node to node communication<br>d) man to man communication | I | CO3 |

| | | | |
|---|---|---|---|
| #4C-10 | Which of the following is a transport layer protocol?<br>a) stream control transmission protocol<br>b) internet control message protocol<br>c) neighbor discovery protocol<br>d) dynamic host configuration protocol | III | **CO4** |
| #4C-11 | Which of the following is false with respect to TCP?<br>a) Connection-oriented<br>b) Process-to-process<br>c) Transport layer protocol<br>d) Unreliable | IV | **CO4** |
| #4C-12 | In TCP, sending and receiving data is done as _____<br>a) Stream of bytes<br>b) Sequence of characters<br>c) Lines of data<br>d) Packets | III | **CO4** |
| #4C-13 | TCP process may not write and read data at the same speed. So we need _____ for storage.<br>a) Packets<br>b) Buffers<br>c) Segments<br>d) Stacks | IV | **CO4** |
| #4C-14 | TCP groups a number of bytes together into a packet called _____<br>a) Packet<br>b) Buffer<br>c) Segment<br>d) Stack | III | **CO4** |
| #4C-15 | Communication offered by TCP is _____<br>a) Full-duplex<br>b) Half-duplex<br>c) Semi-duplex<br>d) Byte by byte | V | **CO4** |
| **Filling The Blank Questions** | | | |
| #4F-1 | The Transport layer provides _____between devices on the network. | I | CO5 |
| #4F-2 | The _____protocol is a connectionless protocol used for best-effort delivery. | I | CO5 |

<table>
<tr><td>#4F-3</td><td>The _____protocol is a connection-oriented protocol used for reliable data transfer.</td><td>II</td><td>CO5</td></tr>
<tr><td>#4F-4</td><td>The Transport layer provides _____to prevent network congestion.</td><td>II</td><td>CO5</td></tr>
<tr><td>#4F-5</td><td>The Transport layer uses _____to detect and correct errors.</td><td>I</td><td>CO5</td></tr>
<tr><td>#4F-6</td><td>The _____mechanism is used to prevent packets from being delivered out of order.</td><td>II</td><td></td></tr>
<tr><td>#4F-7</td><td>The Transport layer provides _____to ensure data is delivered to correct node</td><td>I</td><td></td></tr>
<tr><td>#4F-8</td><td>The Transport layer uses _____to prioritize packets for transmission.</td><td>II</td><td></td></tr>
<tr><td>#4F-9</td><td>The Transport layer uses _____to manage packet size and fragmentation</td><td>I</td><td></td></tr>
<tr><td>#4F-10</td><td>The Transport layer uses _____to detect and recover from network failures.</td><td>III</td><td></td></tr>
<tr><td>#4F-11</td><td>In _____congestion control policies are applied to prevent congestion before it happens.</td><td>IV</td><td></td></tr>
<tr><td>#4F-12</td><td>The Transport layer uses _____to manage multiple conversation between applications.</td><td>III</td><td></td></tr>
<tr><td>#4F-13</td><td>The Transport layer uses _____to control the amount of data sent at one time.</td><td>IV</td><td></td></tr>
<tr><td>#4F14</td><td>When a segment is corrupted, lost or delayed, it is _____.</td><td>III</td><td></td></tr>
<tr><td>#4F-15</td><td>In TCP, one end can stop sending data while still receiving data is called as _____.</td><td>VI</td><td></td></tr>
<tr><td></td><td>Match The Following Questions</td><td></td><td></td></tr>
<tr><td>#4M-1</td><td>
<table>
<tr><th>List I</th><th>List II</th></tr>
<tr><td>1) User datagram Protocol</td><td>A. Connection-Oriented service.</td></tr>
<tr><td>2) Checksum</td><td>B. Connectionless Service.</td></tr>
<tr><td>3) TCP</td><td>C. Flow control.</td></tr>
<tr><td>4) Mechanism to control the rate of data sent.</td><td>D. Mechanism to detect and correct errors.</td></tr>
</table>
</td><td>I</td><td>CO5</td></tr>
</table>

<table>
<tr>
<td>#4M-2</td>
<td>
<table>
<tr><td>1) Protocol for real-time applications, best-effort delivery.</td><td>Retransmission.</td></tr>
<tr><td>2) Data resent when it is corrupted, lost, delayed.</td><td>UDP.</td></tr>
<tr><td>3) Mechanism to ensure data delivery to correct destination device.</td><td>Maximum Segment Size.</td></tr>
<tr><td>4) Function to manage packet size and fragmentation.</td><td>Port.</td></tr>
</table>
</td>
<td>II</td>
<td>CO5</td>
</tr>
<tr>
<td>#4M-3</td>
<td>
<table>
<tr><td>1) Transport layer for streaming media.</td><td>Quality of Service.</td></tr>
<tr><td>2) Mechanism to prioritize packets based on urgency.</td><td>User Datagram Protocol.</td></tr>
<tr><td>3) Mechanism to detect congestion.</td><td>Windowing.</td></tr>
<tr><td>4) Controls amount of data sent at one time.</td><td>Congestion Control.</td></tr>
</table>
</td>
<td>I</td>
<td>CO5</td>
</tr>
<tr>
<td>#4M-4</td>
<td>
<table>
<tr><td>1) Packet in TCP.</td><td>Push the data.</td></tr>
<tr><td>2) PSH</td><td>Segment</td></tr>
<tr><td>3) RST</td><td>Terminate the Connection</td></tr>
<tr><td>5) FIN</td><td>Reset the connection.</td></tr>
</table>
</td>
<td>V</td>
<td>CO4</td>
</tr>
</table>

| | | | |
|---|---|---|---|
| #4M-5 | <table><tr><td>1) Header.</td><td>Synchronize sequence numbers during connection.</td></tr><tr><td>2) SYN.</td><td>Source and destination port address.</td></tr><tr><td>3) URG.</td><td>The value of acknowledgement field is valid.</td></tr><tr><td>4) ACK.</td><td>The value of the urgent field is valid.</td></tr></table> | VI | CO4 |
| | | | |
| 1. | Distinguish between point to point links and multi point links. Give relevant diagrams? | **IV** | CO4 |
| 2. | List and discuss the states used in the TCP connection management finite state machine? | I | CO4 |
| 3. | Discuss the various timers used by TCP to perform its various operations? | II | CO4 |
| 4. | Explain briefly about UDP? | II | CO4 |
| 5. | Explain briefly about TCP? | II | CO4 |
| 6. | Discuss Strategies TCP uses to avoid Congestion? | II | CO4 |
| 7. | Explain Process to Process Delivery? (R16-MAR-2021) | II | CO5 |
| 8. | a) Explain how connection is established and released in TCP with a neat sketch.<br>Explain the default timer mechanism followed in TCP. (R16-MAR-2021) | II | CO5 |
| 9. | Explain briefly about Integrated services and Differentiated services? | II | CO5 |
| 10. | Discuss briefly about Qos in Switched Networks. | II | CO5 |
| 11. | Explain Three-way Handshaking? | II | CO4 |
| 12. | Write about Multiplexing? | I | CO4 |
| 13. | Discuss Various issues in TCP layer? | II | CO4 |
| 14. | Explain TCP Server? | II | CO4 |
| 15. | What is flow control, and why is it important in transport layer protocols? Explain how TCP implements flow control using the sliding window mechanism | VI | CO4 |
| **UNIT V APPLICATION LAYER** | | | |
| **Multiple Choice Questions** | | | **Course Outcome** |
| #5C-1 | Which is not a application layer protocol?<br>a) HTTP<br>b) SMTP<br>c) FTP<br>d) TCP | I | CO6 |

| | | | |
|---|---|---|---|
| #5C-2 | The packet of information at the application layer is called _____<br>a) Packet<br>b) Message<br>c) Segment<br>d) Frame | II | CO6 |
| #5C-3 | Which one of the following is an architecture paradigm?<br>a) Peer to peer<br>b) Client-server<br>c) HTTP<br>d) Both Peer-to-Peer & Client-Server | I | CO6 |
| #5C-4 | Application developer has permission to decide the following on transport layer side<br>a) Transport layer protocol<br>b) Maximum buffer size<br>c) Both Transport layer protocol and Maximum buffer size<br>d) None of the mentioned | II | CO6 |
| #5C-5 | Application layer offers _____service<br>a)Endtoend<br>b)Processtoprocess<br>c)BothEndtoendandProcesstoprocess<br>d) None of the mentioned | I | CO6 |
| #5C-6 | E-mail is _____<br>a) Loss-tolerant application<br>b) Bandwidth-sensitive application<br>c) Elastic application<br>d) None of the mentioned | II | CO6 |
| #5C-7 | Pick the odd one out.<br>a) File transfer<br>b) File download<br>c) E-mail<br>d) Interactive games | I | CO6 |
| #5C-8 | Which of the following is an application layer service?<br>a) Network virtual terminal<br>b) File transfer, access, and management<br>c) Mail service<br>d) All of the mentioned | II | CO6 |
| #5C-9 | To deliver a message to the correct application program running on a host, the _____address must be consulted.<br>a) IP<br>b) MAC<br>c) Port<br>d) None of the mentioned | I | CO6 |
| #5C-10 | Which is a time-sensitive service?<br>a) File transfer<br>b) File download<br>c) E-mail<br>d) Internet telephony | III | CO6 |
| #5C-11 | Transport services available to applications in one or another form _____<br>a) Reliable data transfer<br>b) Timing<br>c) Security<br>d) All of the mentioned | IV | CO5 |

| | | | |
|---|---|---|---|
| #5C-12 | Electronic mail uses which Application layer protocol?<br>a) SMTP<br>b) HTTP<br>c) FTP<br>d) SIP | III | CO5 |
| #5C-13 | Which one of the following is not correct?<br>a) Application layer protocols are used by both source and destination devices during a communication session<br>b) HTTP is a session layer protocol<br>c) TCP is an application layer protocol<br>d) All of the mentioned | IV | CO6 |
| #5C-14 | When displaying a web page, the application layer uses the _____<br>a) HTTP protocol<br>b) FTP protocol<br>c) SMTP protocol<br>d) TCP protocol | III | CO6 |
| #5C-15 | The _____translates internet domain and host names to IP address.<br>a) domain name system<br>b) routing information protocol<br>c) network time protocol<br>d) internet relay chat | V | CO5 |
| | **Filling The Blank Questions** | | |
| #5F-1 | Application layer provides services to _____such as e-mail, file transfer and web browsing. | I | CO6 |
| #5F-2 | The _____protocol is used for sending emails between email servers. | I | CO6 |
| #5F-3 | The _____protocol is used for transferring files over the internet | II | CO6 |
| #5F-4 | The _____protocol is used for accessing web pages on the internet. | II | CO6 |
| #5F-5 | The application layer uses _____to identify specific applications or services. | I | CO6 |
| #5F-6 | Domain name system is an internet service that translates domain names to _____. | II | CO6 |
| #5F-7 | DNS stands for _____. | I | CO6 |
| #5F-8 | The _____domains define the registered hosts according to their generic behavior. | II | CO6 |
| #5F-9 | URL stands for _____. | I | CO6 |
| #5F-10 | HTTP stands for _____. | III | CO6 |
| #5F-11 | HTTP is a _____protocol as both client and server know each other only during the current request. | IV | CO6 |
| #5F-12 | The _____protocol is used for network management and monitoring. | III | CO6 |
| #5F-13 | SNMP has two components _____and agent. | IV | CO6 |
| #5F-14 | MIB stands for _____. | III | CO5 |
| #5F-15 | In SNMP the _____message is sent from an agent to manager to report an event. | VI | CO5 |
| | **Match The Following Questions** | | |

<table>
<tr>
<td>#5M-1</td>
<td>
<table>
<tr><th>List I</th><th>List II</th></tr>
<tr><td>1) Protocol sending email between email servers.</td><td>A. DNS</td></tr>
<tr><td>2) Service for resolving domain names to IP address.</td><td>B. SMTP</td></tr>
<tr><td>3) Protocol for transferring files over the internet.</td><td>C. SNMP</td></tr>
<tr><td>4) Services for network management and monitoring.</td><td>D. FTP.</td></tr>
</table>
</td>
<td>I</td>
<td>CO6</td>
</tr>
<tr>
<td>#5M-2</td>
<td>
<table>
<tr><th>List I</th><th>List II</th></tr>
<tr><td>1) Services for remote terminal access.</td><td>A.RTP</td></tr>
<tr><td>2) Protocol for real time communication (Videos).</td><td>B. Telnet</td></tr>
<tr><td>3) Service for web page formatting and display.</td><td>C. MIB</td></tr>
<tr><td>4) Second component for network management</td><td>D. HTML</td></tr>
</table>
</td>
<td>II</td>
<td>CO6</td>
</tr>
<tr>
<td>#5M-3</td>
<td>
<table>
<tr><th>List I</th><th>List II</th></tr>
<tr><td>1) Get Request</td><td>A. Message sent from agent to manager to report event.</td></tr>
<tr><td>2) Set Request</td><td>B. Message sent from manager to agent to get variable value.</td></tr>
<tr><td>3) Get Response</td><td>C. Message sent from manager to agent to set variable value.</td></tr>
<tr><td>4) Trap</td><td>D. Message sent from agent to manager in response to request.</td></tr>
</table>
</td>
<td>I</td>
<td>CO6</td>
</tr>
<tr>
<td>#5M-4</td>
<td>
<table>
<tr><th>List I</th><th>List II</th></tr>
<tr><td>1) Manager and Agent are two components of.</td><td>A. URL</td></tr>
<tr><td>2) Method, Host, Port and Path are components of.</td><td>B. SNMP</td></tr>
<tr><td>3) Request and response are the two types of messages in.</td><td>C. S/MIME</td></tr>
<tr><td>4) Provides secure email, transmission, and encryption.</td><td>D. HTTP</td></tr>
</table>
</td>
<td>V</td>
<td>CO6</td>
</tr>
</table>

| | | | |
|---|---|---|---|
| #5M-5 | <table><tr><th>List I</th><th>List II</th></tr><tr><td>1) Protocol used to access data on WWW.</td><td>A. SMTP</td></tr><tr><td>2) Set of communication guidelines to transmit an email.</td><td>B. HTTP</td></tr><tr><td>3) Email address for blind carbon copy.</td><td>C. Return Path</td></tr><tr><td>4) Can be used to identify the path to the sender.</td><td>D. BCC</td></tr></table> | VI | CO6 |
| | | | |
| 1. | Describe about an Electronic mail?(R18-FEB-2022) | VI | CO6 |
| 2. | What is the Purpose of DNS? | I | CO6 |
| 3. | Write short note on HTTP and WWW?( R18-FEB-2022) | I | CO6 |
| 4. | Explain about SNMP? | II | CO6 |
| 5. | What is the Function of SMTP? | I | CO6 |
| 6. | Write down the types of WWW documents? | I | CO6 |
| 7. | Explain about Digital Signature? | II | CO6 |
| 8. | Explain the purpose of FTP. | II | CO6 |
| 9. | Discuss how HTTP works and discuss the features of HTTP. Also give default port numbers of HTTP and HTTPS.(R16-MAR-2021) | II | CO6 |
| 10. | Describe the techniques for address resolution in DNS. (R16-MAR-2021) | II | CO6 |
| 11. | What are the primary functions and services provided by the Application layer in the OSI model? | IV | CO5 |
| 12. | How does the Application layer differ from the Presentation and Session layers in the OSI model | III | CO6 |
| 13. | Can you explain the working of common Application layer protocols like HTTP, FTP, SMTP, and DNS? | IV | CO6 |
| 14. | What role does the Application layer play in ensuring data integrity and security in network communications | III | CO5 |
| 15. | How do Application layer protocols handle data formatting, conversion, and compression | VI | CO6 |

## COs MAPPING WITH POs & PSOs

## Machine Learning (C311)

At the end of the course student will be able to:

| | |
|---|---|
| C3101.1. | Identify the characteristics of datasets and compare the trivial data and big data for various applications(k2-Understand) |
| C3101.2. | Classify machine learning techniques and computing environment that are suitable for the applications under consideration(k4-Analysis) |
| C3101.3. | Solve problems associated with batch learning and online learning, and the big data characteristics such as high dimensionality, dynamically growing data and in particular scalability issues( k3-Apply) |
| C3101.4. | Develop scaling up machine learning techniques and associated computing techniques and technologies for various applications (k6-Create) |
| C3101.5. | Implement various ways of selecting suitable model parameters for different machine learning techniques( k3-Apply) |
| C3101.6. | Integrate machine learning libraries, and mathematical and statistical tools with modern technologies like Hadoop distributed file system and Map Reduce programming model ( k3-Apply) |

## Course Articulation Matrix

| Course Outcome | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| C3101.1. | 3 | 3 | - | 3 | 3 | - | - | - | - | - | - | 3 | 3 | - |
| C3101.2. | 3 | 2 | - | 3 | 3 | - | - | - | - | - | - | 3 | 2 | - |
| C3101.3. | 3 | - | 3 | 3 | 3 | - | - | - | - | - | - | 3 | 3 | - |
| C3101.4. | 3 | 2 | 3 | 3 | 3 | - | - | - | - | - | - | 3 | 3 | - |
| C3101.5. | 3 | - | 3 | 3 | 3 | - | - | - | - | - | - | 3 | 2 | - |
| C3101.6. | 3 | - | 3 | 3 | 3 | - | - | - | - | - | - | 3 | 3 | - |

# Machine Learning

| | | |
|---|---|---|
| | **SRI INDU COLLEGE OF ENGG & TECH**<br>**LESSON PLAN**<br>**(Regulation: R22)**<br>**Department of Information Technology** | **Prepared on**<br>**Rev1:**<br>**Page:** 7 to 11 |

| | | | |
|---|---|---|---|
| **Sub. Code & Title** | **(R22CSM3112) Machine Learning** | | |
| **Academic Year: 2024-25** | **Year/Sem./Section** | **III/IT** | |
| **Faculty Name & Designation** | **S VARSHA REDDY & Assistant Professor** | | |

| Unit/ Item No. | Topic (s) | Book Reference | Teaching Methodology | Proposed No. of Periods | Actual Date of Handled | CO/RBT |
|---|---|---|---|---|---|---|
| | **UNIT-I** | | | | | |
| **I** | **Introduction of Machine Learning** | | | **6** | | |
| 1.1 | Well-posed learning problems, Designing a learning system | T-1 | Black board | 01 | | CO-1, L2 |
| 1.2 | Satellite Frequency Bands Perspectives and issues in machine learning Concept learning and the general to specific ordering | T-1, R-1 | PPT | 01 | | CO-1, L2 |
| 1.3 | Satellite Systems Introduction, A concept learning task, | T-1, R-2 | PPT | 01 | | CO-1, L2 |
| 1.4 | Concept learning as search | R-2 | Black board | 01 | | CO-1, L2 |
| 1.5 | Orbital Period and Velocity Find-S: finding a maximally specific hypothesis | T-1 | Black board | 01 | | CO-1, L2 |
| 1.6 | Effects of orbital inclination Version spaces and the candidate elimination algorithm | T-1 | Black board | 01 | | CO-1, L2 |
| | **Review** | **Signature of the HOD/Coordinator** | | | | |
| **Unit/ Item No.** | **Topic (s)** | **Book Reference** | **Teaching Methodology** | **Proposed No. of Periods** | **Actual Date of Handled** | **CO/RBT** |
| | **UNIT-II** | | | | | |
| **II** | **Decision Tree learning** | | | **11** | | |
| 2.1 | Decision Tree learning – Introduction, Decision tree representation | T-1, R-1 | Black board | 01 | | CO-2, L3 |
| 2.2 | Appropriate problems for decision tree learning, The basic decision tree learning algorithm | T-1, R-1 | PPT | 02 | | CO-2, L3 |
| 2.3 | Hypothesis space search in decision tree learning | T-1, R-1 | Black board | 01 | | CO-2, L3 |
| 2.4 | Inductive bias in decision tree learning | T-1, R-1 | Black board | 01 | | CO-2, L3 |
| 2.5 | Issues in decision tree learning Artificial Neural Networks – Introduction, Neural networkrepresentation | T-1, R-1 | PPT | 01 | | CO-2, L3 |
| 2.6 | Appropriate problems for neural network learning, Perceptions | T-1, R-1 | Black board | 01 | | CO-2, L3 |
| 2.7 | Multilayer networks and the back-Propagation algorithm, Remarks on the back-propagation algorithm | T-1 | Black board | 01 | | CO-2, L3 |
| 2.8 | Illustrative example Face recognition Advanced topicsin artificial neural networks Evaluation Hypotheses – Motivation | T-1 | Black board | 01 | | CO-2, L3 |
| 2.9 | Estimation hypothesis accuracy, Basics of sampling theory | T-1 | Black board | 01 | | CO-2, L3 |
| 2.10 | A general approach for deriving confidence intervals | T-1, R-1 | Black board | 01 | | CO-2, L3 |
| 2.11 | Difference in error of two hypotheses, Comparing learning algorithms | T-1, R-1 | PPT | 01 | | CO-2, L3 |
| | **Review** | **Signature of the HOD/Coordinator** | | | | |
| | **UNIT-III** | | | | | |
| **III** | **Bayesian learning – Introduction** | | | **13** | | |
| 3.1 | Bayes theorem, Bayes theorem and concept learning | R-1 | Black board | 01 | | CO-4, L4 |

| | | | | | | |
|---|---|---|---|---|---|---|
| 3.2 | Maximum likelihood and least squared error Hypotheses | T-1 | Black board | 01 | | CO-4, L4 |
| 3.3 | Maximum likelihood hypotheses for predicting probabilities | T-1 | Black board | 01 | | CO-4, L4 |
| 3.4 | Minimum description length principle | T-1, R-1 | Black board | 01 | | CO-4, L4 |
| 3.5 | Rain induced attenuation Bayes optimal classifier, Gibbs algorithm, Naïve Bayes classifier, An example learning to classify text, Bayesian belief networks | T-1, R-1 | Black board | 01 | | CO-4, L4 |
| 3.6 | The EM algorithm Computational learning theory – Introduction | T-1 | Black board | 01 | | CO-4, L4 |
| 3.7 | Multiple Access: Frequency Division Multiple Access (FDMA)Probability learning an approximately correct hypothesis, Sample complexity for Finite Hypothesis Space | T-1, R-2, R-3 | PPT | 01 | | CO-4, L4 |
| 3.8 | Sample Complexity for infinite Hypothesis Spaces | T-1, R-1, R-2 | PPT | 01 | | CO-4, L4 |
| 3.9 | The mistake bound model of learning - Instance-Based Learning- Introduction | T-1 | Black board | 01 | | CO-4, L4 |
| 3.10 | k -Nearest Neighbor Learning, Locally Weighted Regression, Radial Basis Functions | T-1 | Black board | 01 | | CO-4, L4 |
| 3.11 | Characteristics Case-Based Reasoning, Remarks on Lazy and Eager Learning Genetic Algorithms | T-1 | Black board | 01 | | CO-4, L4 |
| 3.12 | Motivation, Genetic Algorithms, An illustrative Example, Hypothesis Space Search, Genetic Programming | T-1 | PPT | 01 | | CO-4, L4 |
| 3.13 | Models of Evolution and Learning, Parallelizing Genetic Algorithms | T-1 | PPT | 01 | | CO-4, L4 |
| | **Review** | **Signature of the HOD/Coordinator** | | | | |
| **Unit/ Item No.** | **Topic (s)** | **Book Reference** | **Teaching Methodology** | **Proposed No. of Periods** | **Actual Date of Handled** | **CO/RBT** |
| **UNIT-IV** | | | | | | |
| **IV** | **Learning Sets of Rules** | | | **12** | | |
| 4.1 | Transmitters Introduction, Sequential Covering Algorithms | T-2, R-1 | PPT | 02 | | CO-5, L2 |
| 4.2 | Receivers Learning Rule Sets: Summary, Learning First Order Rules | T-2, R-1 | PPT | 02 | | CO-5, L2 |
| 4.3 | Antennas, Learning Sets of First Order Rules: FOIL | T-2, T-3, R-2 | Black board | 02 | | CO-5, L2 |
| 4.4 | Tracking Systems Induction as Inverted Deduction, Inverting Resolution Analytical Learning – Introduction | T-2, R-2 | Black board | 02 | | CO-5, L2 |
| 4.5 | Terrestrial Interface Learning with Perfect Domain Theories: | T-2 | Black board | 02 | | CO-5, L2 |
| 4.6 | Prolog-EBG Remarks on Explanation-Based | T-2 | Black board | 01 | | CO-5, L2 |

| | | | | | | |
|---|---|---|---|---|---|---|
| | Learning | | | | | |
| 4.7 | Explanation-Based Learning of Search Control Knowledge | T-1 | Black board | 01 | | CO-5, L2 |
| | **Review** | **Signature of the HOD/Coordinator** | | | | |
| **UNIT-V** | | | | | | |
| **V** | **Combining Inductive and Analytical Learning** | | | **10** | | |
| **Unit/ Item No.** | **Topic (s)** | **Book Reference** | **Teaching Methodology** | **Proposed No. of Periods** | **Proposed Date of Handling** | **CO/RBT** |
| 5.1 | Message Transmission by FDMA: M/G/1 QueueMotivation, Inductive-Analytical Approaches to Learning, | T-3 | PPT | 02 | | CO-6, L5 |
| 5.2 | Using Prior Knowledge to Initialize the Hypothesis, | T-3 | Black board | 02 | | CO-6, L5 |
| 5.3 | Using Prior Knowledge to Alter the Search Objective, Using Prior Knowledge to Augment Search Operators, | T-3 | Black board | 02 | | CO-6, L5 |
| 5.4 | Slotted Aloha Reinforcement Learning – Introduction,The Learning Task, Q Learning | T-3 | PPT | 02 | | CO-6, L5 |
| 5.5 | , Non-Deterministic, Rewards and Actions, TemporalDifference Learning, Generalizing from Examples | T-3 | Black board | 01 | | CO-6, L5 |
| 5.6 | Tree Algorithm Relationship to Dynamic Programming | T-3 | Black board | 01 | | CO-6, L5 |
| | **Review** | **Signature of the HOD/Coordinator** | | | | |

## LIST OF TEXT BOOKS AND REFERENCES

### TEXT BOOKS:

T1. Machine Learning – Tom M. Mitchell, - MGH

T2. Machine Learning: An Algorithmic Perspective, Stephen Marsland, Taylor & Francis (CRC)

### REFERENCE BOOKS:


1. Machine Learning Methods in the Environmental Sciences, Neural Networks, William W Hsieh, Cambridge Univ Press.
2. Richard o. Duda, Peter E. Hart and David G. Stork, pattern classification, John Wiley & Sons Inc., 2001
3. Chris Bishop, Neural Networks for Pattern Recognition, Oxford University Press, 1995.


Web References:

1. Httd://ww.udemy.com/MachineLearning/Online_Course
2. https://en.wikipedia.org/wiki/Machine_learning

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| | **Academic Year: 2024-25** | **Year/Sem./Section** | **III/IT** |
| | **Faculty Name & Designation** | **S VARSHA REDDY & Assistant Professor** | |

**CONTENT BEYOND THE SYLLABUS**

| S.No | Topics | Proposed Actions | Date | Resource Person/Mode | Pos | PSOs |
|---|---|---|---|---|---|---|
| 1 | Introduction - Well-posed learning problems | Class room (1 Period) | | | PO5, PO10, PO6 | PSO1, PSO2 |
| 2 | Decision Tree learning – Introduction | Class room (1 Period) | | | PO5, PO10, PO6 | PSO1, PSO2 |
| 3 | Machine learning based Artificial Neural networks | Online | | NPTEL | PO5, PO10, PO6 | PSO1, PSO2 |
| 4 | Tools and Resources Cognitive Science influences | Online | | NPTEL | PO5, PO10, PO6 | PSO1, PSO2 |

| **SELF STUDY TOPICS** | | | |
|---|---|---|---|
| **S.No.** | **Topics** | **Books & Journals** | **Course Outcomes** |
| 1 | Machine Learning Methods | Machine Learning Methods in the Environmental Sciences, Neural Networks, William W Hsieh, Cambridge Univ Press. | CO1 |
| 2 | Bayesian learning | Richard o. Duda, Peter E. Hart and David G. Stork, pattern classification, John Wiley & Sons Inc., 2001 | CO4 |
| 3 | Neural Networks | .Chris Bishop, Neural Networks for Pattern Recognition, Oxford University Press, 1995. | CO5 |

| | | |
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| **Sub. Code & Title** | **(R22CSM3112) Machine Learning** | | |
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| **Faculty Name & Designation** | **S VARSHA REDDY & Assistant Professor** | | |

ASSIGNMENT-I

| S. No. | Assignment Questions | Course Outcome | Books To be Referred | Date Of Announcement | Date of Submission |
|---|---|---|---|---|---|
| 1 | Explain the steps in designing a learning system in detail. | CO1 | T-1 | | |
| 2 | Write a short note on<br>i) Perceptron training rule<br>ii) Gradient Descent & Delta rule. | CO2 | T-1 | | |
| 3 | Define Bayesian theorem? What is the relevance and features of Bayesian theorem? Explain the practical difficulties of Bayesian theorem. | CO3 | R-1 | | |

ASSIGNMENT-II

| S. No. | Assignment Questions | Course Outcome | Books To be Referred | Date Of Announcement | Date of Submission |
|---|---|---|---|---|---|
| 1 | What is genetic algorithm? How to parallelizing genetic algorithm. | CO4 | T-1 | | |
| 2 | Explain details of learning sets of rules? | CO5 | T-1, R-1 | | |
| 3 | Explain KBANN algorithm. Give an Example. | CO6 | R-1 | | |

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# QUESTION BANK WITH BLOOMS TAXONOMY LEVEL(BTL)

(1.Remembering2.Understanding3.Applying4.Analyzing5.Evaluating6.Creating)

| UNIT-1:INTRODUCTION & DECISION TREE LEARNING | | | |
|---|---|---|---|
| | **MultiplechoiceQuestions** | **BTLevel** | **Course Outcome** |
| 1C-1 | 1. What is Machine learning?<br>a) The selective acquisition of knowledge through the use of computer programs<br>b) The selective acquisition of knowledge through the use of manual programs<br>c) The autonomous acquisition of knowledge through the use of computer programs<br>d) The autonomous acquisition of knowledge through the use of manual programs | L1 | CO1 |
| 1C-2 | 2. K-Nearest Neighbors (KNN) is classified as what type of machine learning algorithm?<br>a) Instance-based learning<br>b) Parametric learning<br>c) Non-parametric learning<br>d) Model-based learning | L2 | CO1 |
| 1C-3 | 3. Which of the following is not a supervised machine learning algorithm?<br>a) K-means<br>b) Naïve Bayes<br>c) SVM for classification problems<br>d) Decision tree | L2 | CO1 |
| 1C-4 | 4. What's the key benefit of using deep learning for tasks like recognizing images?<br>a) They need less training data than other methods.<br>b) They're easier to explain and understand than other models.<br>c) They can learn complex details from the data on their own.<br>d) They work faster and are more efficient computationally. | L2 | CO1 |
| 1C-5 | 5. Which algorithm is best suited for a binary classification problem?<br>a) K-nearest Neighbors<br>b) Decision Trees<br>c) Random Forest<br>d) Linear Regression | L2 | CO1 |

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|---|---|---|---|
| 1C-6 | 6. What is the key difference between supervised and unsupervised learning?<br>a) Supervised learning requires labeled data, while unsupervised learning does not.<br>b) Supervised learning predicts labels, while unsupervised learning discovers patterns.<br>c) Supervised learning is used for classification, while unsupervised learning is used for regression.<br>d) Supervised learning is always more accurate than unsupervised learning. | L2 | CO1 |
| 1C-7 | 7. Which type of machine learning algorithm falls under the category of “unsupervised learning”?<br>a) Linear Regression<br>b) K-means Clustering<br>c) Decision Trees<br>d) Random Forest | L2 | CO1 |
| 1C-8 | 8. What is one of the drawbacks of the Find-S algorithm?<br>a) Computation cost is high<br>b) Time-ineffective<br>c) All correct hypotheses are not output<br>d) Most specific accurate hypothesis is not output | L2 | CO1 |
| 1C-9 | 9. Decision tree uses the inductive learning machine learning approach.<br>a) False<br>b) True | L2 | CO1 |
| 1C-10 | 10. What elements describe the Candidate-Elimination algorithm?<br>a) depends on the dataset<br>b) just a set of candidate hypotheses<br>c) just a set of instances<br>d) set of instances, set of candidate hypotheses | L2 | CO1 |

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| 1C-11 | 11. What is the goal of concept learning?<br>a) To minimize cross-validation set error<br>b) To maximize test set accuracy<br>c) To find a hypothesis that is most suitable for training instances<br>d) To identify all possible predictors | L2 | CO1 |
| 1C-12 | 12. For a dataset with 4 attributes, which is the most general hypothesis?<br>a) (Sunny, Warm, Strong, Humid)<br>b) (Sunny, ?, ?, ?)<br>c) (?, ?, ?, ?)<br>d) (phi, phi, phi, phi) | L3 | CO1 |
| 1C-13 | 13. What is present in the version space of the Find-S algorithm in the beginning?<br>a) Set of all hypotheses H<br>b) Both maximally general and maximally specific hypotheses<br>c) Maximally general hypothesis<br>d) Maximally specific hypothesis | L2 | CO1 |
| 1C-14 | 14. What is one of the assumptions of the Find-S algorithm?<br>a) No assumptions are made<br>b) The most specific hypothesis is also the most general hypothesis<br>c) All training data are correct (there is no noise)<br>d) Overfitting does not occur | L2 | CO1 |

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| 1C-15 | 15. How does the hypothesis change gradually?<br>a) Specific to Specific<br>b) Specific to General<br>c) General to Specific<br>d) General to General | L2 | CO1 |
| IF-1 | _____algorithm is best suited for a binary classification problem | L1 | CO1 |
| 1F-2 | _____ is a generative model used in machine learning | L1 | CO1 |
| 1F-3 | Candidate-Elimination algorithm can be described by _____ | L1 | CO1 |
| 1F-4 | version space represented by _____ | L1 | CO1 |
| 1F-5 | S = <sunny, warm, high, same>. Training data = <sunny, warm, normal, same> => Yes (positive example). How will S be represented after encountering this training data_____ | L2 | CO1 |
| 1F-6 | version space of the Find-S algorithm in the beginning by_____ | L1 | CO1 |
| 1F-7 | What is one of the advantages of the Find-S algorithm_____ | L1 | CO1 |
| 1F-8 | one of the drawbacks of the Find-S algorithm_____ | L1 | CO1 |
| 1F-9 | Which algorithm accommodates all the maximally specific hypotheses_____ | L4 | CO1 |
| 1F-10 | _____introduced the concept of PAC learning | L2 | CO1 |
| 1F-11 | The full form of PAC is _____ | L2 | CO1 |
| 1F-12 | One of the goals of PAC learning is to give _____ | L4 | CO1 |
| 1F-13 | A learner can be deemed consistent if it produces a hypothesis that perfectly fits the _____ | L4 | CO1 |
| 1F-14 | _____is the significance of delta in PAC learning | L1 | CO1 |
| 1F-15 | PAC learning is invented by _____ | L2 | CO1 |
| | | | |
| 1M-1 | (1) Machine learning(A) Minimize errors in predictions<br>(2) Supervised learning (B)The predicted category of an input<br>(3) Un supervised learning (C)A technique for teaching computers to learn from data<br>(4) BackupandRecovery(D)K-Means Clustering | L2<br>L1<br>L1<br>L1 | CO1 |

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| 1M-2 | (1) Cross Validation(A) Precision focuses on false positives<br>(2) Reguralization (B)recall focuses on false negatives<br>(3) Precision (C)Testing a model's generalization ability<br>(4) Recall(D)To decrease model complexity | L2<br>L2<br>L1<br>L1 | CO1 |
| 1M-3 | ) Find-S algorithm(A) Positive Example inconsistent with the hypothesis is encountered<br>) hypothesis (B)Computation cost is high<br>) Find-S algorithm drawbacks (C) Maximally specific hypothesis<br>) Hypothesis in FIND S(D)Specific to General | L2<br>L1<br>L4<br>L2 | CO1 |
| 1M-4 | ) K-Nearest Neighbors (KNN)(A) K-means<br>not a supervised algorithm (B)Instance-based learning<br>binary classification problem(C)K-means Clustering<br>) unsupervised learning(D)Decision Trees | L1<br>L1<br>L2<br>L2 | CO1 |
| 1M-5 | (5) Machine learning(A) Minimize errors in predictions<br>(6) Supervised learning (B)The predicted category of an input<br>(7) Un supervised learning (C)A technique for teaching computers to learn from data<br>(1) BackupandRecovery(D)K-Means Clustering | L2<br>L1<br>L1<br>L1 | CO1 |

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| 1D-1. | DefineMachine Learning. Explainwith exampleswhymachinelearningis important. | 1 | CO1 |
| 1D-2. | DescribethefollowingproblemswithrespecttoTasks,Performance andExperience:<br>a.A Checkers learningproblem<br>b.AHandwrittenrecognitionlearningproblem<br>c.ARobot drivinglearningproblem | 2 | CO1 |
| 1D-3. | WriteFIND-Salgorithmandexplainwithexamplegivenbelow | 2 | CO1 |

| Example | Sky | AirTemp | Humidity | Wind | Water | Forecast | Enjoy Sport |
|---|---|---|---|---|---|---|---|
| 1 | Sunny | Warm | Normal | Strong | Warm | Same | Yes |
| 2 | Sunny | Warm | High | Strong | Warm | Same | Yes |
| 3 | Rainy | Cold | High | Strong | Warm | Change | No |
| 4 | Sunny | Warm | High | Strong | Cool | Change | Yes |

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| 1D-4. | Writethefinal versionspacefor thebelowmentioned trainingexamplesusingcandidate elimination algorithm. | L1 | CO1 |
| 1D-5. | Explainindetail theInductiveBiasofCandidateEliminationalgorithm. | 2 | CO1 |

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|---|---|---|---|
| 1D-6. | DefineConsistentHypothesisandVersionSpace. | 1 | CO1 |
| 1D-7. | Defineconceptlearninganddiscusswithexample. | 1 | CO1 |

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|---|---|---|---|
| 1D-8 | Explainthesteps indesigningalearningsystemsin detail. | 2 | CO1 |
| 1D-9 | Whatiswell-posed learningproblems.Explain withexample? | 1 | CO1 |
| 1D-10 | What are the key properties and complaints of FIND-S algorithm? Explain inDetail | 1 | CO1 |
| 1D-11 | Writecandidateelimination algorithmandillustratewithexample. | 2 | CO1 |
| 1D-12 | Explainindetailthe InductiveBiasofCandidate Eliminationalgorithm. | 2 | CO1 |
| 1D-13 | Giveabrief noteon inductivelearninghypothesiswith example. | 3 | CO1 |
| 1D-14 | Justifythe necessityofgeneraland specific boundaryon hypothesis derivation. | 4 | CO1 |
| 1D-15 | Explain machine learning, applications and features of machine learning? | L1 | CO1 |

**UNIT-II:INTROUCTIONTO THERELATIONMODEL**

| | MultiplechoiceQuestions | BTLevel | CourseOutcome |
|---|---|---|---|
| 2C-1 | **How nodes are connected in ANN?**<br>○ Source<br>○ Links<br>○ Anodes<br>○ Cathodes | L1 | CO2 |
| 2C-2 | 2. What is perceptron?<br>a) a single layer feed-forward neural network with pre-processing<br>b) an auto-associative neural network<br>c) a double layer auto-associative neural network<br>d) a neural network that contains feedback | L2 | CO2 |

| | | | |
|---|---|---|---|
| 2C-3 | 3. What is an auto-associative network?<br>a) a neural network that contains no loops<br>b) a neural network that contains feedback<br>c) a neural network that has only one loop<br>d) a single layer feed-forward neural network with pre-processing | L2 | CO2 |
| 2C-4 | 4. What are the advantages of neural networks over conventional computers?<br>(i) They have the ability to learn by example<br>(ii) They are more fault tolerant<br>(iii)They are more suited for real time operation due to their high 'computational' rates<br>a) (i) and (ii) are true<br>b) (i) and (iii) are true<br>c) Only (i) | L2 | CO2 |
| | d) All of the mentioned | | |

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| 2C-5 | 5. What is Neuro software?<br>a) A software used to analyze neurons<br>b) It is powerful and easy neural network<br>c) Designed to aid experts in real world<br>d) It is software used by Neurosurgeon | L2 | CO2 |
| | | | CO2 |
| 2C-6 | 6. Which of the following is true for neural networks?<br>(i) The training time depends on the size of the network.<br>(ii) Neural networks can be simulated on a conventional computer.<br>(iii) Artificial neurons are identical in operation to biological ones.<br>a) All of the mentioned<br>b) (ii) is true<br>c) (i) and (ii) are true<br>d) None of the mentioned | L2 | CO2 |
| 2C-7 | 7. What does the character 'b' represents in the above diagram?<br>a) bias<br>b) any constant value<br>c) a variable value<br>d) none of the mentioned | L2 | CO2 |
| 2C-8 | 8. Which of the following model has ability to learn?<br>a) pitts model<br>b) rosenblatt perceptron model<br>c) both rosenblatt and pitts model<br>d) neither rosenblatt nor pitts | L2 | CO2 |
| 2C-9 | 9. What is full form of ANNs?<br><br>A. Artificial Neural Node<br>B. AI Neural Networks<br>C. Artificial Neural Networks<br>D. Artificial Neural numbers | L1 | CO2 |
| 2C-10 | 10. How many types of Artificial Neural Networks?<br><br>A. 2<br>B. 3<br>C. 4 | L1 | CO2 |

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| | D. 5 | | |
| 2C-11 | **The basic processing unit in a Neural Network is called:**<br><br>a) A byte<br>b) A transistor<br>c) A neuron<br>d) An algorithm | L1 | CO2 |
| 2C-12 | **In Neural Networks, "backpropagation" is used for:**<br><br>a) Speeding up network connections<br>b) Updating the weights of neurons during training<br>c) Data encryption<br>d) Reducing data storage needs | L2 | CO2 |

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| 2C-13 | **Convolutional Neural Networks (CNNs) are particularly effective for:**<br>a) Text data processing<br>b) Image and video recognition tasks<br>c) Network speed optimization<br>d) Data encryption | L2 | CO2 |
| 2C-14 | **Recurrent Neural Networks (RNNs) are particularly well-suited for:**<br>a) Image recognition<br>b) Sequential data processing, such as language modeling<br>c) Network security<br>d) Data storage optimization | L2 | CO2 |
| 2C-15 | What is the basic building block of an Artificial Neural Network?<br>a) Neuron<br>b) Activation function<br>c) Gradient descent<br>d) Loss function | L1 | CO2 |
| | **Fill inthe blanks** | | |
| 2F-1 | **ANN is the collection of artificial _____** | L2 | CO2 |
| 2F-2 | **In ANN, Neurons interconnected among multiple network layers are referred to as _____** | L1 | CO2 |
| 2F-3 | **The complexity of ANN is dependent upon _____** | L2 | CO2 |
| 2F-4 | **Weighted sums in ANNs are referred to as _____** | L1 | CO2 |
| 2F-5 | **Weighted sums are passed via activation functions and _____is produced** | L2 | CO2 |
| 2F-6 | **Ultimate results are produced in ANN at _____** | L1 | CO2 |
| 2F-7 | **Input applied in ANN passed on to layers hidden to produce outcome is referred to as** | L2 | CO2 |
| 2F-8 | **Computational power in ANNs is determined by _____** | L2 | CO2 |
| 2F-9 | **ANN involves large processors operating in _____** | L1 | CO2 |
| 2F-10 | **ANNs are _____** | L1 | CO2 |
| 2F-11 | **Facial recognitions & computer vision technologies use _____** | L2 | CO2 |

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| 2F-12 | Processing nodes outcome is saved in _____variant of ANN | L2 | CO2 |
| 2F-13 | Text-to-speech conversion uses _____ | L1 | CO2 |
| 2F-14 | Image recognition is possible by using _____ | L2 | CO2 |
| 2F-15 | ANNs are utilized for _____Dynamic modelling and its identification | L2 | CO2 |

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| | Matchthefollowing | | |
|---|---|---|---|
| 2M-1 | interconnected units(A) representing predictions or classifications.<br>Input Layer (B)Neurons<br>Hidden Layer(C)receives the input data<br>Output Layer(D)perform intermediate computations and transformations | L2<br>L1<br>L2<br>L2 | CO2 |
| 2M-2 | perceptron (A) representing predictions or classifications.<br>auto-associative network (B) a singleayer feed-forward neural network with pre-processing<br>Neuro software(C)receives the input data<br>Output Layer(D)perform intermediate computations and transformations | L1<br>L2<br>L1<br>L2 | CO2 |
| 2M-3 | interconnected units (A) representing predictions or classifications.<br>Input Layer (B)Neurons<br>Hidden Layer(C)receives the input data<br>Output Layer(D)perform intermediate computations and transformations | L2<br>L1<br>L2<br>L2 | CO2 |
| 2M-4 | Artificial Neural Network (A) A collection of interconnected nodes or "neurons"<br>ReLU Activation Function (B) Maps all negative values to 0<br>Backpropagation (C) An optimization algorithm for training neural networks<br>Output Layer (D)perform intermediate computations and transformations | L1<br>L2<br>L2<br>L2 | CO2 |
| 2M-5 | Null hypothesis (A) A statement of an effect or a difference<br>Alternative hypothesis(B) A statement of no effect or no difference<br>Type I Error (C) Failing to reject the null hypothesis when it is false<br>Type II Error (D) Rejecting the null hypothesis when it is true | L1<br>L1<br>L2<br>L2 | CO2 |
| | **5-MARKSQUESTIONS** | | |
| 2D-1. | Elaborate multi layer networks and back propagation algorithm with an example. | L2 | CO2 |

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| 2D-2. | Consider two perceptron defined by the threshold expression w0 + wlxl+ w2x2 >0.<br>PerceptronAhasweightvaluesw0=1, w1=2,<br>w2=1<br>andperceptronBhastheweightvaluesw0=0, w1=2,<br>w2=1<br>True or false? PerceptronA is more-general than perceptronB. | L2 | CO2 |
| 2D-3. | Writeanote on(i)Perceptron TrainingRule (ii)GradientDescentandDeltaRule | L6 | CO2 |
| 2D-4. | HowasingleperceptronCanbeused torepresenttheBooleanfunctionssuchasAND& OR?Justify | L3 | CO2 |
| 2D-5. | Design atwo-inputperceptronthatimplementsthe BooleanfunctionAΛ¬B.Designatwo-layer networkofperceptron'sthatimplementsAXORB. | L6 | CO2 |
| 2D-6. | GiveDecision trees forthefollowingset of trainingexamples | L6 | CO2 |

| Day | Outlook | Temperature | Humidity | Wind | Play Tennis |
|---|---|---|---|---|---|
| D1 | Sunny | Hot | High | Weak | No |
| D2 | Sunny | Hot | High | Strong | No |
| D3 | Overcast | Hot | High | Weak | Yes |
| D4 | Rain | Mild | High | Weak | Yes |
| D5 | Rain | Cool | Normal | Weak | Yes |
| D6 | Rain | Cool | Normal | Strong | No |
| D7 | Overcast | Cool | Normal | Strong | Yes |
| D8 | Sunny | Mild | High | Weak | No |
| D9 | Sunny | Cool | Normal | Weak | Yes |
| D10 | Rain | Mild | Normal | Weak | Yes |
| D11 | Sunny | Mild | Normal | Strong | Yes |
| D12 | Overcast | Mild | High | Strong | Yes |
| D13 | Overcast | Hot | Normal | Weak | Yes |
| D14 | Rain | Mild | High | Strong | No |

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| 2D-7. | Considerthefollowingset of trainingexamples.<br>a) What is the entropy of this collection of training example with respect to theTargetfunction classification?<br>b) Whatisthe informationgainofa2relativeto thesetrainingexamples? | L3 | CO2 |

| Instance | Classification | $a_1$ | $a_2$ |
|---|---|---|---|
| 1 | + | T | T |
| 2 | + | T | T |
| 3 | - | T | F |
| 4 | + | F | F |
| 5 | - | F | T |
| 6 | - | F | T |

| | | | |
|---|---|---|---|
| 2D-8 | Identifytheentropy,informationgainand drawthedecisiontreesforthefollowingset of Trainingexamples<br>Gender / Car ownership / Travel cost / Income Level / Transportation (Class)<br>Male / 0 / Cheap / Low / Bus<br>Male / 1 / Cheap / Medium / Bus<br>Female / 1 / Cheap / Medium / Train<br>Female / 0 / Cheap / Low / Bus<br>Male / 1 / Cheap / Medium / Bus<br>Male / 0 / Standard / Medium / Train<br>Female / 1 / Standard / Medium / Train<br>Female / 1 / Expensive / High / Car<br>Male / 2 / Expensive / Medium / Car<br>Female / 2 / Expensive / High / Car | L1 | CO2 |
| 2D-9 | Discuss Inductive BiasinDecisionTree LearningandexplaintheRestrictionBiases,PreferenceBiases. | L1 | CO2 |
| 2D-10 | Evaluatethepracticaldesignchoicesinvolvedinapplyingbackpropagationalgorithmin learningtask of facerecognition system. | L4 | CO2 |
| 2D-11 | ListandInterprettheissuesindecisiontreelearningindetail. | L4 | CO2 |
| 2D-12 | WhataretheremarksofBackPropagationAlgorithm?Illustrateindetail. | L2 | CO2 |

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| 2D-13 | Suppose hypothesis h commits r = 10 errors over a sample of n = 65 independentlydrawnexamples.<br>•Whatisthevariance andstandarddeviationfor numberoftrue errorrate$error_D(h)$?<br>•Whatisthe90%confidenceinterval(two-sided) forthetrue errorrate?<br>•Whatisthe95%one-sidedinterval(i.e.,whatistheupperboundUsuch that$error_D(h) \leq 5$ Uwith 95%confidence)?<br>•Whatisthe90%one-sidedinterval?<br>$\alpha$ \| 0.100 \| 0.050 \| 0.025 \| 0.001<br>$1-\alpha$ \| 0.900 \| 0.950 \| 0.975 \| 0.999<br>$z_{1-\alpha}$ \| 1.28 \| 1.64 \| 1.96 \| 3.09 | L5 | CO2 |
| 2D-14 | Discussindetailhowtheperformanceoftwolearningalgorithmsarecompared. | L3 | CO2 |
| 2D-15 | Explainbasicdecisiontreealgorithmwithexample? | L3 | CO2 |

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| **FacultyName&Designation** | **MrsS.VARSHA REDDY,ASST.PROFESSOR** | |

| **UNIT-IIISQL** | | | |
|---|---|---|---|
| | **MultiplechoiceQuestions** | **BTLevel** | **Course Outcome** |
| 3C-1 | 1. How many terms are required for building a bayes model?<br>a) 1<br>b) 2<br>c) 3<br>d) 4 | L1 | CO3 |
| 3C-2 | 2. What is needed to make probabilistic systems feasible in the world?<br>a) Reliability<br>b) Crucial robustness<br>c) Feasibility<br>d) None of the mentioned | L2 | CO3 |
| 3C-3 | 3. Where does the bayes rule can be used?<br>a) Solving queries<br>b) Increasing complexity<br>c) Decreasing complexity<br>d) Answering probabilistic query | L2 | CO3 |
| 3C-4 | 4. What does the bayesian network provides?<br>a) Complete description of the domain<br>b) Partial description of the domain<br>c) Complete description of the problem<br>d) None of the mentioned | L2 | CO3 |

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| 3C-5 | 5. How the entries in the full joint probability distribution can be calculated?<br>a) Using variables<br>b) Using information<br>c) Both Using variables & information<br>d) None of the mentioned | L3 | CO3 |
| 3C-6 | 6. How the bayesian network can be used to answer any query?<br>a) Full distribution<br>b) Joint distribution<br>c) Partial distribution<br>d) All of the mentioned | L3 | CO3 |
| 3C-7 | 7. How the compactness of the bayesian network can be described?<br>a) Locally structured<br>b) Fully structured<br>c) Partial structure<br>d) All of the mentioned | L2 | CO3 |
| 3C-8 | . To which does the local structure is associated?<br>a) Hybrid<br>b) Dependant<br>c) Linear<br>d) None of the mentioned | L2 | CO3 |

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| 3C-9 | **Which of the following is an advantage of instance-based learning over model-based learning?**<br>Faster training time<br>Faster prediction time<br>Better handling of noisy data<br>D<br>Lower memory requirements | L2 | CO3 |
| 3C-10 | **How can the performance of instance-based learning algorithms be improved when dealing with large datasets?**<br>A<br>By using a more complex similarity measure<br>B<br>By using a simpler similarity measure<br>C<br>By using indexing structures to efficiently search for nearest neighbors<br>D<br>By using more nearest neighbors for classification | L3 | CO3 |
| 3C-11 | **Which of the following instance-based learning algorithms is a non-linear classifier?**<br>A<br>Linear Discriminant Analysis (LDA)<br>B<br>Logistic Regression<br>C<br>k-Nearest Neighbors<br>D<br>Perceptron | L1 | CO3 |
| 3C-12 | **What is the effect of noise on instance-based learning algorithms?**<br>A<br>It reduces the performance of the algorithm | L2 | CO3 |

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| | B<br>It has no effect on the performance of the algorithm<br>C<br>It improves the performance of the algorithm<br>D<br>It depends on the type of similarity measure used | | |
| 3C-13 | **How can instance-based learning algorithms be adapted for anomaly detection tasks?**<br>A<br>By setting a threshold on the distance to the k nearest neighbors<br>B<br>By setting a threshold on the number of nearest neighbors<br>C<br>By setting a threshold on the similarity measure<br>D<br>By setting a threshold on the classification accuracy | L3 | CO3 |
| 3C-14 | **In the context of instance-based learning, what is an episodic memory?**<br>A<br>A memory of specific instances in the training data<br>B<br>A memory of the general patterns in the training data<br>C<br>A memory of the similarity measures used during training<br>D<br>A memory of the classification rules learned during training | L2 | CO3 |
| 3C-15 | **Which of the following is NOT an issue in instance-based learning algorithms?**<br>A<br>Curse of dimensionality<br>B<br>Handling missing values<br>C | L2 | CO3 |

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| | Sensitivity to noisy instances<br>D<br>Sensitivity to irrelevant features | | |

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| | **Fill inthe blanks** | | |
| 3F-1 | ----------_terms are required for building a bayes model. | L2 | CO3 |
| 3F-2 | ----------_provides way and means of weighing up the desirability of goals and the likelihood of achieving them. | L2 | CO3 |
| 3F-3 | Probability provides a way of summarizing the----------that comes from our laziness and ignorances | L1 | CO3 |
| 3F-4 | The bayesian network can be used to answer any query by using-------- | L2 | CO3 |
| 3F-5 | Causal chain (For example, Smoking cause cancer) gives rise to---------- | L2 | CO3 |
| 3F-6 | The entries in the full joint probability distribution can be calculated as-------- | L4 | CO3 |
| 3F-7 | Bayesian networks allow compact specification of---------- | L2 | CO3 |
| 3F-8 | The compactness of the bayesian network can be described by---------- | L2 | CO3 |
| 3F-9 | Naïve Bayes Algorithm is a ----------learning algorithm. | L1 | CO3 |
| 3F-10 | EM algorithm includes two repeated steps, here the step 2 is---------- _____ | L2 | CO3 |
| 3F-11 | Naïve Bayes algorithm is based on ----------_and used for solving classification problems. | L2 | CO3 |
| 3F-12 | _____is the most common instance-based learning algorithm used in machine learning | L1 | CO3 |
| 3F-13 | _____parameter of the K-Nearest Neighbors algorithm determines the number of neighbors to consider when classifying a new point | L2 | CO3 |
| 3F-14 | In the context of instance-based learning, what does the term `nan` refer to_____ | L1 | CO3 |
| 3F-15 | kind of data representation is commonly used in instance-based learning methods like K-Nearest Neighbors_____ | L2 | CO3 |
| | **Matchthefollowing** | | |
| 3M-1 | COLOUMN A / COLOUMN B<br>1)Prior Probability — A. The probability of a hypothesis before observing any data.<br>2)Likelihood — B. The probability of the data given the hypothesis<br>3)Posterior Probability — C. The probability of the hypothesis given the observed data.<br>4)Evidence — D. The overall probability of observing the data . | L1<br>L1<br>L1<br>L1 | CO3 |

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| 3M-2 | COLOUMN A — COLOUMN B<br>1) Instance-Based Learning — A. where the model makes decisions<br>2) k-Nearest Neighbors (k-NN) — B. A method for measuring the similarity between instances<br>3) Distance metric — C An algorithm that classifies a new instance<br>4) Training Set — D. The collection of examples used to train the model | L2<br>L2<br>L2<br>L2 | CO3 |
| 3M-3 | COLOUMN A — COLOUMN B<br>1) Prototype-Based Classification — A. model uses a subset of training instances.<br>2) Instance Selection — B. modifies the basic k-NN algorithm by assigning weights<br>3) Weighted k-Nearest Neighbors — C. A classification method where instances are compared.<br>4) Local Models — D. A problem that arises when a model learns | L2<br>L2<br>L2<br>L2 | CO3 |
| | 3) | | |
| 3M-4 | COLOUMN A — COLOUMN B<br>1) Multinomial Naive Bayes — A) Handles continuous features<br>2. Bernoulli Naive Bayes — B) Handles discrete features with multiple categories<br>3. Gaussian Naive Bayes — C) Handles discrete features with only two categories<br>4)Evidence — D. The overall probability of observing the data | L2<br>L2<br>L2<br>L2 | CO3 |
| 3M-5 | COLOUMN A — COLOUMN B<br>1) Lazy Learning — A) Builds a model before receiving any data<br>2. Eager Learning — B) Waits for data to arrive before building a model<br>3. Online Learning — C) Updates the model as new data arrives<br>4) Decision Trees — D)Eager learning | L2<br>L2<br>L2<br>L2 | CO3 |

**5-MARKS QUESTIONS**

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|---|---|---|---|
| 3D-1. | Justifyindetailtherelationshipbetween Bayestheoremand concept learning. | L1 | CO3 |
| 3D-2. | Analyzethenecessityof maximumlikelihoodandleastsquarederrorhypothesesin predictingprobabilities. | L1 | CO3 |
| 3D-3. | ExplainCADETSystemusingCasebasedreasoning. | L2 | CO3 |
| 3D-4. | IllustrateindetailaboutK-NearestNeighborLearning. | L1 | CO3 |
| 3D-5. | Explainindetailabout NaïveBayesClassifier withanexample. | L1 | CO3 |
| 3D-6. | Explaintheconceptof EMAlgorithm.DiscusswhatGaussianMixturesare. | L2 | CO3 |
| 3D-7. | DescribetheconceptofMDL.Obtain theequationforMDL. | L2 | CO3 |

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| 3D-8 | Consider a medical diagnosis problem in which there are two alternativehypotheses: 1.that the patient has a particular form of cancer (+) and 2. That thepatient does not (-). A patient takes a lab test and the result comes back positive.The test returns a correct positive result in only 98% of the cases in which thediseaseis actuallypresent, and acorrect negativeresult in only97%of the cases inwhich the disease is not present. Furthermore, .008 of the entire population havethis cancer. Determine whether the patient has Cancer or not using MAPhypothesis. | L6 | CO3 |
| 3D-9 | DiscussindetailaboutBayesian Beliefnetwork. | L1 | CO4 |
| 3D-10 | Evaluatethe followinglearningalgorithms using mistakebound model.<br>(a) FIND-SAlgorithm.<br>(b) HalvingAlgorithm. | L1 | CO4 |
| 3D-11 | ExplainWeighted Majorityalgorithm with example | L3 | CO4 |
| 3D-12 | DeriveLocallyWeightedLinearRegressionwithanexample | L4 | CO4 |
| 3D-13 | DescribeGenetic Algorithmsand explainhowitcanbeusedinidentifyingthebesthypothesis | L4 | CO4 |
| 3D-14 | Writeadetailed noteongeneticprogrammingwithan illustrativeexample | L2 | CO4 |
| 3D-15 | Brieflyexplain on the following<br>(a) ModelsofEvolutionandLearning<br>(b) ParallelizingGeneticAlgorithms | L2 | CO4 |

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| **UNIT–IVTRANSACTIONS** | | | |
|---|---|---|---|
| | **OBJECTIVETYPEQUESTIONS** | **BT Level** | **Course Outcome** |
| 4C-1 | What will happen when a chain-termination mutation is found in the S gene?<br>a. Cell lysis gets blocked.<br>b. The growth of cells containing low levels of packaging proteins is not allowed.<br>c. The lysis of cells cannot be carried artificially<br>d. Packaging cannot be carried out efficiently | L2 | CO4 |
| 4C-2 | **What is the fundamental principle behind Genetic Algorithms (GAs)?**<br>a) Random mutation<br>b) Natural selection<br>c) Artificial intelligence<br>d) Stochastic optimization | L2 | CO4 |

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| 4C-3 | **What is the role of encoding in Genetic Algorithms?**<br><br>a) It determines the probability of crossover.<br>b) It converts candidate solutions into a form suitable for processing.<br>c) It selects the individuals for reproduction.<br>d) It controls the mutation rate. | L2 | CO4 |
| 4C-4 | **Which of the following is a crucial component of Genetic Algorithms for evaluating the suitability of individuals within a population?**<br><br>a) Encoding<br>b) Fitness function<br>c) Crossover<br>d) Mutation | L2 | CO4 |
| 4C-5 | **Which function selects individuals from a population for reproduction based on their fitness?**<br><br>a) Crossover function<br>b) Mutation function<br>c) Selection function<br>d) Encoding function | L2<br><br>L1 | CO4<br><br>CO4 |

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| 4C-6 | **Which genetic operator introduces random changes in an individual's genetic material?**<br><br>a) Crossover<br>b) Encoding<br>c) Selection<br>d) Mutation | L1 | CO4 |
| 4C-7 | First Order Logic is also known as _____<br>a) First Order Predicate Calculus<br>b) Quantification Theory<br>c) Lower Order Calculus<br>d) All of the mentioned | L2 | CO4 |
| 4C-8 | | L2 | CO4 |
| 4C-9 | A common convention is:<br>• is evaluated first<br>• and are evaluated next<br>• Quantifiers are evaluated next<br>• is evaluated last.<br>a) True<br>b) False | L1 | CO4 |
| 4C-10 | **How many types of feedback does reinforcement provide?**<br><br>A. 1<br>B. 2<br>C. 3<br>D. 4 | L1 | CO4 |

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| 4C-11 | **Which kind of data does reinforcement learning use?**<br><br>A. Labeled data<br>B. Unlabelled data<br>C. None<br>D. Both | L2 | CO4 |
| 4C-12 | **Reinforcement learning methods learned through ____?**<br><br>A. Experience<br>B. Predictions<br>C. Analyzing the data | L2 | CO4 |
| 4C-13 | **Which of the following is the practical example of reinforcement learning?**<br><br>A. House pricing prediction<br>B. Market basket analysis<br>C. Text classification<br>D. Driverless cars | L3 | CO4 |
| 4C-14 | **What is the environment in reinforcement learning?**<br><br>A. Environment is a situation that is based on the current state<br>B. Environment is a situation in which an agent is present.<br>C. Environment is similar to feedback<br>D. Environment is a situation that the agent returns as a result. | L2 | CO4 |

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| 4C-15 | **In how many ways can you implement reinforcement learning?**<br><br>A. 2<br>B. 3<br>C. 4<br>D. 5 | L1 | CO4 |
| | **FILLINTHEBLANKS<br>½MARKQUESTIONS** | **BTLevel** | **Course Outcome** |
| 4F-1 | **primary purpose of crossover in a Genetic Algorithm is _____** | L2 | CO4 |

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| 4F-2 | _____represents the main advantage of Genetic Algorithms | L2 | CO4 |
| 4F-3 | _____operator in a Genetic Algorithm increases the diversity of the population | L2 | CO4 |
| 4F-4 | In a Genetic Algorithm, what does the term "offspring" refer to _____ | L1 | CO4 |
| 4F-5 | _____is the primary objective of crossover in a Genetic Algorithm | L2 | CO4 |
| 4F-6 | _____is any predicate (or its negation) applied to any set of terms. | L1 | CO4 |
| 4F-7 | _____emphasizes learning feedback that evaluates the learner's performance without providing standards of correctness in the form of behavioural targets. | L2 | CO4 |
| 4F-8 | Features of Reinforcement learning are _____ | L1 | CO4 |
| 4F-9 | _____is the feedback used by RL | L1 | CO4 |
| 4F-10 | A _____is used to demonstrate, on a purely syntactic basis, that one formula is a logical consequence of another formula. | L2 | CO4 |
| 4F-11 | The statement comprising the limitations of FOL is/are _____ | L4 | CO4 |
| 4F-12 | First Order Logic is also known as _____ | L1 | CO4 |
| 4F-13 | The adjective "first-order" distinguishes first-order logic from _____in which there are predicates having predicates or functions as arguments, or in which one or both of predicate quantifiers or function quantifiers are permitted. | L2 | CO4 |
| 4F-14 | **Reinforcement learning is a ____** | L1 | CO4 |
| 4F-15 | **Reinforcement learning methods learned through ____** | L2 | CO4 |

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| | MATCHTHEFOLLOWING1MARKQUESTIONS | | BTLevel | Course Outcome |
|---|---|---|---|---|
| 4M-1 | 1. Chromosome<br>2. Gene<br>3. Population<br>4. Fitness Function | A) A set of candidate solutions<br>B) A single value in a chromosome<br>C) A process of selecting fittest individuals<br>D) A measure of how good a solution is | L1<br>L1<br>L1<br>L2 | CO4 |
| 4M-2 | 1. Selection<br>2. Crossover<br>3. Mutation<br>4. Generation | A) A process of combining genes from parents<br>B) A process of selecting fittest individuals<br>C) A process of introducing random changes<br>D) A set of candidate solutions | L2<br>L2<br>L2<br>L1 | CO4 |

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| 4M-3 | 1. Value Function<br>2. Q-Learning<br>3. Exploration<br>4. Exploitation | A) A prediction of the expected return<br>B) A model-based reinforcement learning algorithm<br>C) The act of trying new actions to learn more<br>D) The act of choosing the best known action | L2<br>L2<br>L2<br>L2 | CO4 |
| 4M-4 | 1. Agent<br>2. Environment<br>3. Reward<br>4. Policy | A) A reward given for an action<br>B) The learner that interacts with the environment<br>C) A set of possible states<br>D) A mapping of states to actions | L2<br>L2<br>L2<br>L1 | CO4 |

| PARTB | | | |
|---|---|---|---|
| 5MARKSQUESTIONS | | | |
| 4D-1 | ExplainindetailaboutSequentialAlgorithm | L1 | CO4 |
| l4D-2 | Discussindetailaboutgeneral tospecificbeamsearchalgorithm | L1 | CO4 |
| 4D-3 | Demonstratetheproceduresfor Learningsetsoffirstorderrules. | L2 | CO4 |
| 4D-4 | DescribeFOILAlgorithmwith an example | L3 | CO4 |
| 4D-5 | WritedetailednoteonInverting resolution | L1 | CO4 |
| 4D-6 | DiscusstheFOCLAlgorithm in detail. | L2 | CO4 |
| 4D-7 | WhatisReinforcementLearningandexplainReinforcementlearningproblemwith Neatdiagram | L2 | CO4 |
| 4D-8 | ExplaintheQfunction andQ LearningAlgorithmassumingdeterministicrewardsandactions with example. | L3 | CO4 |
| 4D-9 | DiscussindetailaboutNonDeterministicrewardsandactions | L2 | CO4 |
| 4D-10 | Justifythe necessityofTemporal DifferenceLearning | L4 | CO4 |
| 4D-11 | ExplainindetailhowQLearningcanperformGeneralizationfromExamples | L3 | CO4 |
| 4D-12 | IllustrateindetailaboutrelationshipofReinforcementLearningMethodsand DynamicProgramming | L3 | CO5 |
| 4D-13 | DiscusstheEBNN Algorithm | L3 | CO5 |
| 4D-14 | ExplainKBANNAlgorithm.GiveanExample | L2 | CO5 |
| 4D-15 | DiscusstheTangentPropAlgorithm.Illustrative Example | L2 | CO5 |

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| **UNIT–V** | | | |
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| | **OBJECTIVETYPEQUESTIONS**<br>**½MARKQUESTIONS** | **BT Level** | **Course Outcome** |
| 5C-1 | Which combines inductive methods with the power of first-order representations?<br>a) Inductive programming<br>b) Logic programming<br>c) Inductive logic programming<br>d) Lisp programming | L2 | CO5 |
| 5C-2 | How many reasons are available for the popularity of ILP?<br>a) 1<br>b) 2<br>c) 3<br>d) 4 | L1 | CO5 |
| 5C-3 | Which cannot be represented by a set of attributes?<br>a) Program<br>b) Three-dimensional configuration of a protein molecule<br>c) Agents<br>d) None of the mentioned | L4 | CO5 |
| 5C-4 | Which of the following is a limitation of analytical learning?<br><br>A) It can be time-consuming and labor-intensive<br>B) It requires a large amount of data to be effective<br>C) It can be difficult to apply learned principles to new situations<br>D) It is only suitable for simple concepts and relationships | L5 | CO5 |
| 5C-5 | What is the primary goal of analytical learning?<br><br>A) To learn from specific instances and generalize to new ones<br>B) To break down complex concepts into simpler components<br>C) To identify patterns and relationships through similarity<br>D) To apply learned principles to new, analogous situations | L2 | CO5 |

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| 5C-6 | Which of the following is a characteristic of analytical learning?<br><br>A) It involves starting with general principles and applying to specific instances<br>B) It involves starting with specific instances and generalizing to new ones<br>C) It involves breaking down complex concepts into simpler components<br>D) It involves identifying patterns and relationships through similarity | L2 | CO5 |
| 5C-7 | What is the role of abstraction in analytical learning?<br><br>A) To identify patterns and relationships through similarity<br>B) To break down complex concepts into simpler components<br>C) To apply learned principles to new, analogous situations<br>D) To learn from specific instances and generalize to new ones | L4 | CO5 |
| 5C-8 | Which of the following is an advantage of analytical learning?<br><br>A) It allows for rapid learning from specific instances<br>B) It enables the identification of complex patterns and relationships<br>C) It facilitates the application of learned principles to new situations<br>D) It breaks down complex concepts into simpler components | l5 | CO6 |

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| 5C-9 | What is the relationship between analytical learning and top-down processing?<br><br>A) Analytical learning involves top-down processing<br>B) Analytical learning involves bottom-up processing<br>C) Analytical learning is independent of top-down processing<br>D) Analytical learning is the opposite of top-down processing | L2 | CO6 |
| 5C-10 | What is the primary goal of explanation-based learning?<br><br>A) To learn from specific instances and generalize to new ones<br>B) To identify patterns and relationships through similarity<br>C) To construct a causal explanation for a phenomenon<br>D) To apply learned principles to new, analogous situations | L2 | CO6 |
| 5C-11 | Which of the following is a key component of explanation-based learning?<br><br>A) Operationality criterion<br>B) Learnability criterion<br>C) Conceptual framework<br>D) All of the above | L1 | CO6 |
| 5C-12 | What is the role of the operationality criterion in explanation-based learning?<br><br>A) To evaluate the simplicity of an explanation<br>B) To evaluate the accuracy of an explanation<br>C) To evaluate the applicability of an explanation<br>D) To evaluate the generality of an explanation | L5 | CO6 |
| 5C-13 | What is the role of abstraction in inductive learning?<br><br>A) To identify specific details in instances<br>B) To identify general patterns across instances<br>C) To construct a causal explanation for a phenomenon<br>D) To apply learned principles to new situations | L4 | CO6 |

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| 5C-14 | What is the primary goal of inductive learning?<br><br>A) To learn a general principle from specific instances<br>B) To apply a learned principle to a specific instance<br>C) To identify patterns and relationships through similarity<br>D) To construct a causal explanation for a phenomenon | L2 | CO6 |
| 5C-15 | Which of the following is a characteristic of inductive learning?<br><br>A) It involves starting with general principles and applying to specific instances<br>B) It involves starting with specific instances and generalizing to new ones<br>C) It involves identifying patterns and relationships through similarity<br>D) It involves constructing a causal explanation for a phenomenon | L2 | CO6 |
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| | FILLINTHEBLANKS<br>½MARKQUESTIONS | BTLevel | Course Outcome |
|---|---|---|---|
| 5F-1 | Analytical learning involves breaking down complex concepts into smaller, more manageable _____. | L1 | CO5 |
| 5F-2 | The primary goal of analytical learning is to understand the underlying _____of a phenomenon. | L1 | CO5 |
| 5F-3 | Analytical learning typically involves a _____approach, starting with specific details and building up to general principles. | L2 | CO5 |
| 5F-4 | Abstraction is a key process in analytical learning, involving the identification of _____patterns and relationships. | L1 | CO5 |
| 5F-5 | Analytical learning enables learners to develop a deep understanding of complex concepts, allowing them to _____their knowledge to new situations. | L2 | CO5 |
| 5F-6 | Explanation-based learning involves constructing a _____explanation for a phenomenon, identifying the underlying causes and mechanisms. | L1 | CO5 |
| 5F-7 | The operationality criterion is used in explanation-based learning to evaluate the _____of an explanation. | L1 | CO5 |
| 5F-8 | Explanation-based learning typically involves a _____framework, providing a structured representation of knowledge. | L1 | CO5 |
| 5F-9 | The learnability criterion is used in explanation-based learning to evaluate the _____of an explanation. | L1 | CO6 |

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| 5F-10 | Explanation-based learning enables learners to develop a deep understanding of complex concepts, allowing them to their knowledge to new situations. | L2 | CO6 |
| 5F-11 | 1. Q-Learning is a type of _____learning, where an agent learns to take actions in an environment to maximize a reward signal. | **L1** | CO6 |
| 5F-12 | In Q-Learning, the agent learns to predict the expected _____of taking a particular action in a particular state. | L1 | CO6 |
| 5F-13 | The Q-Value in Q-Learning represents the expected _____of taking a particular action in a particular state, and following the optimal policy thereafter. | L1 | CO6 |
| 5F-14 | Inductive learning typically involves a _____approach, starting with specific details and building up to general principles. | L1 | CO6 |
| 5F-15 | Inductive learning involves making generalizations or drawing conclusions based on _____instances or observations. | L1 | CO6 |
| | **MATCH THE FOLLOWING1MARKQUESTIONS** | **BTLevel** | **Course Outcome** |
| 5C-1 | 1. Top-Down Processing — A) Involves starting with specific details and building up to general concepts<br>2. Bottom-Up Processing — B) Involves starting with general concepts and breaking down to specific details<br>3. Forward Chaining — C) Involves reasoning from causes to effects<br>4. Backward Chaining — D) Involves reasoning from effects to causes | L2<br>L2<br>L4<br>L4 | CO5 |
| 5C-2 | 1. Inductive Learning — A) Involves learning general rules from specific examples<br>2. Deductive Learning — B) Involves reasoning from general rules to specific examples<br>3. Analytical Learning — C) Involves breaking down complex concepts into simpler components<br>4. Abductive Learning — D) Involves making educated guesses based on incomplete information | L2<br>L2<br>L4<br>L5 | CO5 |
| 5C-3 | 1. Explanation-Based Generalization — A) A process of removing irrelevant details from a learned concept<br>2. Abstraction — B) A process of identifying the most relevant features of a concept<br>3. Operationalization — C) A process of applying a learned concept to new situations<br>4. Knowledge Compilation — D) A process of integrating new knowledge into existing knowledge structures | L4<br>L4<br>L3<br>L6 | CO6 |
| 5C-4 | 1. Explanation — A) A set of training examples used to learn a concept<br>2. Operationality Criterion — B) A measure of how well a learned concept can be applied<br>3. Learnability Criterion — C) A measure of how easy it is to learn a concept<br>4. Conceptual Framework — D) A structured representation of knowledge used to guide learning | L1<br>L5<br>L5<br>L2 | CO6 |

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| 5C-5 | 1. Observation<br>2. Induction<br>3. Abstraction<br>4. Generalization | A) A general principle or rule learned from specific instances<br>B) The process of gathering specific instances to learn from<br>C) The process of identifying patterns or relationships in data<br>D) A specific instance used to learn a general principle | L1<br>L2<br>L4<br>L3 | CO6 |

| PARTB | | | |
|---|---|---|---|
| 5MARKSQUESTIONS | | | |
| 5C-1 | IllustrateindetailaboutPROLOG-EBG | L1 | CO5 |
| 5C-2 | ExplainindetailaboutremarksonExplanationBasedLearning | L5 | CO5 |
| 5C-3 | Give detailed description on capabilities and limitations of Explanation BasedLearning | L3 | CO5 |
| 5C-4 | ExplainInductionas InvertedDeductionto InductiveLogicProgramming | L2 | CO5 |
| 5C-5 | DiscussaboutPROGOL? | L3 | CO5 |
| 5C-6 | Defend InductionasInvertedDeduction. | L4 | CO5 |
| 5C-7 | WhataretheDeductionResolutionRule? | L2 | CO5 |
| 5C-8 | Explain remarks on explanation based learning? | L2 | CO6 |
| 5C-9 | Discussthecorrespondencebetweeninductionandinverseentailment. | L3 | CO5 |
| 5C-10 | Compareandcontrastanalyticalandinductivelearning. | L3 | CO5 |

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# SRI INDU COLLEGE OF ENGINEERING & TECHNOLOGY

## III B.Tech - II Semester - I Mid Term Examination, Mar/Apr.–2023

## (R20CSE3201) MACHINE LEARNING

**(For CSE, IT, CS, AIML and DS)**

**Dt: 31-03-2023, Day-1 (FN)**

III-II Sem

**Duration: 90 Mins** **Max Marks: 25M**

### Section – A

**Marks: 5Qx1M = 5M**

Answer *All* the questions

* (I-Remembering, II-Understanding, III-Applying, IV-Analyzing, V-Evaluating, and VI-Creating.)

| | | *Blooms Taxonomy Levels | Course Outcomes |
|---|---|---|---|
| 1. | What is well- posed learning problems? | I | CO1 |
| 2. | Define Version Space. | I | CO1 |
| 3. | What is overfiting of data? | VI | CO2 |
| 4. | What is linear and non-linear seperable of data? | VI | CO2 |
| 5. | Explain Brute force Bayes Concept Learning. | II | CO3 |

2 MID
2T AB!- 20/1227, 42 (2)

### Section – B

**Marks: 4Qx5M = 20M**

**Answer any *FOUR* questions**

6. Write the final version space for the below mentioned training examples using candidate elimination algorithm. — II CO1

| Origin | Manufacturer | Color | Decade | Type | Example Type |
|---|---|---|---|---|---|
| Japan | Honda | Blue | 1980 | Economy | Positive |
| Japan | Toyota | Green | 1970 | Sports | Negative |
| Japan | Toyota | Blue | 1990 | Economy | Positive |
| USA | Chrysler | Red | 1980 | Economy | Negative |
| Japan | Honda | White | 1980 | Economy | Positive |
| Japan | Toyota | Green | 1980 | Economy | Positive |
| Japan | Honda | Red | 1990 | Economy | Negative |

| Size | Color | Shape | Class |
|---|---|---|---|
| Big | Red | Circle | No |
| Small | Red | Triangle | No |
| Small | Red | Circle | Yes |
| Big | Blue | Circle | No |
| Small | Blue | Circle | Yes |

7. Define concept learning and discuss with example. — I CO1
8. Explain the Back Propagation algorithm. — II CO2
9. Consider the following set of training examples: — III CO2

a) What is the entropy of this collection of training example with respect to the target function classification?

b) What is the information gain of a2 relative to these training examples?

| Instance | Classification | $a_1$ | $a_2$ |
|---|---|---|---|
| 1 | + | T | T |
| 2 | + | T | T |
| 3 | - | T | F |
| 4 | + | F | F |
| 5 | - | F | T |
| 6 | - | F | T |

10. What are Restriction Biases and Preference Biases and differentiate between them? — I CO2
11. Write about bayes optimal classifier. — I CO3

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QC997

Write Your Ht.No.

# SRI INDU COLLEGE OF ENGINEERING & TECHNOLOGY

(An Autonomous Institution under UGC, New Delhi) - Recognized under 2(f) and 12(B) of UGC Act 1956

**III B.Tech. II Semester (SUPPLEMENTARY) End Examinations, Feb/Mar – 2023.**

**(R18CSE3201) MACHINE LEARNING**

**(For CSE and IT)**

**27/02/2023** **Day- 1 (AN)**

**Duration: 3 Hrs** **Maximum Marks: 70M**

**Blooms Taxonomy** : (I-Remembering, II-Understanding, III-Applying, IV-Analyzing, V-Evaluating and VI-Creating)

**Course Outcomes** : CO

## SECTION-A

*Answer ALL the following questions.* (5Qx 4M = 20M)

| | | | |
|---|---|---|---|
| 1. | Define well-posed learning problems. | II | CO1 |
| 2. | Define Neural networks and throw light on its representation. | II | CO2 |
| 3. | Estimate sample complexity for infinite Hypothesis space. | V | CO3 |
| 4. | Introduce about inverting resolution analytical learning. | I | CO4 |
| 5. | Define about Temporal Difference Learning. | II | CO5 |

## SECTION – B

*Answer FIVE questions choosing at least one from each unit.* (5Qx10M =50M)

| | | | |
|---|---|---|---|
| | **UNIT-I** | | |
| 6. | Apply Version spaces and the candidate elimination algorithm with a suitable instance of values. | III | CO1 |
| | OR | | |
| 7. | Design a learning system with suitable example which uses Machine Learning Concepts. | III | CO1 |
| | **UNIT-II** | | |
| 8. | What is perceptron? Estimate Multilayer networks and the back propagation algorithm for a suitable neural network. | V | CO2 |
| | OR | | |
| 9. | Estimate back propagation algorithm for face recognition application. | V | CO2 |
| | **UNIT-III** | | |
| 10. | Explain about k – Nearest Neighbour Learning for a suitable example. | II | CO3 |
| | OR | | |
| 11. | Outline the remarks on Lazy and Eager Learning Genetic algorithm and motivation of Genetic Algorithm. | II | CO3 |
| | **UNIT-IV** | | |
| 12. | Outline the EBG remarks on Explanation-Based Learning. | II | CO4 |
| | OR | | |
| 13. | State and first order rules and explain all first order rules in detail. | II | CO4 |
| | **UNIT-V** | | |
| 14. | Explain analytical approaches to learning, usage of prior knowledge to alter the search objective. | II | CO5 |
| | OR | | |
| 15. | Outline the usage of Dynamic programming for solving Machine Learning based applications. | II | CO5 |

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# SRI INDU COLLEGE OF ENGINEERING & TECHNOLOGY

(An Autonomous Institution under UGC, New Delhi) - Recognized under 2(f) and 12(B) of UGC Act 1956

## III B.Tech. II Semester (For CSE,IT,DS and AI & ML)

## (R20CSE2101)MACHINE LEARNING

## MODEL PAPER-1

**Duration: 3 Hrs** **Maximum Marks: 70M**

**Blooms Taxonomy : (L1-Remembering, L2-Understanding, L3-Applying, L4-Analyzing, L5-Evaluating and L6-Creating)**

**Course Outcomes : CO**

**PART-A** **(5QX4M=20Marks)**

| S.NO | QUESTIONS | MARKS | COURSE OUT COME | BT LEVEL |
|---|---|---|---|---|
| 1 | Discuss applications of ML? | 4 | CO1 | 2 |
| 2 | Discuss Inductive Bias in Decision Tree Learning | 4 | CO2 | 1 |
| 3 | What are Consistent Learners? | 4 | CO4 | 1 |
| 4 | Write Learning First-Order Rules? | 4 | CO5 | 1 |
| 5 | Discuss Reinforcement Learning | 4 | CO6 | 4 |

**PART-B** **(5QX10M=20Marks)**

<table>
<tr>
<td>

**UNIT-1**

6. Write FIND-S algorithm and explain with example given below

| Example | Sky | AirTemp | Humidity | Wind | Water | Forecast | EnjoySport |
|---|---|---|---|---|---|---|---|
| 1 | Sunny | Warm | Normal | Strong | Warm | Same | Yes |
| 2 | Sunny | Warm | High | Strong | Warm | Same | Yes |
| 3 | Rainy | Cold | High | Strong | Warm | Change | No |
| 4 | Sunny | Warm | High | Strong | Cool | Change | Yes |

OR

7. Explain in detail the Inductive Bias of Candidate Elimination algorithm.

</td>
<td>10</td>
<td>CO3,CO1</td>
<td>2,3</td>
</tr>
<tr>
<td>

**UNIT-II**

8.Explain the followings w.r.t Back Propagation algorithm

- Convergence and Local Minima
- Representational Power of Feedforward Networks
- Hypothesis Space Search and Inductive Bias
- Hidden Layer Representations
- Generalization, Overfitting, and Stopping Criterion

**OR**

9. Consider two perceptrons defined by the threshold expression w0 + wlxl+ w2x2 > 0. Perceptron A has weight values

w0 = 1, w1=2, w2=1 and perceptron B has the weight values

w0 = 0, w1=2, w2=1

True or false? Perceptron A is more-general than perceptron B.

</td>
<td>10</td>
<td>CO2</td>
<td>2,1</td>
</tr>
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<td>

**UNIT-III**

10. What is genetic algorithm? How to parallelizing genetic algorithms

**OR**

11. Define is Maximum a Posteriori (MAP) Maximum Likelihood (ML) Hypothesis. Derive the relation for $h_{MAP}$ and $h_{ML}$ using Bayesian theorem.

</td>
<td>10</td>
<td>CO4</td>
<td>5,2</td>
</tr>
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<td>

**UNIT-IV**

12. Write the First Order Inductive Learning Algorithm? With example

**OR**

13. Discuss in detail about Explanation Based Learning

</td>
<td>10</td>
<td>CO5</td>
<td>2</td>
</tr>
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**UNIT-V**

14. Discuss the EBNN Algorithm

**OR**

15. Implement the Neural Net Equivalent to Domain Theory

</td>
<td>10</td>
<td>CO6</td>
<td>2</td>
</tr>
</table>

# SRI INDU COLLEGE OF ENGINEERING & TECHNOLOGY

(An Autonomous Institution under UGC, New Delhi) - Recognized under 2(f) and 12(B) of UGC Act 1956

## III B.Tech. II Semester(For CSE,IT,DS and AI&ML)

## (R20CSE2101)MACHINE LEARNING ALGORITHM

## MODEL PAPER-2

**Duration: 3 Hrs** **Maximum Marks: 70M**

**Blooms Taxonomy : (L1-Remembering, L2-Understanding, L3-Applying, L4-Analyzing, L5-Evaluating and L6-Creating)**

**Course Outcomes : CO**

**PART-A** **(5QX4M=20Marks)**

| S.NO | QUESTIONS | MARKS | COURSE OUT COME | BTLEVEL |
|---|---|---|---|---|
| 1 | Write the steps in designing a learning systems in detail. | 4 | CO1 | 1 |
| 2 | Give Decision trees to represent the Boolean Functions:<br>a) A && ~ B<br>b) A V [B && C]<br>c) A XOR B<br>d) [A&&B] V [C&&D] | 4 | CO2 | 2 |
| 3 | Explain the practical difficulties of Bayesian theorem. | 4 | CO4 | 1 |
| 4 | Explain about Sequential covering algorithm | 4 | CO5 | 1 |
| 5 | Define Domain Theory? | 4 | CO6 | 1 |

**PART-B** **(5QX10M=20Marks)**

**UNIT-1**

6. Describe the following problems with respect to Tasks, Performance and Experience:

a. A Checkers learning problem

b. A Handwritten recognition learning problem

C .A Robot driving learning problem

**OR**

7. Write the final version space for the below mentioned training examples using candidate elimination algorithm

| Size | Color | Shape | Class |
|---|---|---|---|
| Big | Red | Circle | No |
| Small | Red | Triangle | No |
| Small | Red | Circle | Yes |
| Big | Blue | Circle | No |
| Small | Blue | Circle | Yes |

**10** **CO1** **5,2**

**UNIT-II**

8. Explain the followings w.r.t Back Propagation algorithm **(10)**

- Convergence and Local Minima
- Representational Power of Feed forward Networks
- Hypothesis Space Search and Inductive Bias
- Hidden Layer Representations
- Generalization, Over fitting, and Stopping Criterion

**OR**

9. Give Decision trees for the following set of training examples

| Day | Outlook | Temperature | Humidity | Wind | Play Tennis |
|---|---|---|---|---|---|
| 1 | Sunny | Hot | High | Weak | No |
| 2 | Sunny | Hot | High | Strong | No |
| 3 | Overcast | Hot | High | Weak | Yes |
| 4 | Rain | Mild | High | Weak | Yes |
| 5 | Rain | Cool | Normal | Weak | Yes |
| 6 | Rain | Cool | Normal | Strong | No |
| 7 | Overcast | Cool | Normal | Strong | Yes |
| 8 | Sunny | Mild | High | Weak | No |
| 9 | Sunny | Cool | Normal | Weak | Yes |
| 10 | Rain | Mild | Normal | Weak | Yes |
| 11 | Sunny | Mild | Normal | Strong | Yes |
| 12 | Overcast | Mild | High | Strong | Yes |
| 13 | Overcast | Hot | Normal | Weak | Yes |
| 14 | Rain | Mild | High | Strong | No |

**10** **CO2** **2**

| | | | |
|---|---|---|---|
| **UNIT-III**<br>10. Suppose hypothesis h commits r = 10 errors over a sample of n = 65 independently drawn examples.<br>• What is the variance and standard deviation for number of true error rate errorD(h)?<br>• What is the 90% confidence interval (two-sided) for the true error rate?<br>• What is the 95% one-sided interval (i.e., what is the upper bound U such that errorD(h) ≤5 U with 95% confidence)?<br>What is the 90% one-sided interval? | **10** | **CO4** | **2,6** |

| $\alpha$ | 0.100 | 0.050 | 0.025 | 0.001 |
|---|---|---|---|---|
| $1-\alpha$ | 0.900 | 0.950 | 0.975 | 0.999 |
| $z_{1-\alpha}$ | 1.28 | 1.64 | 1.96 | 3.09 |

| | | | |
|---|---|---|---|
| **OR**<br>11. Define is Maximum a Posteriori (MAP) Maximum Likelihood (ML) Hypothesis. Derive the relation for hMAP and hML using Bayesian theorem. (10) | | | |
| **UNIT-IV**<br>12.Write the Sequential Covering Algorithm? With example. **OR**<br>13. Discus about PROGOL? | **10** | **CO5** | **2** |
| **UNIT-V**<br>14. Discuss about Hypothesis Space Search. Demonstrate the Using Prior Knowledge to Initialize the Hypothesis<br>**OR**<br>15. What is the Motivation? Explain Motivation Inductive-Analytical Approaches to learning | **10** | **CO6** | **2** |

# COURSE OUTCOMES (CO's)

COURSE NAME: Principles of Programming Languages(**R20CSE3143)**

At the end of the course, the student will be able to

| Course Outcomes (COs) | |
|---|---|
| **C314.1** | Describe the Phases of compilation and concept of data structures in compiler, Input Buffering.(Understand) |
| **C314.2** | Constructing the Top Down and Bottom up parsing with problems based on LR and LALR. (Apply) |
| **C314.3** | Constructing the Syntax Directed Translation and Creating the Symbol Table Format.(Create) |
| **C314.4** | Describing about the storage allocation of static and dynamic, arrays and Constructing the Intermediate Code Generation.(Remember) |
| **C314.5** | Describing the code optimization and designing the data flow analysis.(Create) |
| **C314.6** | Analyze & Design the concept of Code Generation algorithms and DAG and Error Recovery in various phases.(Create) |

**Course Name: PRINCIPLES O FPROGRAMMING LANGUAGES Course Code: R22CSE3143**

| **Course Outcomes (COS)** | **Program Outcomes (POs)** | | | | | | | | | | | | **Program Specific Outcomes (PSOs)** | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | P10 | P11 | P12 | PSO1 | PSO2 | PSO3 |
| C314.1 | 3 | - | - | - | 2 | - | - | - | - | - | - | - | - | - | - |
| C314.2 | 3 | - | - | - | 2 | - | - | - | - | - | - | - | - | - | - |
| C314.3 | 1 | 1 | 1 | 3 | 1 | - | - | - | - | - | - | - | - | - | - |
| C314.4 | - | 3 | 3 | 1 | - | - | - | - | - | - | - | - | - | 1 | - |
| C314.5 | 3 | - | - | - | 1 | - | - | - | - | - | - | - | - | 1 | - |
| C314.6 | 3 | - | - | - | 1 | - | - | - | - | - | - | - | - | 1 | - |
| C314 | 2.6 | 2 | 2 | 2 | 1.4 | - | - | - | - | - | - | - | - | 1 | - |

# SRI INDU COLLEGE OF ENGINEERING & TECHNOLOGY

## (An Autonomous Institution under UGC, New Delhi)

**B.Tech. - III Year – I Semester**

| L | T | P | C |
|---|---|---|---|
| 3 | 0 | 0 | 3 |

**Professional Elective-I**

**(R22CSE3143) Principles of Programming Languages**

**Objectives:**

- To briefly describe various programming paradigms.
- To provide conceptual understanding of High level language design and implementation.
- To introduce the power of scripting languages.

**UNIT I :**

**Preliminary Concepts:** Reasons for studying, concepts of programming languages, Programming domains, Language Evaluation Criteria, influences on Language design, Language categories, Programming Paradigms – Imperative, Object Oriented, functional Programming , Logic Programming. Programming Language Implementation – Compilation and Virtual Machines, programming environments. **Syntax and Semantics:** general Problem of describing Syntax and Semantics, formal methods of describing syntax - BNF, EBNF for common programming languages features, parse trees, ambiguous grammars, attribute grammars, denotational semantics and axiomatic semantics for common programming language features.

**UNIT II :**

**Data types:** Introduction, primitive, character, user defined, array, associative, record, union, pointer and reference types, design and implementation uses related to these types. Names, Variable, concept of binding, type checking, strong typing, type compatibility, named constants, variable initialization. **Expressions and Statements:** Arithmetic relational and Boolean expressions, Short circuit evaluation mixed mode assignment, Assignment Statements, Control Structures – Statement Level, Compound Statements, Selection, Iteration, Unconditional Statements, guarded commands.

**UNIT III :**

**Subprograms and Blocks:** Fundamentals of sub-programs, Scope of life time of variables, static and dynamic scope, design issues of subprograms and operations, local referencing environments, parameter passing methods, overloaded sub-programs, generic sub-programs, parameters that are sub-program names, design issues for functions user defined overloaded operators, co routines.

**UNIT IV :**

**Abstract Data types:** Abstractions and encapsulation, introductions to data abstraction, design issues, language examples, C++ parameterized ADT, object oriented programming in small talk, C++, Java, C#, Ada 95

**Concurrency:** Subprogram level concurrency, semaphores, monitors, massage passing, Java threads, C# threads.

**Exception handling:** Exceptions, exception Propagation, Exception handler in Ada, C++ and Java.

**Logic Programming Language:** Introduction and overview of logic programming, basic elements of prolog, application of logic programming.

**UNIT V:**

**Functional Programming Languages:** Introduction, fundamentals of FPL, LISP, ML, Haskell, application of Functional Programming Languages and comparison of functional and imperative Languages.

**Scripting Language:** Pragmatics, Key Concepts, Case Study: Python- Values and Types, Variables, Storage and Control, Bindings and Scope, Procedural Abstraction, Separate Compilation, Module Library.

**TEXT BOOKS:**

1. Concepts of Programming Languages Robert .W. Sebesta 8/e, Pearson Education, 2008.
2. Programming Language Design Concepts, D. A. Watt, Wiley dreamtech, rp-2007.

**REFERENCE BOOKS:**

1. Programming Languages, 2nd Edition, A. B. Tucker, R. E. Noonan, TMH.
2. Programming Languages, K. C. Louden, 2nd Edition, Thomson, 2003.
3. LISP Patric Henry Winston and Paul Horn Pearson Education.
4. Programming in Prolog, W. F. Clocksin & C. S. Mellish, 5th Edition, Springer.
5. Programming Python, M. Lutz, 3rd Edition, O'reilly, SPD, rp-2007.
6. Core Python Programming, Chun, II Edition, Pearson Education, 2007.
7. Guide to Programming with Python, Michel Dawson, Thomson, 2008

**Course Outcomes:**

**At the end of the course student will be able to**

- Define the syntax-related concepts including context-free grammars, parse trees, recursive-descent parsing, and interpretation(**Remember K1**)
- Illustrate the semantic issues associated with implementations, including variable binding, scoping rules, Expression and Assignment statement and control structures.(**Apply K3**)
- Justify the language abstraction constructs of functions, parameter passing and co routines.(**Evaluate K5**)
- Classify the Abstract Data Types, concurrency and Exception handling in various programming languages.(**Analyze K4**)
- Describe the implementation of Functional programming languages and scripting languages.(**Understand K2**)
- Describe the implementation model of logic programming language.(**Understand K2**)

| | SRI INDU COLLEGE OF ENGG & TECH<br>LESSON PLAN<br>(Regulation :R22)<br>Department of Information Technology | Prepared on<br>Rev1:<br>Page: 1 of 7 |
|---|---|---|
| | **Sub. Code & Title** | **R22CSE3143 Principles of Programming Languages** |
| | **Academic Year: 2024-25** | **Year/Sem./Section** **III/I** |
| | **Faculty Name & Designation** | **P.Swathi Assistant Professor** |

| Unit/ Item No. | Topic (s) | Book Reference | Page (s) From | Page (s) To | Teaching Methodology | Proposed No. of Periods | Actual Date of Handling | CO/RBT |
|---|---|---|---|---|---|---|---|---|
| | **UNIT-I** | | | | | | | |
| **I** | **PRELIMINARY CONCEPTS** | | | | | **20** | | |
| 1.1 | Reasons for studying concepts of programming languages | T1 | 1.2 | 1.5 | Blackboard | 02 | | CO1/L1 |
| 1.2 | Programming domains | T1 | 1.5 | 1.7 | Blackboard | 01 | | CO1/L2 |
| 1.3 | Language evaluation criteria | T1 | 1.7 | 1.19 | Blackboard | 02 | | CO1/L5 |
| 1.4 | Influences on language design | T1 | 1.19 | 1.22 | Blackboard | 01 | | CO1/L2 |
| 1.5 | Language categories | T1 | 1.22 | 1.24 | Blackboard | 01 | | CO1/L2 |
| 1.6 | Programming Paradigms – Imperative | T1 | 2.4 | 2.12 | Blackboard | 02 | | CO2/L2 |
| 1.7 | Object Oriented | T1 | 2.12 | 2.15 | Blackboard | 01 | | CO1/L2 |
| 1.8 | Logic programming | T1 | 2.10 | 2.12 | Blackboard | 01 | | C02/L2 |
| 1.9 | Programming language Implementation-compilation and virtual machines | T1 | 2.15 | 2.22 | Blackboard | 01 | | CO2/L3 |
| 1.10 | Programming environments | T1 | 1.32 | 1.33 | Blackboard | 01 | | CO2/L2 |
| 1.11 | Syntax and Semantics: general problem of describing syntax and semantics | T1 | 3.32 | 3.5 | Blackboard | 03 | | CO2/L4 |
| 1.12 | Formal methods of describing syntax-BNF | T1 | 3.5 | 3.9 | Blackboard | 02 | | CO2/L4 |
| 1.13 | EBNF for common programming languages features | T1 | 3.18 | 3.20 | Blackboard | 02 | | CO2/L5 |
| 1.14 | Parse trees | T1 | 3.9 | 3.10 | Blackboard | 01 | | CO1/L3 |
| 1.15 | Ambiguous grammars | T1 | 3.10 | 3.11 | Blackboard | 01 | | CO1/L3 |
| 1.16 | Attribute grammars | T1 | 3.20 | 3.27 | Blackboard | 01 | | CO2/L4 |
| 1.17 | Denotational semantics and axiomatic semantics for common programming language features | T1 | 3.27 | 3.30 | Blackboard | 01 | | CO2/L2 |
| | **Review** | **Signature of the HOD/Coordinator** | | | | | | |

| Unit/ Item No | Topic (s) | Book Reference | Page (s) From | Page (s) To | Teaching Methodology | Proposed No. of Periods | Actual Date of Handling | CO/RBT |
|---|---|---|---|---|---|---|---|---|
| | **UNIT-II** | | | | | | | |
| **II** | **DATA TYPES** | | | | | **15** | | |
| 2.1 | Introduction | T1 | 6.2 | 6.3 | Blackboard | 01 | | CO3/L1 |
| 2.2 | Primitive data types | T1 | 6.42 | 6.7 | Blackboard | 01 | | CO3/L2 |
| 2.3 | Character string types | T1 | 6.8 | 6.13 | Blackboard | 01 | | CO3/L2 |
| 2.4 | User defined ordinal types | T1 | 6.13 | 6.17 | Blackboard | 01 | | CO3/L2 |
| 2.5 | Array types | T1 | 6.17 | 6.28 | Blackboard | 01 | | CO3/L2 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 2.6 | Associative arrays | T1 | 6.31 | 6.33 | Blackboard | 01 | | CO3/L2 |
| 2.7 | Record types | T1 | 6.36 | 6.40 | Blackboard | 01 | | CO3/L2 |
| 2.8 | Union types | T1 | 6.41 | 6.44 | Blackboard | 01 | | CO3/L2 |
| 2.9 | Pointer and reference types | T1 | 6.45 | 6.45 | Blackboard | 01 | | CO3/L2 |
| 2.10 | Design and implementation uses related to these types | T1 | 6.45 | 6.58 | Blackboard | 01 | | CO3/L3 |
| 2.11 | Names | T1 | 5.2 | 5.5 | Blackboard | 01 | | CO2/L1 |
| 2.12 | Variables | T1 | 5.5 | 5.7 | Blackboard | 01 | | CO1/L1 |
| 2.13 | The concept of binding | T1 | 5.8 | 5.11 | Blackboard | 01 | | CO2/L1 |
| 2.14 | Type checking | T1 | 6.58 | 6.59 | Blackboard | 01 | | CO4/L4 |
| 2.15 | Strong typing | T1 | 5.92 | 5.60 | Blackboard | 01 | | CO2/L2 |
| 2.16 | Type compatability | T1 | 6.60 | 6.63 | Blackboard | 01 | | CO1/L2 |
| 2.17 | Named constants | T1 | 5.31 | 5.33 | Blackboard | 01 | | CO3/L1 |
| 2.18 | Variable initialization | T1 | 5.5 | 5.6 | Blackboard | 01 | | CO3/L1 |
| 2.19 | Expressions and statements: arithmetic relational and Boolean expressions | T1 | 7.2,7.3 | 7.17 | Blackboard | 01 | | CO3/L5 |
| 2.20 | Short circuit evaluation mixed mode assignment | T1 | 7.19 | 7.21 | Blackboard | 01 | | CO2/L6 |
| 2.21 | Assignment statements | T1 | 7.21 | 7.25 | Blackboard | 01 | | CO2/L2 |
| 2.22 | Control structures –statement level | T1 | 8.2 | 8.3 | Blackboard | 01 | | CO3/L3 |
| 2.23 | Compound statements | T1 | 8.2 | 8.3 | Blackboard | 01 | | CO3/L2 |
| 2.24 | Selection statements | T1 | 8.4 | 8.16 | Blackboard | 01 | | CO3/L1 |
| 2.25 | Iterative statements | T1 | 8.17 | 8.32 | Blackboard | 01 | | CO3/L1 |
| 2.26 | Unconditional statements | T1 | 8.32 | 8.33 | Blackboard | 01 | | CO3/L1 |
| 2.27 | Guarded statements | T1 | 8.33 | 8.35 | Blackboard | 01 | | CO3/L1 |
| | **Review** | **Signature of the HOD/Coordinator** | | | | | | |

| Unit/ Item No. | Topic(s) | Book Reference | Page (s) | | Teaching Methodology | Proposed No. of Periods | Actual Date of Handled | CO/RBT |
|---|---|---|---|---|---|---|---|---|
| | | | From | To | | | | |
| | UNIT-III | | | | | | | |
| III | **SUBPROGRAMS AND BLOCKS** | | | | | 13 | | |
| 3.1 | Fundamentals of sub programs | T1 | 9.2 | 9.13 | Blackboard | 01 | | CO4/L2 |
| 3.2 | Scope of life time of variables | T1 | 5.28 | 5.29 | Blackboard | 01 | | CO4/L2 |
| 3.3 | Static and dynamic scope | T1 | 5.19 | 5.27 | Blackboard | 01 | | CO4/L1 |
| 3.4 | Design issues of sub programs and operations | T1 | 9.13 | 9.14 | Blackboard | 02 | | CO4/L2 |
| 3.5 | Local referencing environments | T1 | 9.14 | 9.15 | Blackboard | 02 | | CO4/L2 |
| 3.6 | Parameter passing methods | T1 | 9.15 | 9.16 | Blackboard | 01 | | CO4/L1 |
| 3.7 | Overloaded sub programs | T1 | 9.39 | 9.41 | Blackboard | 01 | | CO4/L1 |
| 3.8 | Generic sub programs | T1 | 9.41 | 9.43 | Blackboard | 01 | | CO4/L2 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 3.9 | Parameters that are sub program names | T1 | 9.43 | 9.48 | Blackboard | 01 | | CO4/L2 |
| 3.10 | Design issues for functions user defined overloaded operators | T1 | 9.48 | 9.49 | Blackboard | 01 | | CO4/L1 |
| 3.11 | Co routines | T1 | 9.50 | 9.52 | Blackboard | 01 | | CO4/L2 |
| | **Review** | **Signature of the HOD/Coordinator** | | | | | | |
| Unit/ Item No. | Topic(s) | Book Reference | Page (s) From | Page (s) To | Teaching Methodology | Proposed No. of Periods | Actual Date of Handled | CO/RBT |
| | **UNIT-IV** | | | | | | | |
| IV | **ABSTACT DATATYPES** | | | | | 24 | | |
| 4.1 | Abstractions and encapsulation | T1 | 10.2 | 10.3 | Blackboard | 01 | | CO5/L1 |
| 4.2 | Introduction to data abstraction | T1 | 10.3 | 10.5 | Blackboard | 01 | | CO5/L1 |
| 4.3 | Design issues | T1 | 10.6 | 10.6 | Blackboard | 01 | | CO5/L1 |
| 4.4 | Language examples | T1 | 10.7 | 10.13 | Blackboard | 01 | | CO5/L1 |
| 4.5 | C++ parameterized ADT | T1 | 10.14 | 10.24 | Blackboard | 01 | | CO5/L2 |
| 4.7 | OOPS in small talk | T1 | 11.10 | 11.13 | Blackboard | 01 | | CO5/L2 |
| 4.8 | C++ | T1 | 11.13 | 11.24 | Blackboard | 01 | | CO5/L1 |
| 4.9 | Java | T1 | 11.24 | 11.28 | Blackboard | 01 | | CO5/L1 |
| 4.10 | C# | T1 | 11.28 | 11.30 | Blackboard | 01 | | CO5/L2 |
| 4.11 | Ada 95 | T1 | 11.30 | 11.35 | Blackboard | 01 | | CO5/L2 |
| 4.12 | Concurrency :sub program level concurrency | T1 | 12.2 | 12.10 | Blackboard | 01 | | CO5/L2 |
| 4.13 | Semaphores | T1 | 12.10 | 12.15 | Blackboard | 01 | | CO5/L2 |
| 4.14 | Monitors | T1 | 12.15 | 12.17 | Blackboard | 01 | | CO5/L2 |
| 4.15 | Message passing | T1 | 12.17 | 12.30 | Blackboard | 01 | | CO5/L1 |
| 4.16 | java threads | T1 | 12.30 | 12.38 | Blackboard | 01 | | CO5/L2 |
| 4.17 | C# threads | T1 | 12.38 | 12.40 | Blackboard | 01 | | CO5/L1 |
| 4.18 | Exception handling:exceptions | T1 | 13.2 | 13.3 | Blackboard | 01 | | CO5/L1 |
| 4.19 | Exception propogation | T1 | 13.3 | 13.8 | Blackboard | 01 | | CO5/L3 |
| 4.20 | Exception handler in Ada | T1 | 13.8 | 13.15 | Blackboard | 01 | | CO5/L2 |
| 4.21 | C++ and java | T1 | 13.15 | 13.29 | Blackboard | 01 | | CO5/L1 |
| 4.22 | Logic programming language: introduction and overview of logic programming | T1 | 15.2 | 15.10 | Blackboard | 01 | | CO5/L3 |
| 4.23 | Basic elements of prolog | T1 | 15.10 | 15.31 | Blackboard | 01 | | CO5/L1 |
| 4.24 | Application of logic programming | T1 | 15.31 | 15.33 | Blackboard | 01 | | CO5/L1 |
| | **Review** | **Signature of the HOD/Coordinator** | | | | | | |

| | SRI INDU COLLEGE OF ENGG & TECH<br>LESSON PLAN<br>(Regulation :R22)<br>Department of Information Technology | Prepared on<br>Rev1:<br>Page: 4 of 7 |
|---|---|---|
| | **Sub. Code & Title** | **R22CSE3143 Principles of Programming Languages** |
| | **Academic Year: 2024-25** | **Year/Sem./Section** **III/I** |
| | **Faculty Name & Designation** | **P.Swathi Assistant Professor** |

| Unit/ Item No | Topic(s) | Book Reference | Page (s) | | Teaching Methodology | Proposed No. of Periods | Actual Date of Handled | CO/RBT |
|---|---|---|---|---|---|---|---|---|
| | | | From | To | | | | |
| | **UNIT-V** | | | | | | | |
| V | FUNCTIONAL PROGRAMMING LANGUAGES | | | | | 16 | | |
| 5.1 | Introduction | T1 | 14.2 | 14.5 | Blackboard | 01 | | CO6/L1 |
| 5.2 | Fundamentals of FPL | T1 | 14.5 | 14.6 | Blackboard | 01 | | CO6/L2 |
| 5.3 | LISP | T1 | 14.7 | 14.10 | Blackboard | 02 | | CO6/L3 |
| 5.4 | ML | T1 | 14.28 | 14.32 | Blackboard | 01 | | CO6/L3 |
| 5.5 | HASKELL | T1 | 14.32 | 14.37 | Blackboard | 01 | | CO6/L3 |
| 5.6 | Application of functional programming and comparison of functional and imperative languages | T1 | 14.37 | 14.40 | Blackboard | 01 | | CO6/L4 |
| 5.7 | Scripting language-pragmatics | T1 | 16.1 | 16.5 | Blackboard | 02 | | CO6/L1 |
| 5.8 | Key concepts | T1 | 16.5 | 16.9 | Blackboard | 01 | | CO6/L2 |
| 5.9 | Case study: python-values and types | T1 | 16.9 | 16.12 | Blackboard | 01 | | CO6/L6 |
| 5.10 | Variables | T1 | 16.12 | 16.14 | Blackboard | 01 | | CO6/L6 |
| 5.11 | Storage and control | T1 | 16.12 | 16.18 | Blackboard | 01 | | CO6/L6 |
| 5.12 | Binding and scope | T1 | 16.22 | 16.24 | Blackboard | 01 | | CO6/L6 |
| 5.13 | Procedural abstraction | T1 | 16.18 | 16.20 | Blackboard | 01 | | CO6/L6 |
| 5.14 | Separate compilation, module library | T1 | 16.24 | 16.29 | Blackboard | 01 | | CO6/L6 |
| | **Review** | **Signature of the HOD/Coordinator** | | | | | | |

## LIST OF TEXT BOOKS AND REFERENCES

### TEXT BOOKS:


1. Concepts of Programming Languages Robert. W. Sebesta 8/e, Pearson Education, 2008.
2. Programming Language Design Concepts, D .A. Watt, Wiley dreamtech, rp-2007.


### REFERENCES:


- Programming Languages, 2nd Edition, A. B. Tucker, R. E. Noonam, TMH.
- Programming Languages. K.C.Louden, 2nd Edition, Thomson, 2003.
- LISP Patric Henry Winston and Paul Horn Pearson Education.
- Programming in Prolog, W. F. Clock sin & C.S.Mellish, 5th Edition, Springer.
- Programming Python, M .Lutz, 3rd Edition, O'reilly, SPD, rp-2007.
- Core Python Programming, Chun, II Edition, Pearson Education, 2007.
- Guide to Programming with Python, Michel Dawson, Thomson, 2008.

## Weblinks

W1. https://www.javatpoint.com/programming-language.

W2.https://www.tutorialspoint.com/basics_of_computer_science/basics_of_computer_science_programming_languages.htm#:~:text=The%20computer%20system%20is%20simply,languages%20or%20simply%20computer%20languages.

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| | **Sub. Code & Title** | **R22CSE3143 Principles of Programming Languages** |
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| | **Faculty Name & Designation** | **P.Swathi Assistant Professor** |

## ASSIGNMENT QUESTIONS MID-I & II

| S.No | Assignment Questions | Course Outcome | Books To be Referred | Date Of Announcement | Date Of Submission |
|---|---|---|---|---|---|
| 1 | Explain the process of Compilation? | CO1 | T1 | | |
| 2 | a) Explain EBNF along with an example.<br>b) Explain various programming paradigms | CO1 | T1 | | |
| 3 | Define data Type? Explain about Primitive and non-primitive data type? | CO3 | T1 | | |
| 4 | Explain about types of assignment statements? | CO3 | T1 | | |
| 5 | Discuss the design issues for subprograms and functions? | CO4 | T1 | | |
| 6 | Write about overloaded Subprograms? | CO4 | T1 | | |
| 7 | Discuss object oriented features, programming features in small talk? | CO5 | T1 | | |
| 8 | Discuss basic elements of prolog? | CO5 | T1 | | |
| 9 | Explain about LISP? | CO6 | T1 | | |
| 10 | Explain various data types supported in python? | CO6 | T1 | | |

## SELF STUDY TOPICS

| S. No | Topics | Books & Journals | Course Outcome |
|---|---|---|---|
| 1 | Compilation Process | Robert. W. Sebesta | CO1 |
| 2 | Exception Handling | Robert. W. Sebesta | CO5 |

| Prepared by | Recommended and Approved by |
|---|---|
| **P.Swathi**<br>**( Signature & Name)** | **HOD/IT** |

| | | |
|---|---|---|
| | **SRI INDU COLLEGE OF ENGG & TECH**<br>**QUESTION BANK**<br>**(Regulation :R22)**<br>**Department of INFORMATION TECNOLOGY** | **(Regulation :R18)**<br>**Prepared on**<br>**Rev1:**<br>**Page: 1 of 6** |

| | | |
|---|---|---|
| **Sub. Code & Title** | **(R22CSE3143) Principles of Programming Language** | |
| **Academic Year: 2024-25** | **Year/Sem.** | **III/I** |
| **Faculty Name & Designation** | **P.Swathi, Assistant Professor** | |

## QUESTION BANK WITH BLOOMS TAXONOMY LEVEL (BTL)

(1. Remembering 2. Understanding 3. Applying 4. Analyzing 5. Evaluating 6. Creating)

| **UNIT-I PRILIMINARYCONCEPTS** | | | |
|---|---|---|---|
| 1 MARKS QUESTIONS | | **BT Level** | **Course Outcome** |
| 1 | Write disadvantages of aliasing? | 1 | CO1 |
| 2 | Define the phases of compilation process? | 1 | CO1 |
| 3 | List the language categories? | 1 | CO1 |
| 4 | Explain the reasons for studying principles of programming languages? | 1 | CO1 |
| 5 | Define imperative languages? | 1 | CO1 |
| 6 | Define a Parse tree? | 4 | CO2 |
| 7 | Define a Token? | 1 | CO2 |
| 8 | Define Synthesized Attributes? | 1 | CO2 |
| 9 | Illustrate the example of Regular Expression? | 1 | CO2 |
| 10 | Write about Grammar? | 2 | CO3 |
| **5 MARKS QUESTIONS** | | | |
| 1 | Explain the process of Compilation??**(April/May2019)** | 5 | CO1 |
| 2 | a) Explain EBNF along with an example.<br>**b)** Explain various programming paradigms. **(April/May2018)** | 2 | CO1 |
| 3 | Explain the control structures along with examples.**(April/May 2017)** | 2 | CO1 |
| 4 | Explain about the factors that influence the languagdesign?.**(April/May2018)** | 2 | CO1 |
| 5 | Describe the reasons for studying the principles of programming languages? Explain? (understand)**(April/May2018)** | 2 | CO2 |
| 6 | Explain formal methods of BNF? | 3 | CO1 |

| | | | |
|---|---|---|---|
| 7 | Write the general problems of describing syntax? | 1 | CO2 |
| 8 | Write the primary use of attribute grammars ?How is the order of evaluation of attributes determined for the trees of a given attribute grammar ? | 1 | CO2 |
| 9 | Solve a parse tree and leftmost derivation for the statement: A=(A+B)*C<br>Given grammar is: <assign> → <id>=<expr><br><id> → A/B/C<br><expr> →<expr> + <term> / <term><br><term> → <term> * <factor> / <factor><br><factor>→ (<expr>) / <id>(applying) | 4 | CO2 |
| 10 | Describe the basic concept of denotational semantics?**(April/May2017)** | 2 | CO2 |
| | **UNIT-II DATA TYPES** | | |
| | **1 MARKS QUESTIONS** | | |
| 1 | Write a data type and What are types? | 1 | CO3 |
| 2 | Define a record & union?**(May2019)** | 3 | CO3 |
| 3 | Write about an enumeration datatype? | 1 | CO3 |
| 4 | Define a pointer and with example? | 1 | CO3 |
| 5 | Define Type Checking and Strong Typing?**(May2019)** | 3 | CO3 |
| 6 | Define expression? Give example? | 6 | CO3 |
| 7 | Define operator precedence? | 2 | CO3 |
| 8 | Define mixed mode assignment statement? | 1 | CO3 |
| 9 | State the design issues of selection statements? | 6 | CO3 |
| | **5 MARKS QUESTIONS** | | |
| 1 | Explain Named Constants? Compare the design issues related to constants in any two programming languages? **(April/May2018)** | 2 | CO3 |
| 2 | Write the general problem with static scoping? How is a reference to a non-local variable in a static scoped program connected to its definition? **(April/May-2017)** | 2 | CO3 |

| | | | |
|---|---|---|---|
| 3 | Define type compatibility? Distinguish between name type compatibility and Structure type compatibility? | 6 | CO3 |
| 4 | Define data Type? Explain About Primitive and non-primitive data type? | 3 | CO3 |
| 5 | Explain about types of assignment statements?**(May2018)** | 2 | CO3 |
| 6 | Discuss unconditional statement? Give examples? | 2 | CO3 |
| 7 | Explain about relational and Boolean expressions? **(May2018)** | 2 | CO3 |
| 8 | Describe the design issues of multiple-selection statements and logically controlled loop statements?**(April/May2018)** | 5 | CO3 |
| 9 | Define the terms: coercion, type error, strong typing**(May2019)** | 2 | CO3 |
| 10 | Explain in detail Dijkstra's guarded commands with examples?**(May 2019)** | 6 | CO3 |

## UNIT-III SUBPROGRAMS AND BLOCKS

### 1Mark Questions

| | | | |
|---|---|---|---|
| 1 | Define sub program? | 1 | CO4 |
| 2 | Describe about block? | 1 | CO4 |
| 3 | Define procedure?**(May2019)** | 1 | CO4 |
| 4 | Define function? | 2 | CO4 |
| 5 | Define dynamic scope? **(April/May 2017)** | 1 | CO4 |
| 6 | Discuss Extent? Give example? | 1 | CO4 |
| 7 | Discuss Generic subprogram**?(May 2018)** | 2 | CO4 |
| 8 | Define co- routines **(May 2018)** | 1 | CO4 |
| 9 | Differentiate between pass-by-value and pass-by-reference? | 2 | CO4 |
| 10 | Define pass-by-Name? | 1 | CO4 |

### 5 Mark Questions

| | | | |
|---|---|---|---|
| 1 | Explain the characteristics of co-routine feature? List the languages which allow co-routines? | 2 | CO4 |
| 2 | Define shallow and deep binding for referencing environment of subprograms that | 5 | CO4 |

| | | | |
|---|---|---|---|
| | have been passed as parameters? **(May 2018)** | | |
| 3 | Discuss the design issues for subprograms and functions? **(May2019)** | 3 | CO4 |
| 4 | Write about overloaded subprograms? | 2 | CO4 |
| 5 | Discuss about actual parameters and positional parameters and keyword parameters? | 2 | CO4 |
| 6 | Define static, fixed stack-dynamic, fixed heap-dynamic and heap-dynamic array. What are the advantages of each?**(May 2019)** | 3 | CO4 |
| 7 | Explain causes a C++ template function to be instantiated?**(May2018)** | 2 | CO4 |
| 8 | Discuss the issues that arise when subprogram names are parameters? (May 2018) | 2 | CO4 |
| 9 | Explain causes a C++ template function to be instantiated | 4 | CO4 |
| 10 | Differentiate between sub program definition and sub program activation. List the two approaches that are concerned with the life time of the sub program environment? | 2 | CO4 |
| | **UNIT-IV ABSTRACT DATATYPES** | | |
| | **1 Mark Questions** | | |
| 1 | Define abstraction and encapsulation? | 1 | CO5 |
| 2 | Define abstract data type? | 1 | CO5 |
| 3 | Define inheritance? Give examples? | 1 | CO5 |
| 4 | Differentiate between java packages and C++ name spaces? | 1 | CO5 |
| 5 | Define Ada package? Give example? | 1 | CO5 |
| 6 | Define exception propagation? | 1 | CO5 |
| 7 | Define logic programming language? | 1 | CO5 |
| 8 | Write difference between C++ Throw and Java Throw? | 2 | CO5 |
| 9 | Define exception handling? | 1 | CO5 |
| 10 | Define unchecked exception? | 2 | CO5 |
| | **5 MARK QUESTIONS** | | |
| 1 | Discuss the Object oriented programming features supported in small talk? **(April/May2017)** | 3 | CO5 |

| | | | |
|---|---|---|---|
| 2 | Discuss the relationship of monitors to Ada to tasks for competition synchronization? | 2 | CO5 |
| 3 | Explain the reason java doesn't have friend functions or friend classes?**(April/May 2017)** | 5 | CO5 |
| 4 | Illustrate the language design requirements for a language that supports abstract data types?**(April/May2017)(May 2018)** | 6 | CO5 |
| 5 | Describe exception handler in Java? | 6 | CO5 |
| 6 | Write compassion of the Exception Handling capabilities of C++ and those of JAVA? | 2 | CO5 |
| 7 | Discuss basic elements of Prolog? | 6 | CO5 |
| 8 | Explain syntactic forms and usage of fact and rule statements in Prolog? | 3 | CO4 |
| 9 | Explain the generate – and – test programming strategy in Prolog? | 2 | CO4 |
| 10 | Explain subprogram level concurrency? | 4 | CO4 |

## UNIT-V FUNCTIONAL PROGRAMMING LANGUAGES AND SCRIPTING LANGUAGES

### 1 Mark Questions

| | | | |
|---|---|---|---|
| 1 | Define Atom? | 1 | CO6 |
| 2 | Write the list functions of LISP? | 1 | CO6 |
| 3 | Write about the Predicate functions of Lisp? | 1 | CO6 |
| 4 | Describe type inferencing in ML? | 2 | CO6 |
| 5 | Describe the scoping rules common in lisp.ml and Haskell? | 4 | CO6 |
| 6 | Define Haskell? | 5 | CO6 |
| 7 | Define Python? | 4 | CO6 |
| 8 | Write about Procedural Abstraction? | 1 | CO6 |
| 9 | Define Bindings and Scope? | 1 | CO6 |
| 10 | Define Separate Compilation? | 2 | CO6 |

### 5 Marks Questions

| | | | |
|---|---|---|---|
| 1 | Discuss briefly about expressions in meta language? | 3 | CO6 |
| 2 | Explain main features of imperative languages?.**(May2019)** | 3 | CO6 |

| | | | |
|---|---|---|---|
| 3 | Explain procedural abstraction in Python? | 3 | CO6 |
| 4 | Differentiate functional and imperative languages.**(May2019)** | 6 | CO6 |
| 5 | Explain about LISP | 6 | CO6 |
| 6 | Explain structures and arrays in ML give examples? | 6 | CO6 |
| 7 | Describe the syntax and semantics of COND and LET? | 2 | CO6 |
| 8 | Write a Scheme function that removes the last element from a given list? | 4 | CO6 |
| 9 | Define functional forms and referential transparency ?what data types were parts of the original LISP?(Remembering)**(May2018)** | 4 | CO6 |
| 10 | Discuss Various data types supported in Python. | 3 | CO6 |

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**III B.Tech - I Semester - II Mid Term Examinations**

**(R16CSE1110) PRINCIPLES OF PROGRAMMING LANGUAGES -** (Computer Science & Engineering)

**Duration: 90Mins** **Date: 30.10.2019 FN** **Max Marks: 25M**

**Section – A**

**Answer *All* the questions** **Marks: 5Qx1M = 5M**

1. Define pass-by-Name.
2. Write difference between C++ Throw and Java Throw.
3. Define exception handling.
4. Write the list functions of LISP.
5. Write about the Predicate functions of Lisp.

**Section – B**

**Answer any *FOUR* questions** **Marks: 4Qx5M = 20M**

6. Write about overloaded subprograms.
7. Define static, fixed stack-dynamic, fixed heap-dynamic and heap-dynamic array. What are the advantages of each?
8. compare the Exception Handling capabilities of C++ and those of JAVA.
9. Explain the generate – and – test programming strategy in Prolog.
10. Explain main features of imperative languages.
11. Explain structures and arrays in ML give examples.

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**Answer *All* the questions** **Marks: 5Qx1M = 5M**

1. Define pass-by-Name.
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3. Define exception handling.
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5. Write about the Predicate functions of Lisp.

**Section – B**

**Answer any *FOUR* questions** **Marks: 4Qx5M = 20M**

6. Write about overloaded subprograms.
7. Define static, fixed stack-dynamic, fixed heap-dynamic and heap-dynamic array. What are the advantages of each?
8. compare the Exception Handling capabilities of C++ and those of JAVA.
9. Explain the generate – and – test programming strategy in Prolog.
10. Explain main features of imperative languages.
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**Duration: 90Mins** **Date: 26.08.2019 FN** **Max Marks: 25M**

**Section – A**

**Answer *All* the questions** **Marks: 5Qx1M = 5M**

1. Define a Parse tree?
2. Define Syntheized Attributes
3. Define Type Checking and Strong Typing?
4. Define a record and union.
5. Describe about block.

**Section – B**

**Answer any *FOUR* questions** **Marks: 4Qx5M = 20M**

6. Explain about the factors that influence the language design.
7. Explain formal methods of BNF.
8. Write the primary use of attribute grammars. How is the order of evaluation of attributes determined for the trees of a given attribute grammar?
9. Define type compatibility. Distinguish between name type compatibility and structure type compatibility.
10. Define data Type. Explain about Primitive and non-primitive data type.
11. Discuss about actual parameters and positional parameters and keyword parameters.

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**Section – A**

**Answer *All* the questions** **Marks: 5Qx1M = 5M**

1. Define a Parse tree?
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4. Define a record and union.
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**Section – B**

**Answer any *FOUR* questions** **Marks: 4Qx5M = 20M**

6. Explain about the factors that influence the language design.
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8. Write the primary use of attribute grammars. How is the order of evaluation of attributes determined for the trees of a given attribute grammar?
9. Define type compatibility. Distinguish between name type compatibility and structure type compatibility.
10. Define data Type. Explain about Primitive and non-primitive data type.
11. Discuss about actual parameters and positional parameters and keyword parameters.

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**II B.Tech - II Semester - II Mid Term Examinations**

**(R16CSE1110) PRINCIPLES OF PROGRAMMING LANGUAGES**

(Information Technology)

**Duration: 90Mins** **Date: 15.04.2019 FN** **Max Marks: 25M**

**Section – A**

**Answer *All* the questions** **Marks: 5Qx1M = 5M**

1. Show an example for overloaded operators.
2. Define coroutines.
3. What is logic programming language?
4. What is exception handling?
5. Show an internal representation of two LISP lists. (ABCD) and (A(B C)D(E (F G)))

**Section – B**

**Answer any *FOUR* questions** **Marks: 4Qx5M = 20M**

6. Develop a C code for pass by reference.
7. Show an example of user defined overloaded operators in C++. Explain.
8. Give an example on queue abstract data type in a language you know, including operations for enqueue, dequeue and empty.
9. Discuss basic elements of Prolog.
10. Explain main features of imperative languages.
11. Define functional forms and referential transparency. What data types were parts of the original LISP?

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**II B.Tech - II Semester - II Mid Term Examinations**

**(R16CSE1110) PRINCIPLES OF PROGRAMMING LANGUAGES**

(Information Technology)

**Duration: 90Mins** **Date: 15.04.2019 FN** **Max Marks: 25M**

**Section – A**

**Answer *All* the questions** **Marks: 5Qx1M = 5M**

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**Answer any *FOUR* questions** **Marks: 4Qx5M = 20M**

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(An Autonomous Institution Under 2(f) and 12(B) of UGC Act 1956, New Delhi)

**II B.Tech - II Semester - I Mid Term Examinations**

**(R16CSE1110) PRINCIPLES OF PROGRAMMING LANGUAGES**

(Information Technology)

**Duration: 90Mins** **Date: 14.02.2019 FN** **Max Marks: 25M**

**Section – A**

**Answer *All* the questions** **Marks: 5Qx1M = 5M**

1. Define imperative languages.
2. What is a synthesized attributes?
3. Classify different relational operators available in Ada,C,Fortran 95**.**
4. Define short circuit evaluation.
5. Compare formal and actual parameters.

**Section – B**

**Answer any *FOUR* questions** **Marks: 4Qx5M = 20M**

6. Explain the process of compilation in each phase of a compiler.
7. Show a parse tree for the statement A=B*(A+C)
   Given grammar is: <assign> → <id>=<expr>
   <id> → A|B|C
   <expr> →<id> + <expr>
   |<id>*<expr>
   |(<expr>)
   |<id>
8. Show an example to convert the BNF to EBNF. Explain.
9. Explain about primitive and non-primitive data type.
10. Compare the design issues related to constants in any two programming languages.
11. Discuss the issues related to variables that are defined within subprograms.

***

**BR-18** **Write Your Ht.No.** **D4**

Subject Code: R18CSE3113

# SRI INDU COLLEGE OF ENGINEERING & TECHNOLOGY

(An Autonomous Institution under UGC, New Delhi) - Recognized under 2(f) and 12(B) of UGC Act 1956

## III B.Tech I Semester (REGULAR) End Examinations March - 2021

## PRINCIPLES OF PROGRAMMING LANGUAGES

**19 /03/2021** **(Common to CSE and IT)** **Day- 5 (FN)**

**Duration: 3 Hrs** **Marks: 5Qx14M = 70M**

**Answer *FIVE* questions (Treat Q.No.11 as a single question).**

**UNIT-I**

**1.** Draw and explain the functioning of computer architecture.

**(OR)**

**2.** With the help of an example, explain the concept of language recognizers.

**UNIT-II**

**3.** How is a single-dimensional array implemented? How is it described in compile-time?

**(OR)**

**4.** Illustrate with an example a case where a sub operator in a programming language is not communicative.

**UNIT-III**

**5.** Write short notes on:
i) pass-by-value result.
ii) pass-by-reference.

**(OR)**

**6.** How is the parameter-passing method implemented?

**UNIT-IV**

**7.** Write a C program explaining the implementation of Stack.

**(OR)**

**8.** Explain the ways a client can reference a name from namespace in C++.

**UNIT-V**

**9.** Describe the Internal representation of two Lisp lists.

**(OR)**

**10.** What is a predicate function? Explain.

**11. Answer any *THREE* questions from the following. (5M+5M+4M)**

**a)** How does the point "Increased ability to learn new languages" support for Programming Languages? Elaborate.

**b)** Define static, fixed stack-dynamic, fixed beap-dynamic, and beap-dynamic arrays. What are the advantages of each?

**c)** What is subprogram definition?

**d)** Why are destructors rarely used in Java but essential in C++?

**e)** What does lambda expression specify?

*****

**BR-16** **Write Your Ht.No.** **D4**

Subject Code: R16CSE1110

# SRI INDU COLLEGE OF ENGINEERING & TECHNOLOGY

(An Autonomous Institution under UGC, New Delhi) - Recognized under 2(f) and 12(B) of UGC Act 1956

## III B.Tech I Semester (SUPPL.) End Examinations March - 2021

## PRINCIPLES OF PROGRAMMING LANGUAGES

**09 /03/2021** **(Computer Science Engineering)** **Day- 1**

**Duration: 3 Hrs** **Marks: 5Qx14M = 70M**

**Answer *FIVE* questions (Treat Q.No.11 as a single question).**

**UNIT-I**

**1.** Explain BNF for common programming languages.

**(OR)**

**2.** Write short notes on.

**a)** Parse trees.

**b)** Virtual Machines.

**UNIT-II**

**3.** Describe about various Arithmetic relational expressions.

**(OR)**

**4.** Explain the control structures with an example.

**UNIT-III**

**5.** Write the design issues for functions user defined overloaded operators.

**(OR)**

**6.** Explain the local referencing environments.

**UNIT-IV**

**7.** Discuss about semaphores and monitors.

**(OR)**

**8.** Describe with an example of exception handling in JAVA.

**UNIT-V**

**9.** Give an account LISP and Haskell.

**(OR)**

**10.** Explain the procedural abstraction in Python.

**11.** **Answer any *THREE* questions from the following.** **(5M+5M+4M)**

**a)** Write about programming paradigms.

**b)** List out the primitive data types.

**c)** Differentiate static and dynamic scope.

**d)** Define data abstraction and encapsulation.

**e)** Comparison of functional and imperative languages.

*****

**BR-16** **HallTicket No.:**_____ **D4**

# SRI INDU COLLEGE OF ENGINEERING & TECHNOLOGY

(An Autonomous Institution under UGC, New Delhi)(Recognized under 2(f) and 12(B) of UGC Act 1956)

## II B.Tech - II Semester –End Examinations (Regular) November-2020

## R16CSE1110 – PRINCIPLES OF PROGRAMMING LANGUAGES

**(Information Technology)**

**Duration:2 Hrs** **13.11.2020 (AN)** **Max Marks:70M**

**Section – A**

**Answer Any <u>Three</u> of the following questions.** **Marks: 3Qx6M =18M**

1. What is meant by Virtual Machine? Explain how it is achieved
2. Differentiate between selection and iteration.
3. Define block. What is the scope of the formal parameter?
4. What is a Thread? Give one example
5. Discuss Procedural abstraction.

**Section – B**

## Answer ***<u>FOUR</u>*** questions from the following

**Marks: 4Qx13M = 52M**

### UNIT – I

6. (a) Explain the main features of the programming paradigm with examples?
   (b) Differentiate between syntax and semantics.

**(OR)**

7. Define Attribute grammars. What is the difference between synthesized and inherited attributes?

### UNIT - II

8. (a) Explain primitive data types with suitable examples
   (b) Give one example for compound control structure

**(OR)**

9. Discuss precedence and associativity rules of different programming languages.

### UNIT - III

10. (a) What are the characteristics of co-routine feature? List the languages which allow co -routines.
    (b) Discuss static and dynamic scope of a variable.

**(OR)**

**11.** (a) Explain about various design issues for functions**.**
   (b) What is a block? Give one example.

### UNIT - IV

12. Define monitor? Explain how cooperation synchronization and competition synchronization are implemented using monitors.

**(OR)**

13. (a) What is Exception ? How it is useful in programming languages.
    (b) What is inheritance with respect to OOPs? What are its benefits?

### UNIT-V

14. (a) Discuss about Programming with ML.
    (b) Compare functional languages with imperative languages.

**(OR)**

15. (a) Differentiate between scripting languages and programming languages
    (b) Write short notes on Python Variables.

**********

# COURSE OUTCOMES

## COURSE NAME : DISTRIBUTED DATABASESCODE : (R22CSE3146)

At the end of the course student will be able to:

| Course Outcomes | Statements |
|---|---|
| C314.1 | Understand distributed database systems architecture and design.**(Understanding)** |
| C314.2 | Able to apply methods and techniques for distributed query processing and optimization.**(Apply)** |
| C314.3 | Understand the broad concepts of distributed transaction process.**(Understanding)** |
| C314.4 | Learn about concurrency control mechanisms and deadlock prevention and removal. **(Understanding)** |
| C314.5 | Study and identify various issues related to the development of DDBSs and learning Reliability concepts.**(Create)** |
| C314.6 | Understand the design aspects of object-oriented data base system and related development.(**Understanding)** |

| CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PS01 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **C314.1** | 2 | 3 | 3 | - | - | - | - | - | - | - | - | - | - | - |
| **C314.2** | 3 | 2 | - | - | 1 | - | - | -- | - | - | - | 1 | - | - |
| **C314.3** | 1 | 3 | 3 | - | - | - | - | - | - | - | 1 | - | - | - |
| **C314.4** | 3 | 1 | - | - | 3 | - | - | - | - | - | - | 1 | 1 | 2 |
| **C314.5** | - | 2 | 3 | - | - | - | - | - | - | - | 1 | - | - | - |
| **C314.6** | 1 | - | 1 | - | 3 | - | - | - | - | - | - | - | 1 | 1 |
| **C314** | 2 | 2.2 | 2.5 | - | 2.33 | - | - |  | - | - | 1 | 1 | 1 | 1.5 |

# SRI INDU COLLEGE OF ENGINEERING & TECHNOLOGY

## (An Autonomous Institution under UGC, New Delhi)

| B.Tech. – III Year – I Semester | | L | T | P | C |
|---|---|---|---|---|---|
| | | 3 | 0 | 0 | 3 |

**Professional Elective – II**

**(R22CSE3146) DISTRIBUTED DATABASES**

**Course Objectives:**

- The purpose of the course is to enrich the previous knowledge of database systems and exposing the need for distributed database technology to confront with the deficiencies of the centralized database systems.
- Introduce basic principles and implementation techniques of distributed database systems.
- Equip students with principles and knowledge of parallel and object-oriented databases.
- Topics include distributed DBMS architecture and design; query processing and optimization; distributed transaction management and reliability; parallel and object database management systems.

**Course Outcomes:**

- Understand theoretical and practical aspects of distributed database systems.
- Study and identify various issues related to the development of distributed database system.
- Understand the design aspects of object-oriented database system and related development.

**UNIT - I**

**Introduction:** Distributed Data Processing, Distributed Database System, Promises of DDBSs, Problem areas.
**Distributed DBMS Architecture**: Architectural Models for Distributed DBMS, DDMBS Architecture.
**Distributed Database Design**: Alternative Design Strategies, Distribution Design issues, Fragmentation, Allocation.

**UNIT - II**

**Query processing and decomposition**: Query processing objectives, characterization of query processors, layers of query processing, query decomposition, localization of distributed data.
**Distributed query Optimization**: Query optimization, centralized query optimization, distributed query optimization algorithms.

**UNIT - III**

**Transaction Management**: Definition, properties of transaction, types of transactions, distributed concurrency control: serializability, concurrency control mechanisms & algorithms, time stamped & optimistic concurrency control Algorithms, deadlock Management.

**UNIT - IV**

**Distributed DBMS Reliability**: Reliability concepts and measures, fault-tolerance in distributed systems, failures in Distributed DBMS, local & distributed reliability protocols, site failures and network partitioning.
**Parallel Database Systems**: Parallel database system architectures, parallel data placement, parallel query processing, load balancing, database clusters.

**UNIT-V**

**Distributed object Database Management Systems**: Fundamental object concepts and models, object distributed design, architectural issues, object management, distributed object storage, object query Processing.
**Object Oriented Data Model**: Inheritance, object identity, persistent programming languages, persistence of objects, comparison OODBMS and ORDBMS.

**TEXTBOOKS:**

1. M.Tamer OZSU and Patuck Valduriez: Principles of Distributed Database Systems, Pearson Edn. Asia,2001.
2. Stefano Ceriand Giuseppe Pelagatti: Distributed Databases, McGrawHill.

**REFERENCEBOOK:**

1.HectorGarcia-Molina,JeffreyD.Ullman,JenniferWidom:"DatabaseSystems:TheComplete Book",Second Edition, Pearson International Edition.

# Sri Indu College of Engineering and Technology

(An Autonomous Institution under UGC)
Sheriguda(V), Ibrahimpatnam(M), Ranga Reddy(Dist)–501510

## Department of Information Technology
## Time – Table

**ROOM NO : 304**

**Class III IT (I SEM)**
**w.e.f:22/7/2024**

| Days/Time | 9:40–10:40 | 10:40–11:40 | 11:40–12:40 | 12:40 To1:20 | 1:20–2:15 | 2:15–3:10 | 3:10–4:00 |
|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | | 4 | 5 | 6 |
| **Monday** | SE | DD | ML | | DCCN | IPR | COUN |
| **Tuesday** | DCCN | ML | SE | | DD | PPL | SE |
| **Wednesday** | DD | PPL | ML | | ACSLAB | | |
| **Thursday** | SE&CNLAB | | | | PPL | DD | DCCN |
| **Friday** | SE | ML | DCCN | | MLLAB | | |
| **Saturday** | ML | SE | PPL | | IPR | SDCLAB | |

| SUBJECTCODE | SUBJECTNAME | NAMEOFTHEFACULTY |
|---|---|---|
| **R22CSE2215** | SOFTWARE ENGINEERING (SE) | MRS.K.PRIYANKA |
| **R22INF3112** | DATA COMMUNICATION & COMPUTER NETWORKS DCCN) | MRS.J.HEMALATHA |
| **R22CSM3112** | MACHINE LEARNING (ML) | MRS.J.S.RADHIKA |
| **R22CSE3143** | PRINCIPLES OF PROGRAMMING LANGUAGES (PPL) | MRS.SWATHYREDDY |
| **R22CSE3146** | DISTRIBUTED DATABASES (DD) | MRS.J.SASIREKHA |
| **R22INF3126** | SOFTWARE ENGINEERING & COMMUNICATION NETWORKS LAB (SE&CNLAB) | MRS.K.PRIYANKA,MRS.J.HEMALATHA |
| **R22CSM3126** | MACHINE LEARNING LAB (ML LAB) | MRS.J.S.RADHIKA,MRS.S.VARSHA REDDY |
| **R22HAS3128** | ADVANCED COMMUNICATION SKILLS LAB (ACSLAB) | MR.B.SANJAIAH |
| **R22MAC3110** | INTELLECTUAL PROPERTY RIGHTS (IPR) | MR.M.SATYAM |
| **R22CSE3121** | SKILL DEVELOPMENT COURSE (UI DESIGN-FLUTTER )(SDCLAB) | MRS.K.PRIYANKA,MRS.J.SASIREKHA |
| **COUN** | COUNSELLING | MRS.J.S.RADHIKA, MRS.J.HEMALATHA,MRS.Y.HARATHI |

**CLASSCO-ORDINATOR**
MRS.J.S.RADHIKA

**HOD**

# Sri Indu College of Engineering and Technology

(An Autonomous Institution under UGC)
Sheriguda(V), Ibrahimpatnam(M), Ranga Reddy(Dist)–501510

## Department of Information Technology

### FACULTY INDIVIDUAL TIME TABLE

**Name of the Faculty : Mrs. J. Sasirekha** **Room No: LH-304(IT),MB-LAB-V**

**Designation : Assistant Professor** **AY:2023-2024 Year/ Semester:III/I**

| Time | 9:40–10:40 | 10:40–11:40 | 11:40–12:40 | 12:40 To1 :20 | 1:20–2:15 | 2:15–3:10 | 3:10–4:00 |
|---|---|---|---|---|---|---|---|
| Days | 1 | 2 | 3 | | 4 | 5 | 6 |
| Monday | | III IT | | | III CSIT | | |
| Tuesday | III CSIT | | | | III IT | | |
| Wednesday | III IT | | | | | | |
| Thursday | | | | | | III IT | |
| Friday | | | III CSIT | | | | |
| Saturday | | III CSIT | | | | | |

**LUNCH**

| S.NO. | SUBJECT CODE | SUBJECT | CLASS | NO OF HOURS IN A WEEK | ADDITIONAL WORKLOAD |
|---|---|---|---|---|---|
| 1 | R22CSE3146 | DISTRIBUTED DA TABASES (DD) | III IT | 4 | NBA-Criteria VII Member |
| 2 | R22CSE3146 | DISTRIBUTED DA TABASES(DD) | III CSIT | 4 | |
| 3 | Total Hours In a Week | | | **8** | |

**Faculty Signature** **Head of the Department**

# AcademicCalendar2024-2025

SRI INDU COLLEGE OF ENGINEERING & TECHNOLOGY
(An Autonomous Institution under UGC, New Delhi)
Recognized under 2(f) and 12(B) of UGC Act 1956
NBA & NAAC Accredited, Approved by AICTE and Permanently affiliated to JNTUH
Sheriguda (V), Ibrahimpatnam, R.R.Dist, Hyderabad - 501 510

D4

**BR-22**

**Lr.No.SICET/AUTO/DAE/III B.Tech Academic Calendar/85/2024** **Dt: 03.07.2024**

## B.TECH III-YEAR I-SEM & II-SEM ACADEMIC CALENDAR
## (FOR ACADEMIC YEAR : 2024-25)

### Academic Calendar for B.Tech – III[rd] Year Students (2022 - 23 Batch), BR-22 Regulation.

### I – Semester

| S.No. | EVENT | PERIOD | DURATION |
|---|---|---|---|
| 1. | **Commencement of class work.** | **22.07.2024 (Monday)** | |
| 2. | 1st Spell of Instructions for covering First Two and a half Units.(Including CRT training Classes) | 22.07.2024 – 25.09.2024 | 9 Weeks 3 Days |
| 3. | I Mid Term Examinations. | 26.09.2024 – 28.09.2024 | 3 Days |
| 4. | Submission of I Mid Term Examination Marks. | 03.10.2024 | |
| 5. | 2nd Spell of Instructions for Remaining Two and a half Units. | 30.09.2024 – .05.10.2024 | 1 Week |
| 6. | Dasara Vacation. | 07.10.2024 – 12.10.2024 | 1 Week |
| 7. | Continuation of 2nd Spell of Instructions. | 14.10.2024 – 30.11.2024 | 7 Weeks |
| 8. | II Mid Term Examinations. | 02.12.2024 – 04.12.2024 | 3 Days |
| 9. | Preparation Holidays and Practical Examinations | 05.12.2024 – 14.12.2024 | 10 Days |
| 10. | Submission of II Mid Term Examination Marks. | 11.12.2024 | |
| 11. | I Semester End Examinations. | 16.12.2024 – 31.12.2024 | 2 Weeks 2 Days |
| **Commencement of Class-Work for III B.Tech - II Semester 02.01.2025** | | | |

### II – Semester

| S.No. | EVENT | PERIOD | DURATION |
|---|---|---|---|
| 1. | **Commencement of class work.** | **02.01.2025 (Thursday)** | |
| 2. | 1st Spell of Instructions for covering First Two and a half Units. (Including Sankranthi Holidays). | 02.01.2025 – 01.03.2025 | 8 Weeks 3 Days |
| 3. | Sankranthi Holidays. | 13.01.2025 – 15.01.2025 | 3 Days |
| 4. | I Mid Term Examinations. | 03.03.2025 – 05.03.2025 | 3 Days |
| 5. | Submission of I Mid Term Examination Marks. | 12.03.2025 | |
| 6. | 2nd Spell of Instructions for Remaining Two and a half Units. | 06.03.2025 – 30.04.2025 | 8 Weeks |
| 7. | II Mid Term Examinations. | 01.05.2025 – 03.05.2025 | 3 Days |
| 8. | Preparation Holidays and Practical Examinations | 05.05.2025 – 10.05.2025 | 1 Week |
| 9. | Submission of II Mid Term Examination Marks. | 07.05.2025 | |
| 10. | Summer Vacation | 12.05.2025 – 24.05.2025 | 2 Weeks |
| 11. | II Semester End Examinations | 26.05.2025 – 07.06.2025 | 2 Weeks |
| 12. | Commencement of Class-Work for IV B.Tech - I Semester | 09.06.2025(Monday) | |

ACE

CE

Controller of Examination
Sri Indu College of Engineering & Technology
(An Autonomous Institution Under UGC)
Sheriguda (V), Ibrahimpatnam, R.R. Dist-501510

DIRECTOR

Sri Indu College of Engineering & Technology
(An Autonomous Institution Under UGC)
Sheriguda (V), Ibrahimpatnam, R.R. Dist-501510.

PRINCIPAL

Sri Indu College of Engineering & Technology
(An Autonomous Institution Under UGC)
Sheriguda (V), Ibrahimpatnam, R.R. Dist-501510.

Sign: _____
**Dr. M.V.S.S. Giridhar**
Prof. of CEA; JNTUH Nominee

Sign: _____
**Dr. T. Venu Gopal**
Prof. of CSE; JNTUH Nominee

Sign: _____
**Dr. D. Ramesh**
Prof. of CSE; JNTUH Nominee

**(Copy to DAP&E and Copy to all the Dept. Heads)**

# LESSON PLAN

| | SRI INDU COLLEGE OF ENGG & TECH<br>LESSON PLAN<br>(Regulation : R22)<br>Department of Information Technology | PreparedonRev 1:<br>Page:1of2 |
|---|---|---|
| | **Sub.Code & Title** | **R22CSE3146 DISTRIBUTED DATABASES** |
| | **Academic Year:2024-25** | **Year/Sem.** **III/I** |
| | **Faculty Name & Designation** | **J.SASIREKHA, Assistant Professor** |

| Unit/ Item No. | Topic(s) | Book Reference | Page(s) From | Page(s) To | Teaching Methodology | Proposed No.of Periods | Proposed Date of Handled | CO/RBT |
|---|---|---|---|---|---|---|---|---|
| | **UNIT I** | | | | | | | |
| 1.1 | **Introduction:** Distributed Data Processing | T1 | 1 | 2 | BlackBoard/PPT | 2 | | CO1 |
| 1.2 | Distributed Database System | T1 | 3 | 7 | BlackBoard/PPT | 2 | | CO1 |
| 1.3 | Promises of DDBSs | T1 | 7 | 15 | BlackBoard/PPT | 1 | | CO1 |
| 1.4 | Problem areas | T1 | 16 | 17 | BlackBoard/PPT | 1 | | CO1 |
| 1.5 | **Distributed DBMS Architecture:** Architectural Models for Distributed DBMS | T1 | 25 | 38 | BlackBoard/PPT | 2 | | CO1 |
| 1.6 | DDMBS Architecture | T1 | 23 | 24 | BlackBoard/PPT | 1 | | CO1 |
| 1.7 | **Distributed Database Design:** Alternative Design Strategies | T1 | 79 | 80 | BlackBoard/PPT | 1 | | CO1 |
| 1.8 | Distribution Design issues | T1 | 75 | 79 | BlackBoard/PPT | 1 | | CO1 |
| 1.9 | Fragmentation | T1 | 81 | 113 | BlackBoard/PPT | 1 | | CO1 |
| 1.10 | Allocation | T1 | 113 | 121 | BlackBoard/PPT | 1 | | CO1 |
| | **UNIT II** | | | | | | | |
| 2.1 | **Query Processing And Decomposition:** Query Processing Objectives | T1 | 209 | 210 | BlackBoard/PPT | 2 | | CO2 |
| 2.2 | Characterization Of Query Processors | T1 | 211 | 215 | BlackBoard/PPT | 1 | | CO2 |
| 2.3 | Layers Of Query Processing | T1 | 215 | 219 | BlackBoard/PPT | 1 | | CO2 |
| 2.4 | Query Decomposition | T1 | 222 | 231 | BlackBoard/PPT | 1 | | CO2 |
| 2.5 | Localization Of Distributed Data. | T1 | 231 | 239 | BlackBoard/PPT | 1 | | CO2 |
| 2.6 | **Distributed Query Optimization:** Query Optimization | T1 | 245 | 257 | BlackBoard/PPT | 2 | | CO2 |
| 2.7 | Centralized Query Optimization | T1 | 257 | 267 | BlackBoard/PPT | 1 | | CO2 |
| 2.8 | Distributed Query Optimization Algorithms | T1 | 273 | 292 | BlackBoard/PPT | 1 | | CO2 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **UNIT III** | | | | | | | | |
| 3.1 | **Transaction Management:** Definition, properties of transaction | T1 | 337 | 349 | BlackBoard/PPT | 2 | | CO3 |
| 3.2 | Types of transactions | T1 | 349 | 356 | BlackBoard/PPT | 1 | | CO3 |
| 3.3 | Distributed concurrency control : serializability | T1 | 361 | 367 | BlackBoard/PPT | 1 | | CO3 |
| 3.4 | Concurrency control mechanisms & algorithms | T1 | 367 | 377 | BlackBoard/PPT | 1 | | CO4 |
| 3.5 | Time - stamped & optimistic concurrency control Algorithms | T1 | 377 | 387 | BlackBoard/PPT | 1 | | CO4 |
| 3.6 | Deadlock Management | T1 | 387 | 396 | BlackBoard/PPT | 1 | | CO4 |
| **UNIT IV** | | | | | | | | |
| 4.1 | **Distributed DBMS Reliability:** Reliability concepts and measures | T1 | 406 | 410 | BlackBoard/PPT | 2 | | CO5 |
| 4.2 | Fault-tolerance in distributed systems | T1 | 545 | 546 | BlackBoard/PPT | 1 | | CO5 |
| 4.3 | Failures in Distributed DBMS | T1 | 410 | 413 | BlackBoard/PPT | 1 | | CO5 |
| 4.4 | Local & distributed reliability protocols | T1 | 413 | 427 | BlackBoard/PPT | 1 | | CO5 |
| 4.5 | Site failures and network partitioning | T1 | 448 | 453 | BlackBoard/PPT | 1 | | CO5 |
| 4.6 | **Parallel Database Systems:** Parallel database system architectures | T1 | 497 | 508 | BlackBoard/PPT | 2 | | CO5 |
| 4.7 | Parallel data placement | T1 | 508 | 512 | BlackBoard/PPT | 1 | | CO5 |
| 4.8 | Parallel query processing | T1 | 512 | 525 | BlackBoard/PPT | 1 | | CO5 |
| 4.9 | Load balancing | T1 | 525 | 534 | BlackBoard/PPT | 1 | | CO5 |
| 4.10 | Database clusters | T1 | 534 | 546 | BlackBoard/PPT | 1 | | CO5 |
| **UNIT V** | | | | | | | | |
| 5.1 | **Distributed Object Database Management Systems:** Fundamental Object Concepts And Models | T1 | 551 | 560 | BlackBoard/PPT | 2 | | CO6 |
| 5.2 | Object Distributed Design | T1 | 560 | 565 | BlackBoard/PPT | 1 | | CO6 |
| 5.3 | Architectural Issues | T1 | 566 | 574 | BlackBoard/PPT | 1 | | CO6 |
| 5.4 | Object Management | T1 | 574 | 578 | BlackBoard/PPT | 1 | | CO6 |
| 5.5 | Distributed Object Storage | T1 | 578 | 582 | BlackBoard/PPT | 1 | | CO6 |
| 5.6 | Object Query Processing | T1 | 582 | 592 | BlackBoard/PPT | 1 | | CO6 |
| 5.7 | **Object Oriented Data Model:** Inheritance, Object Identity | T1 | Note | Note | BlackBoard/PPT | 2 | | CO6 |
| 5.8 | Persistent Programming Languages | T1 | Note | Note | BlackBoard/PPT | 1 | | CO6 |
| 5.9 | Persistence Of Objects | T1 | Note | Note | BlackBoard/PPT | 1 | | CO6 |
| 5.10 | Comparison OODBMS And ORDBMS | T1 | Note | Note | BlackBoard/PPT | 2 | | CO6 |
| | **Review** | **Signature of the HOD/Coordinator** | | | | | | |

**Expected Total No. of classes = 55**

## LIST OF TEXT BOOKS AND REFERENCES

**Text Books:**

1. M.Tamer OZSU and PatuckValduriez: Principles of Distributed Database Systems, Pearson Edn.Asia,2001.
2. Stefano Ceriand Giuseppe Pelagatti: Distributed Databases, Mc Graw Hill.

**Reference Books:**

1. Hector Garcia- Molina, JeffreyD. Ullman, JenniferWidom: "Database Systems: The Complete Book", Second Edition, Pearson International Edition.

**Web links**

w-1. https://www.youtube.com/watch?v=AUIMPlzQIbI
w-2. https://www.youtube.com/watch?v=Sn_Wkf9KNEg
w-3. https://www.youtube.com/watch?v=kRRhMCNNb3Q
w-4. https://www.youtube.com/watch?v=LPNwmJXn4OM
w-5. https://www.slideserve.com/lester/distributed-dbms-architecture
w-6. https://slideplayer.com/slide/7378289/
w-7. https://slideplayer.com/slide/5284702/
w-8. https://www.cs.purdue.edu/homes/bb/cs542-11Spr/Query-ho.pdf

## CONTENT BEYOND THE SYLLABUS

| S.No | Topics | ProposedActions | Date | Resource Person/Mode | POs | PSOs |
|---|---|---|---|---|---|---|
| 1 | Distributed System | To get Knowledge on Distributed System | 10/09/2024 | Dr.S.Vijayarangam | 5 | 1 |
| 2 | Object Oriented DBMS | To get Knowledge on OODBMS | 18/09/2024 | Dr.T.CharanSingh | 5 | 1 |

| | | |
|---|---|---|
| | **SRI INDU COLLEGE OF ENGG & TECH**<br>**(Regulation: R22)**<br><br>**Department of Information Technology** | **R22** |
| | **Sub.Code & Title** | **R22CSE3146**<br>**DISTRIBUTED DATABASES** |
| | **Academic Year:2024-25** | **Year/Sem.** **III/I** |
| | **Faculty Name & Designation** | **J.SASIREKHA, Assistant Professor** |

## ASSIGNMENT QUESTIONS ( MID – I )

| Batch No. | Assignment Questions | Roll Number | BT Level | Course Outcome |
|---|---|---|---|---|
| 1 | 1. Define Distributed Databases? List the Advantages and Disadvantages of Distributed Databases.<br>2. Differentiate Homogeneous and Heterogeneous Distribute Databases.<br>3. Explain about the Storage of Distributed Databases with neat diagram.<br>4. List the Advantages and Disadvantages of Fragmentation.<br>5. Define Distributed Data Processing and Data Ingestion. | 22D41A1201 to 22D41A1205 | 1<br>4<br>2<br>1<br>1 | CO1 |
| 2 | 1. What is Distributed database? List its features.<br>2. Compare Centralized and Distributed Database with neat diagram.<br>3. Discuss about Distributed Data Processing and How it works?<br>4. List the Promises of DDBS.<br>5. Define Homogeneous DDB with neat diagram. | 22D41A1206 to 22D41A1210 | 1<br>4<br>2<br>1<br>1 | CO1 |
| 3 | 1. What is Transparency? Explain the various levels of Transparencies in DDBMS.<br>2. List the Complications Introduced by Distribution.<br>3. Explain Distributed Database Architecture and its types with neat diagram.<br>4. Define Replication with neat diagram.<br>5. Why Distributed Processing is Important? | 22D41A1211 to 22D41A1215 | 2<br>1<br>2<br>1<br>1 | CO1 |
| 4 | 1. Define Heterogeneous DDB with neat diagram.<br>2. Discuss about Architectural Models for Distributed DBMSS with neat diagram.<br>3. Explain about Alternative Architectures with example.<br>4. Define Distributed Database Design and its alternative strategies.<br>5. List the Advantages and Disadvantages of Distributed Data Processing. | 22D41A1216 to 22D41A1220 | 1<br>2<br>2<br>1<br>1 | CO1 |
| 5 | 1. List the Issues of Distributed Design.<br>2. Describe Fragmentation and its types with example.<br>3. Define Allocation and its problems.<br>4. Explain ANSI/SPARC Architecture with neat diagram.<br>5. Differentiate Client/Server System with Peer-to-Peer System. | 22D41A1221 to 22D41A1225 | 1<br>2<br>1<br>2<br>4 | CO1 |
| 6 | 1. Explain Multi-Database System Architecture with its two alternatives.<br>2. Define Top-Down approach in distributed database design with diagram.<br>3. Differentiate Horizontal Fragmentation and Vertical Fragmentation with example.<br>4. Define the Components of a distributed DBMS with neat diagram.<br>5. Define Client/Server Reference Architecture with neat diagram. | 22D41A1226 to 22D41A1230 | 2<br>1<br>4<br>1<br>1 | CO1 |
| 7 | 1. Define Distributed Query Processing.<br>2. List the objectives of query processing. | 22D41A1231 to | 1<br>1 | CO2 |

| | | | | |
|---|---|---|---|---|
| | 3. Define Characterization of Query Processing.<br>4. Explain Query Decomposition and its steps.<br>5. Define Centralized Query Optimization. | 22D41A1235 | 1<br>2<br>1 | |
| 8 | 1. What are the layers of query processing? Explain it.<br>2. What is query optimization? Explain about it with example.<br>3. Explain the concept of query decomposition and its importance in distributed query processing.<br>4. What is the role of query fragmentation in distributed query optimization? Explain with an example.<br>5. Give an example for Operator tree. | 22D41A1236<br>to<br>22D41A1240 | 1<br>1<br>2<br>1<br>1 | CO2 |
| 9 | 1.Describe the different types of primitive operations involved in query processing.<br>2.What is query decomposition, and explain its significance in information retrieval?<br>3. Explain about Complexity of relational algebra operations.<br>4. Explain query processing with examples.<br>5. Briefly describe the characterization of query processors. | 22D41A1241<br>to<br>22D41A1245 | 1<br>1<br>2<br>2<br>2 | CO2 |
| 10 | 1.Explain distributed query optimization algorithms.<br>2.Explain briefly about query decomposition & data localization.<br>3. Explain about query processing problems.<br>4. Describe SSD-1 Algorithm.<br>5. Explain Centralized query optimization with example. | 22D41A1246<br>to<br>22D41A1250 | 2<br>2<br>2<br>1<br>2 | CO2 |
| 11 | 1. Describe Distributed query optimization algorithms.<br>2. Describe the role of query optimization techniques in improving query processing performance.<br>3. Briefly explain about Distributed INGRES Algorithm.<br>4. Explain the concept of distributed query optimization and its importance in distributed databases.<br>5. What is query decomposition, and explain its significance in information retrieval? | 22D41A1251<br>to<br>22D41A1255 | 1<br>1<br>2<br>2<br>1 | CO2 |
| 12 | 1.List the objectives of query processing.<br>2.What is query optimization? Explain about it with example.<br>3. Describe SSD-1 Algorithm.<br>4. Explain Centralized query optimization with example.<br>5. Explain query processing with examples. | 22D41A1256<br>to<br>22D41A1260 | 1<br>1<br>2<br>2<br>2 | CO2 |
| 13 | 1.Define TransactionManagement with example.<br>2. Explainpropertiesof TransactionManagement.<br>3. What is Transaction? DefineACIDpropertieswithsuitableexamples.<br>4. List the Characterization of Transaction.<br>5. Differentiate Flat Transaction with Nested Transactions. | 22D41A1261<br>to<br>23D45A1203 | 1<br>2<br>2<br>1<br>4 | CO3 |
| 14 | 1. Explain about Types ofTransactions with example.<br>2. Differentiate Workflow Transaction with Nested Transactions.<br>3. Explain Concurrency Control.<br>4. ExplainSerializability withexamples<br>5. Classify the Concurrency Control Algorithm. | 23D45A1204<br>to<br>23D45A1206 | 2<br>4<br>2<br>2<br>4 | CO3 |

| | SRI INDU COLLEGE OF ENGINEERING AND TECHNOLOGY<br>DEPARTMENT OF INFORMATION TECHNOLOGY | |
|---|---|---|
| | Sub. Code & Name | **R22CSE3146 - DISTRIBUTED DATABASES** |
| Year/Sem.: III/I | Date of Announcement | Submission Date |
| Assn. No: II | 28.11.2024 | 05.12.2024 |

**ASSIGNMENT QUESTIONS**

| Question no. | Question | Marks | RBT Level | COs |
|---|---|---|---|---|
| **Batch 1 (Roll No: 22D41A1201 to 1205)** | | | | |
| **1** | Explain about Locking based concurrency control algorithm. | 5 | K2 | C212.4 |
| **2** | Differentiate Centralized 2PL and Distributed 2PL. | 5 | K2 | C212.4 |
| **3** | Define Reliability concepts and measures. | 5 | K1 | C212.5 |
| **4** | Discuss about fault-tolerance in distributed system. | 5 | K4 | C212.5 |
| **5** | Explain about fundamental object Concepts and Object Models. | 5 | K2 | C212.6 |
| **Batch 2 (Roll No: 22D41A1206 to 1210)** | | | | |
| **1** | Define Timestamp based concurrency control algorithm. | 5 | K1 | C212.4 |
| **2** | Define Deadlock Management. | 5 | K1 | C212.4 |
| **3** | Differentiate Hard fault and soft fault with example. | 5 | K4 | C212.5 |
| **4** | Explain about Local Reliability Protocol. | 5 | K2 | C212.5 |
| **5** | Explain about object distribution design. | 5 | K2 | C212.6 |
| **Batch 3 (Roll No: Roll No: 22D41A1211 to 1215)** | | | | |
| **1** | Explain Serializability theory with an example. | 5 | K2 | C212.4 |
| **2** | List the four possible execution strategies with example. | 5 | K1 | C212.5 |
| **3** | Define Distributed Reliability Protocol | 5 | K1 | C212.5 |
| **4** | Define class partitioning algorithms with example. | 5 | K1 | C212.6 |
| **5** | List the architectural issues of distributed object DBMS. | 5 | K1 | C212.6 |
| **Batch 4 (Roll No: 22D41A1216 to 1220)** | | | | |
| **1** | Compare Lock-based and Timestamp based concurrency control algorithm with example. | 5 | K4 | C212.4 |
| **2** | Draw a diagram of state transactions in 2PC protocols. | 5 | K3 | C212.5 |
| **3** | How to dealing with site failures in distributed database? Explain it. | 5 | K1 | C212.5 |
| **4** | Define two types of alternative client/server architecture. | 5 | K1 | C212.6 |
| **5** | Define Horizontal and Vertical class partitioning. | 5 | K1 | C212.6 |
| **Batch 5 (Roll No: 22D41A1221 to 1225)** | | | | |
| **1** | List the three methods for handling deadlocks. Explain it. | 5 | K1 | C212.4 |
| **2** | Explain about In-Place and Out-of-Place update recovery information with example. | 5 | K2 | C212.5 |
| **3** | Differentiate Centralized and Distributed 2PC Protocol. | 5 | K4 | C212.5 |

| | | | | |
|---|---|---|---|---|
| **4** | Explain about parallel execution for hierarchical architecture. | 5 | K2 | C212.5 |
| **5** | Draw the diagram for page server architecture. | 5 | K3 | C212.6 |
| **Batch 6 (Roll No: 22D41A1226 to 1230)** | | | | |
| **1** | Define Deadlock Avoidance and its types with neat diagram. | 5 | K1 | C212.4 |
| **2** | List the phases of fault-tolerance in distributed system. | 5 | K1 | C212.5 |
| **3** | Define MTBF and MTTR with neat diagram. | 5 | K1 | C212.5 |
| **4** | Define client buffer and server buffer management. | 5 | K1 | C212.6 |
| **5** | Explain about cache consistency and its characteristics. | 5 | K2 | C212.6 |
| **Batch 7 (Roll No: 22D41A1231 to 1235)** | | | | |
| **1** | What is Concurrency control mechanism? Explain the Pessimistic and Optimistic algorithm with example. | 5 | K2 | C212.4 |
| **2** | Draw a diagram of logging interface. | 5 | K3 | C212.5 |
| **3** | Explain about three basic strategies of parallel data partitioning with example. | 5 | K2 | C212.5 |
| **4** | Draw a diagram of state transactions in 3PC protocols. | 5 | K3 | C212.5 |
| **5** | Explain about object identifier management & its types. | 5 | K2 | C212.6 |
| **Batch 8 (Roll No: 22D41A1236 to 1240)** | | | | |
| **1** | List the Timestamp Ordering (TO) algorithm with example. | 5 | K1 | C212.4 |
| **2** | Explain briefly about network partitioning. | 5 | K2 | C212.5 |
| **3** | Explain the failures in DDBMS. | 5 | K2 | C212.5 |
| **4** | Explain load balancing and database cluster with example. | 5 | K2 | C212.5 |
| **5** | Explain about Distributed object storage. | 5 | K2 | C212.6 |
| **Batch 9 (Roll No: 22D41A1241 to 1245)** | | | | |
| **1** | Explain about 2PL and Strict 2PL with neat graph. | 5 | K2 | C212.4 |
| **2** | Explain by means of a diagram the interface between the local recovery manager & buffer manager. | 5 | K2 | C212.5 |
| **3** | Explain general architecture of a parallel database system & shared memory architecture. | 5 | K2 | C212.5 |
| **4** | Explain about Pointer Swizzling. | 5 | K2 | C212.6 |
| **5** | Define object migration with four states. | 5 | K1 | C212.6 |
| **Batch 10 (Roll No: 22D41A1246 to 1250)** | | | | |
| **1** | Explain about two approaches of deadlock prevention with example. | 5 | K2 | C212.4 |
| **2** | Define Inter-Operator and Intra-Operator Parallelism. | 5 | K1 | C212.5 |
| **3** | Define Database Clusters. | 5 | K1 | C212.5 |
| **4** | Explain through diagrams the following<br>1. Shared disk architecture.<br>2. Shared nothing architecture.<br>3. Hierarchical architecture. | 5 | K2 | C212.5 |

| | | | | |
|---|---|---|---|---|
| | 4. Cache-only memory architecture. | | | |
| **5** | Write the features and drawbacks of object DBMS. | 5 | K1 | C212.6 |
| **Batch 11 (Roll No: 22D41A1251 to 1256)** | | | | |
| **1** | Define Deadlock Detection and Resolution. | 5 | K1 | C212.4 |
| **2** | Draw a diagram for fully memory hierarchy managed by LRM and BM. | 5 | K3 | C212.5 |
| **3** | Define Shared nothing architecture with neat diagram. | 5 | K1 | C212.5 |
| **4** | Define object oriented data model. | 5 | K1 | C212.6 |
| **5** | Explain about Inheritance and its types with example. | 5 | K2 | C212.6 |
| **Batch 12 (Roll No: 22D41A1257 to 1262)** | | | | |
| **1** | Discuss about Necessary Conditions of Deadlock. | 5 | K4 | C212.4 |
| **2** | Explain general architecture of a parallel database system & shared memory architecture. | 5 | K2 | C212.5 |
| **3** | Explain about Parallel Query Processing with neat diagram. | 5 | K2 | C212.5 |
| **4** | Define object query processing. | 5 | K1 | C212.6 |
| **5** | Explain about query execution algorithm with examples. | 5 | K2 | C212.6 |
| **Batch 13 (Roll No: 23241A1263, LE-02 - 06)** | | | | |
| **1** | Define Optimistic concurrency control algorithm | 5 | K1 | C212.4 |
| **2** | Explain about Load balancing. | 5 | K2 | C212.5 |
| **3** | Describe Inter-Query and Intra-Query Parallelism with example. | 5 | K1 | C212.5 |
| **4** | Define persistent programming language with example. | 5 | K1 | C212.6 |
| **5** | Differentiate OODBMS and ORDBMS. | 5 | K4 | C212.6 |

# MID I & II
# QUESTION PAPER

BR-22 SRI INDU COLLEGE OF ENGINEERING & TECHNOLOGY D4

III B.Tech - I Semester - I Mid Term Examination, SEP/OCT – 2024

(R22CSE3146 ) DISTRIBUTED DATABASES

(For CSE, IT & CSIT )

Duration: 2 Hrs Dt: 03-10-2024, Day-3 (FN) Max Marks: 30M

Part – A

**Answer *All* multiple choice questions.** Marks: 10Qx1/2M = 5M

* (L1-Remembering, L2-Understanding, L3-Applying, L4-Analyzing, L5-Evaluating, and L6-Creating.)

| | | | *Bloom's Taxonomy Level | Course Outcomes |
|---|---|---|---|---|
| 1. | A heterogeneous distributed database is _____<br>A) The same DBMS is used at each location and data are not distributed across all nodes.<br>B) The same DBMS is used at each location and data are distributed across all nodes.<br>C) A different DBMS is used at each location and data are not distributed across all nodes.<br>D) A different DBMS is used at each location and data are distributed across all nodes. | [ ] | I | CO1 |
| 2. | A distributed database has which of the following advantages over a centralized database?<br>A) Software cost<br>B) Software complexity<br>C) Slow Response<br>D) Modular growth | [ ] | I | CO1 |
| 3. | A server cannot serve on which of the following levels?<br>A) Client Layer B) Business Layer C) Database Layer D) All of the above. | [ ] | II | CO1 |
| 4. | What are the advantages of Replication of data in Distributed database?<br>A) Availability, Parallelism, Increased data transfer<br>B) Availability, Parallelism, Reduced data transfer<br>C) Availability, Increased parallelism, Cost of updates<br>D) All of the above | [ ] | II | CO1 |
| 5. | What is the first layer of query processing?<br>A) Physical layer B) Logical layer C) Syntax layer D) Semantic layer | [ ] | II | CO2 |
| 6 | What is the benefit of using a distributed query optimization algorithm?<br>A) Improved data security B) Reduced data redundancy<br>C) Better query performance D) Simplified query processing | [ ] | I | CO2 |
| 7. | Which of the following is a common technique used in distributed query optimization?<br>A) Query fragmentation B) Query caching<br>C) Query rewriting D) All of the above | [ ] | II | CO2 |
| 8. | What is the purpose of a query optimizer in a distributed database system?<br>A) To generate an execution plan for a query<br>B) To execute a query on a remote site<br>C) To transmit data between sites<br>D) To manage data replication | [ ] | II | CO2 |
| 9. | Isolation means_____<br>A) transaction must not interfere with each other<br>B) transaction must interfere with each other<br>C) transaction must be in a consistent state<br>D) transaction must be executed immediately | [ ] | I | CO3 |
| 10. | A transaction can do only read operation and not write operation on a data item when it acquires _____ lock.<br>A) read mode B) exclusive mode<br>C) shared mode D) write mode | [ ] | I | CO3 |

**Answer *All* fill in the blank questions.** **Marks: 6Qx1/2M = 3M**

| | | | |
|---|---|---|---|
| 11. | Distributed database systems arose from the need to offer local database autonomy at _____ locations. | I | CO1 |
| 12. | Expand ANSI/SPARC _____ | I | CO1 |
| 13. | The _____ of the resources across the nodes or placing individual files of a computer network is a big task. | I | CO1 |
| 14. | The process of allocating sub-queries to processing sites is called _____ | I | CO2 |
| 15. | The primary goal of distributed query optimization is to minimize _____ and reduce overall query execution time. | I | CO2 |
| 16. | _____ means that when it ends, a transaction must leave the database in a consistent state | II | CO3 |

**Answer *All* Match the following questions** **Marks: 2Qx1M = 2M**

17.

| | | | |
|---|---|---|---|
| 1. | Distribution of control | A. | Autonomy |
| 2. | Peer-to-peer distribution | B. | Full distribution |
| 3. | Different data models | C. | Heterogeneity |
| 4. | Two-level architecture | D. | Client / Server |

I CO1

18.

| | | | |
|---|---|---|---|
| 1. | Query Decomposition | A. | Basic operations required to answer a query |
| 2. | Primitive Operations | B. | Smaller queries generated during decomposition |
| 3. | Sub-queries | C. | Locations where sub-queries are executed |
| 4. | Processing Sites | D. | Process of breaking a query into smaller part |

I CO2

## Part – B

**Answer any *FOUR* questions.** **Marks: 4Qx5M = 20M**

| | | | |
|---|---|---|---|
| 19. | Compare Centralized Database and Distributed Database with neat diagram. | IV | CO1 |
| 20. | What is Transparency? Explain the various levels of Transparencies in DDBMS. | II | CO1 |
| 21. | Describe Fragmentation and its types with example. | II | CO1 |
| 22. | Explain the concept of query decomposition and its importance in distributed query processing. | II | CO2 |
| 23. | Explain the layers of Query processing. | II | CO2 |
| 24. | Explain properties of Transaction Management. | II | CO3 |

BR-22 SRI INDU COLLEGE OF ENGINEERING & TECHNOLOGY D4

**III B.Tech - I Semester – II Mid Term Examination, December – 2024**

**(R22CSE3146 ) DISTRIBUTED DATABASES**

**(For CSE, IT & CSIT )**

**Duration: 2 Hrs** **Dt: 19-12-2024, Day-3 (FN)** **Max Marks: 30M**

**Part – A**

**Answer *All* multiple choice questions.** **Marks: 10Qx1/2M = 5M**

* (L1-Remembering, L2-Understanding, L3-Applying, L4-Analyzing, L5-Evaluating, and L6-Creating.)

| | | | *Blooms Taxonomy Levels | Course Outcomes |
|---|---|---|---|---|
| 1. | _____ is a specific concurrency problem where in two transactions depend on each other for something.<br>A) phantom read problem B) transaction read a problem<br>C) deadlock D) locking | [ ] | I | CO4 |
| 2. | A transaction processing system is also called as _____<br>A) processing monitor B) transaction monitor<br>C) TP monitor D) monitor | [ ] | I | CO4 |
| 3. | Which of the following parallel database architectures involves dividing data across multiple processors?<br>A) Shared Disk Architecture B) Shared Memory Architecture<br>C) Shared Nothing Architecture D) Hierarchical Architecture | [ ] | I | CO5 |
| 4. | Which of the following reliability metrics is used to measure the frequency of failures?<br>A) Failure Rate (λ) B) Mean Time To Failure (MTTF)<br>C) Mean Time Between Failures (MTBF) D) Reliability Function (R(t)) | [ ] | I | CO5 |
| 5. | What is the primary goal of parallel data placement in a distributed system?<br>A) To minimize data transfer between nodes B) To maximize data availability<br>C) To optimize data retrieval performance D) To reduce storage costs | [ ] | I | CO5 |
| 6 | What is the purpose of site recovery in a distributed system?<br>A)To prevent site failures B) To detect site failures<br>C) To restore service after a site failure D) To improve system performance | [ ] | I | CO5 |
| 7. | What does the term "object identity" refer to in an object-oriented data model?<br>A)The name of the object B) The unique identifier of an object<br>C) The data type of the object D) The object's methods | [ ] | I | CO6 |
| 8. | In an object-oriented data model, the ability of a subclass to inherit properties from a superclass is known as:<br>A) Abstraction B) Encapsulation<br>C) Inheritance D) Polymorphism | [ ] | I | CO6 |
| 9. | In distributed object storage, which method helps in reducing the latency of data access?<br>A) Data fragmentation B) Object serialization<br>C) Caching D) Object migration | [ ] | I | CO6 |
| 10. | Propose a solution to optimize object query processing in a distributed database system dealing with high transaction volumes.<br>A) Use data fragmentation and object serialization<br>B) Implement load balancing and query caching<br>C) Apply object migration and indexing<br>D) Utilize method overloading and object identity | [ ] | I | CO6 |

**P.T.O**

**Answer *All* fill in the blank questions.** **Marks: 6Qx1/2M = 3M**

| | | | | |
|---|---|---|---|---|
| 11. | _____ helps solve the concurrency problem | I | CO4 |
| 12. | A data cluster is a group of _____ that work together to provide a single system image. | I | CO5 |
| 13. | Site failures can be categorized into two types: _____ failures and Byzantine failures | I | CO5 |
| 14. | In a shared-nothing cluster, each node has its own and disk storage | I | CO5 |
| 15. | In a distributed object system, _____ ensures that all nodes in the network reflect the same data state. | I | CO6 |
| 16. | For improving the efficiency of object query processing in a distributed environment, techniques such as _____ and _____ are crucial. | I | CO6 |

**Answer *All* Match the following questions** **Marks: 2Qx1M = 2M**

17.

| | | | | | |
|---|---|---|---|---|---|
| 1. | Concurrency Control | A. | Read Lock and Write Lock | I | CO4 |
| 2. | Locking | B. | Concurrency Control Mechanisms | | |
| 3. | Optimistic | C. | Isolation | | |
| 4. | Lock Modes | D. | Concurrency Problem | | |

18.

| | | | | | |
|---|---|---|---|---|---|
| 1. | Transaction Failure | A. | Failure that occurs during the execution of a single transaction | I | CO5 |
| 2. | System Failure | B. | Failure that affects the entire database system | | |
| 3. | Media Failure | C. | Failure that occurs due to a problem with the storage media | | |
| 4. | Network Failure | D. | Failure that occurs due to a problem with communication network | | |

## Part – B

**Answer any *FOUR* questions.** **Marks: 4Qx5M = 20M**

| | | | |
|---|---|---|---|
| 19. | Explain Timestamp-Based Concurrency Control Algorithms with example. | II | CO4 |
| 20. | Explain the different architectures of parallel database systems. | II | CO5 |
| 21. | Discuss parallel query processing and its impact on database performance. | II | CO5 |
| 22. | Illustrate the role of Parallel Data Placement in parallel database systems | III | CO5 |
| 23. | Differentiate Horizontal and Vertical class partitioning. | IV | CO6 |
| 24. | Explain about the Object Oriented Data Model. | II | CO6 |

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| | **SRI INDU COLLEGE OF ENGG & TECH**<br>**QUESTION BANK**<br><br>**(Regulation: R22) Department of Information Technology** | **R22** |

| | | |
|---|---|---|
| **Sub. Code & Title** | **R22CSE3146 DISTRIBUTED DATABASES** | |
| **AcademicYear:2024-25** | **Year/Sem.** | **III/I** |
| **Faculty Name & Designation** | **J.SASIREKHA, Assistant Professor** | |

**QUESTION BANK WITH BLOOMS TAXONOMY LEVEL(BTL)**

1. Remembering 2.Understanding 3.Applying 4.Analyzing 5. Evaluating 6.Creating

| **UNIT-I** | | | |
|---|---|---|---|
| | **OBJECTIVETYPEQUESTIONS (½MARKQUESTIONS)** | **BT Level** | **Course Outcome** |
| 1. | **A distributed database has which of the following advantages over a centralized database?**<br>A. Software cost<br>B. Software complexity<br>C. Slow Response<br>D. Modular growth | 1 | CO1 |
| 2. | **A heterogeneous distributed database is**<br>A. The same DBMS is used at each location and data are not distributed across all nodes.<br>B. The same DBMS is used at each location and data are distributed across all nodes.<br>C. A different DBMS is used at each location and data are not distributed across all nodes.<br>D. A different DBMS is used at each location and data are distributed across all nodes. | 1 | CO1 |
| 3. | **A distributed database is which of the following?**<br>A.A single logical database that is spread to multiple locations and is interconnected by a network<br>B.A loose collection of file that is spread to multiple locations and is interconnected by a network<br>C.A single logical database that is limited to one location.<br>D.A loose collection of file that is limited to one location. | 1 | CO1 |
| 4. | **Storing a separate copy of the database at multiple locations is**<br>A.Data Replication<br>B.Horizontal Partitioning<br>C.Vertical Partitioning<br>D.Horizontal and Vertical Partitioning | 1 | CO1 |
| 5. | **A homogenous distributed database is which of the following?**<br>A.The same DBMS is used at each location and data are not distributed across all nodes.<br>B.The same DBMS is used at each location and data are distributed across all nodes.<br>C.A different DBMS is used at each location and data are not distributed across all nodes.<br>D.A different DBMS is used at each location and data are distributed across all nodes. | 1 | CO1 |
| 6. | **Which of the following is a disadvantage of replication?**<br>A.Reduced network traffic<br>B.If the database fails at one site, a copy can be located at another site.<br>C.Each site must have the same storage capacity. | 1 | CO1 |

| | | | |
|---|---|---|---|
| | D.Each transaction may proceed without coordination across the network. | | |
| 7. | **Three-tier architecture includes which of the following?**<br>A. Three server layers<br>B. A client layer and two server layers<br>C. Two client layers and one server layer<br>D. DThree client layers | 1 | CO1 |
| 8. | **A database server is responsible for which of the following?**<br>A. Database storage<br>B. Data processing logic<br>C. Data presentation logic<br>D. All of the above. | 1 | CO1 |
| 9. | **A server cannot serve on which of the following levels?**<br>A. Client Layer<br>B. Business Layer<br>C. Database Layer<br>D. All of the above. | 1 | CO1 |
| 10. | **In distributed query processing, which of the following layer activities are performed by central control site?**<br>A. Query decomposition<br>B. Data localization<br>C. Global optimization<br>D. All the above | 1 | CO1 |
| 11. | **Which of the following are steps in query processing?**<br>A. Parsing and translation<br>B. Optimization<br>C. Evaluation<br>D. All of the mentioned | 1 | CO1 |
| 12. | **A relational algebra operation annotated with instructions on how to evaluate it is called as**<br>A. Evaluation algebra<br>B. Evaluation plan<br>C. Evaluation primitive<br>D. Evaluation engine | 1 | CO1 |
| 13. | What are the advantages of Replication of data in Distributed database?<br>A. Availability, Parallelism, Increased data transfer<br>B. Availability, Parallelism, Reduced data transfer<br>C. Availability, Increased parallelism, Cost of updates<br>D. All of the above | 1 | CO1 |
| 14. | **Some of the columns of a relation are at different sites is which of the following?**<br>A.Data Replication<br>B.Horizontal Partitioning<br>C.Vertical Partitioning<br>D.Horizontal and Vertical Partitioning | 1 | CO1 |
| 15. | **Which of the following would be the advantage of Database Fragmentation**?<br>A. Most of the operations are local to any sites<br>B. Reduced Network Traffic<br>C. Parallel processing<br>D. All the above | 1 | CO1 |

| | FILLIN THEBLANKS<br>½ MARKQUESTIONS | BT Level | Course Outcome |
|---|---|---|---|
| 1. | A distributed database system is a database physically stored on several computer systems across ---------- connected together via ---------- --. | 1 | CO1 |
| 2. | Distributed database systems arose from the need to offer local database autonomy at ---------- locations. | 1 | CO1 |
| 3. | - ---------- is an architecture that enables distributed computing resources on a network to share common resources among groups of users of intelligent workstations. | 1 | CO1 |
| 4. | The two desired properties of distributed databases are<br>(a) ---------- and (b) ---------- | 1 | CO1 |
| 5. | - ----------is a database physically stored in two or more computer systems. | 1 | CO1 |
| 6. | Heterogeneous distributed database system is also referred to as a ------- or ------- | 1 | CO1 |
| 7. | - ----------is very much required to process a query in a distributed database. | 1 | CO1 |
| 8. | A massive amount of data flows through several different sources into the system, the process of data flow is known as ---------- | 1 | CO1 |
| 9. | - ---------- results from the ability to execute multiple queries at the same time. | 1 | CO1 |
| 10. | Expand ANSI/SPARC | 1 | CO1 |
| 11. | The ---------- layer controls the query by adding semantic integrity predicates and authorization predicates. | 1 | CO1 |
| 12. | - ----------Supports user applications and user access to the database. | 1 | CO1 |
| 13. | - ----------Approach is more suitable for tightly integrated, homogeneous Distributed DBMSs. | 1 | CO1 |
| 14. | In ---------- , a combination of horizontal and vertical fragmentation techniques are used. | 1 | CO1 |
| 15. | The---------- of the resources across the nodes or placing individual files of a computer network is a big task. | 1 | CO1 |
| | **MATCHTHEFOLLOWING1 MARKQUESTIONS** | **BT Level** | **Course Outcome** |
| 1. | 1. Database is maintained at one site - a) Heterogeneous DDB<br>2. Database is maintained at different site - b) Centralized DBMS<br>3. The sites have the same operating system - c) Distributed DBMS<br>4. The sites have the different schemas - d) Homogenous DDB | 1 | CO1 |
| 2. | 1. Copies of Data - a) Fragmentation<br>2. No Copies of Data - b) Data Processing<br>3. Data Flow - c) Replication<br>4. Weather Forecast System - d)Data Ingestion | 1 | CO1 |
| 3. | 1. Data Independency - a) Concurrency transparency<br>2. Network Transparency - b) Horizontal fragmentation<br>3. Replication Transparency - c) Naming transparency<br>4. Fragmentation Transparency - d) Physical data independence | 1 | CO1 |
| 4. | 1. Distribution of control - a) Autonomy<br>2. Peer-to-peer distribution - b) Full distribution<br>3. Different data models - c) Heterogeneity<br>4. Two-level architecture - d) Client/server | 1 | CO1 |
| 5. | 1. Local internal schema - a) user view of data<br>2. Global conceptual schema - b) logical data organization<br>3. Local conceptual schema - c) logical view of data | 1 | CO1 |

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| | 4. External schemas - d) physical data organization | | |
| **PARTB** | | | |
| **5 MARKS QUESTIONS** | | | |
| 1 | Define Distributed Databases? List the Advantages and Disadvantages of Distributed Databases. | 1 | CO1 |
| 2 | Differentiate Homogeneous and Heterogeneous Distribute Databases. | 4 | CO1 |
| 3 | Explain about the Storage of Distributed Databases with neat diagram. | 2 | CO1 |
| 4 | Compare Centralized Database and Distributed Database with neat diagram. | 4 | CO1 |
| 5 | Discuss about Distributed Data Processing and How it works? | 2 | CO1 |
| 6 | List the Promises of DDBS. | 1 | CO1 |
| 7 | What is Transparency? Explain the various levels of Transparencies in DDBMS. | 2 | CO1 |
| 8 | List the Complications Introduced by Distribution | 1 | CO1 |
| 9 | Explain Distributed Database Architecture and its types with neat diagram. | 2 | CO1 |
| 10 | Discuss about Architectural Models for Distributed DBMSS with neat diagram. | 2 | CO1 |
| 11 | Explain about Alternative Architectures with example. | 2 | CO1 |
| 12 | Discuss about Distributed Database Design and its alternative strategies. | 2 | CO1 |
| 13 | List the Issues of Distributed Design. | 1 | CO1 |
| 14 | Describe Fragmentation and its types with example. | 2 | CO1 |
| 15 | Explain about Allocation and its problems | 2 | CO1 |

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| | **SRI INDU COLLEGE OF ENGG & TECH**<br>**QUESTION BANK**<br><br>**(Regulation: R22) Department of Information Technology** | **R22** |

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|---|---|---|
| **Sub. Code & Title** | **R22CSE3146 DISTRIBUTED DATABASES** | |
| **AcademicYear:2024-25** | **Year/Sem.** | **III/I** |
| **Faculty Name & Designation** | **J.SASIREKHA, Assistant Professor** | |

**QUESTION BANK WITH BLOOMS TAXONOMY LEVEL(BTL)**
**1. Remembering 2.Understanding 3.Applying 4.Analyzing 5. Evaluating 6.Creating)**

| **UNIT-II** | | | |
|---|---|---|---|
| | **OBJECTIVETYPEQUESTIONS (½MARKQUESTIONS)** | **BT Level** | **Course Outcome** |
| 1. | What is the primary objective of query processing?<br>a) To optimize query performance<br>b) To ensure data security<br>c) To improve data accuracy<br>d) To reduce data redundancy | 1 | CO2 |
| 2. | Which of the following is a characteristic of query processors?<br>a) They only process simple queries<br>b) They can only handle centralized data<br>c) They can handle multiple query languages<br>d) They are only used for data storage | 1 | CO2 |
| 3. | What is the first layer of query processing?<br>a) Physical layer<br>b) Logical layer<br>c) Syntax layer<br>d) Semantic layer | 1 | CO2 |
| 4. | What is query decomposition?<br>a) Breaking down a query into smaller sub-queries<br>b) Combining multiple queries into one<br>c) Optimizing a query for better performance<br>d) Localizing distributed data | 1 | CO2 |
| 5. | What is the main difference between centralized and distributed query optimization?<br>a) Centralized optimization is more efficient<br>b) Distributed optimization is more complex<br>c) Centralized optimization only considers local data<br>d) Distributed optimization considers data from multiple sites | 1 | CO2 |
| 6. | Which algorithm is commonly used for distributed query optimization?<br>a) Dynamic programming<br>b) Greedy algorithm<br>c) Hill climbing<br>d) Semi-join | 1 | CO2 |
| 7. | What is the purpose of localizing distributed data?<br>a) To reduce data redundancy<br>b) To improve data security<br>c) To optimize query performance<br>d) To ensure data consistency | 1 | CO2 |

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| 8. | What is the benefit of using a distributed query optimization algorithm?<br>a) Improved data security<br>b) Reduced data redundancy<br>c) Better query performance<br>d) Simplified query processing | 1 | CO2 |
| 9. | A query processor receives a query that requires data from multiple sites. What should it do?<br>a) Process the query locally<br>b) Decompose the query into smaller sub-queries<br>c) Optimize the query using a centralized algorithm<br>d) Reject the query | 1 | CO2 |
| 10. | A distributed database has data stored across multiple sites. How can query performance be improved?<br>a) By using a centralized query optimization algorithm<br>b) By localizing distributed data<br>c) By using a distributed query optimization algorithm<br>d) By reducing data redundancy | 1 | CO2 |
| 11. | A query requires data from two different sites. What is the best approach to optimize the query?<br>a) Use a centralized query optimization algorithm<br>b) Decompose the query into smaller sub-queries<br>c) Use a distributed query optimization algorithm<br>d) Process the query locally | 1 | CO2 |
| 12. | What is the primary goal of distributed query optimization?<br>A) To minimize network bandwidth usage<br>B) To maximize query parallelism<br>C) To reduce overall query execution time<br>D) To improve data security | 1 | CO2 |
| 13. | Which of the following is a common technique used in distributed query optimization?<br>A) Query fragmentation<br>B) Query caching<br>C) Query rewriting<br>D) All of the above | 1 | CO2 |
| 14. | What is the purpose of a query optimizer in a distributed database system?<br>A) To generate an execution plan for a query<br>B) To execute a query on a remote site<br>C) To transmit data between sites<br>D) To manage data replication | 1 | CO2 |
| 15. | Which factor affects the performance of a distributed query?<br>A) Network latency<br>B) Data distribution<br>C) Query complexity<br>D) All of the above | 1 | CO2 |

| | FILLIN THEBLANKS<br>½ MARKQUESTIONS | BT Level | Course Outcome |
|---|---|---|---|
| 1. | The process of breaking down a query into smaller sub-queries is called | 1 | CO2 |
| 2. | Query decomposition involves identifying the _____operations required to answer the query. | 1 | CO2 |
| 3. | The sub-queries generated during decomposition are executed at different in the distributed database system. | 1 | CO2 |
| 4. | The process of allocating sub-queries to processing sites is called | 1 | CO2 |
| 5. | The goal of query optimization is to minimize _____and reduce overall query execution time. | 1 | CO2 |
| 6. | Query decomposition can be performed using _____methods, such as heuristic or cost-based approaches. | 1 | CO2 |
| 7. | The resulting sub-queries are combined using _____operations, such as join or union. | 1 | CO2 |
| 8. | Query decomposition can improve _____by allowing parallel processing of sub-queries. | 1 | CO2 |
| 9. | The primary goal of distributed query optimization is to minimize and reduce overall query execution time. | 1 | CO2 |
| 10. | Distributed query optimization involves identifying the most efficient plan for executing a query across multiple sites. | 1 | CO2 |
| 11. | The optimization process considers factors such as _____, network bandwidth, and data distribution. | 1 | CO2 |
| 12. | Query optimization techniques include _____,such as reordering joins and selecting optimal join methods. | 1 | CO2 |
| 13. | Distributed query optimization can be performed using _____ methods, such as centralized or decentralized approaches. | 1 | CO2 |
| 14. | Distributed query optimization can improve _____by reducing data transfer and minimizing processing time. | 1 | CO2 |
| 15. | Optimization techniques may also consider _____constraints, such as data security and access control. | 1 | CO2 |
| | **MATCH THEFOLLOWING1 MARKQUESTIONS** | **BT Level** | CO2 |
| 1. | 1. Query Decomposition A. Basic operations required to answer a query<br>2. Primitive Operations B. Smaller queries generated during decomposition<br>3. Sub-queries C. Locations where sub-queries are executed<br>4. Processing Sites D. Process of breaking a query into smaller part | 1 | CO2 |
| 2. | 1. Query Optimization A. Operations used to combine sub-query results<br>2. Combination Operations B.A detailed plan for executing a query<br>3. Allocation C. Process of selecting the most efficient execution plan<br>4. Execution Plan D. Assigning sub-queries to processing sites | 1 | CO2 |
| 3. | 1. Query Fragmentation A. Optimizing queries based on data semantics<br>2. Semantic Optimization B. Rewriting a query to improve performance<br>3. Query Rewriting C. Hierarchical representation of query execution plan<br>4. Bushy Tree D. Breaking down a query into smaller sub-queries | 1 | CO2 |
| 4. | 1. Query Allocation A. Optimizing queries for execution across multiple sites<br>2. Distributed Query Optimization B. Detailed plan for executing query<br>3. Query Execution Plan C. Assigning sub-queries to processing sites<br>4. Primitive Operations D. Basic operations required to answer a query | 1 | CO2 |

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| 5. | 1. Data Distribution<br>2. Network Latency<br>3. Resource Heterogeneity<br>4. Query Complexity | A. Optimizing complex queries<br>B. Managing varying node resources<br>C. Managing data across nodes<br>D. Minimizing network communication delays | 1 | CO2 |
| **PARTB** | | | | |
| **5MARKS QUESTIONS** | | | | |
| 1 | Explain the concept of query decomposition and its importance in distributed query processing. | | 2 | CO2 |
| 2 | Describe the different types of primitive operations involved in query processing. | | 2 | CO2 |
| 3 | Discuss the role of semantic optimization in query processing and decomposition. Explain with an example. | | 2 | CO2 |
| 4 | Describe the steps involved in decomposing a complex query into sub-queries. | | 2 | CO2 |
| 5 | What is query decomposition, and explain its significance in information retrieval? | | 2 | CO2 |
| 6 | What are the challenges associated with query decomposition, and how can they be addressed? | | 1 | CO2 |
| 7 | Explain the layers of Query processing? | | 2 | CO2 |
| 8 | Explain the concept of distributed query optimization and its importance in distributed databases. | | 2 | CO2 |
| 9 | What is the role of query fragmentation in distributed query optimization? Explain with an example. | | 1 | CO2 |
| 10 | Explain the concept of site selection in distributed query optimization and its impact on query performance. | | 2 | CO2 |
| 11 | Explain Centralized query optimization with example. | | 2 | CO2 |
| 12 | Describe Distributed query optimization algorithms. | | 2 | CO2 |
| 13 | Describe the role of query optimization techniques in improving query processing performance. | | 2 | CO2 |
| 14 | Briefly explain about Distributed INGRES Algorithm. | | 2 | CO2 |
| 15 | Describe SSD-1 Algorithm. | | 2 | CO2 |

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| **Sub. Code & Title** | **R22CSE3146 DISTRIBUTED DATABASES** | |
| **AcademicYear:2024-25** | **Year/Sem.** | **III/I** |
| **Faculty Name & Designation** | **J.SASIREKHA, Assistant Professor** | |

**QUESTIONBANKWITHBLOOMSTAXONOMYLEVEL(BTL)**

(1. Remembering2.Understanding3.Applying4.Analyzing5. Evaluating6.Creating)

| **UNIT-III** | | | |
|---|---|---|---|
| | **OBJECTIVETYPEQUESTIONS (½MARKQUESTIONS)** | **BT Level** | **Course Outcome** |
| 1. | Which of the following is not a property of transactions?<br>A. Atomicity<br>B. Concurrency<br>C. Isolation<br>D. Durability | 1 | CO3 |
| 2. | Isolation means<br>A. transaction must not interfere with each other<br>B. transaction must interfere with each other<br>C. transaction must be in a consistent state<br>D. transaction must be executed immediately | 1 | CO3 |
| 3. | ---------- means that a transaction must make its changes permanent to the database ends.<br>A. isolation<br>B. locking<br>C. durability<br>D. consistency | 1 | CO3 |
| 4. | The part of a database management system which ensures that the data remains in a consistent state is<br>A. authorization and integrity manager<br>B. buffer manager<br>C. transaction manager<br>D. file manager | 1 | CO3 |
| 5. | …… protocol is used to perform multiple transactions that execute on a different database.<br>A. commit<br>B. two-phase lock<br>C. two-phase commit<br>D. locking | 1 | CO3 |

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| 6. | Isolation of the transactions is ensured by<br>A. Transaction management<br>B. Application programmer<br>C. Concurrency control<br>D. Recovery management | 1 | CO3 |
| 7. | A transaction can do only read operation and not write operation on a data item when it acquires ……. lock.<br>A. read mode<br>B. exclusive mode<br>C. shared mode<br>D. write mode | 1 | CO3 |
| 8. | If a transaction obtains a shared lock on a row, it means that the transaction wants to ….. that row.<br>A. write<br>B. insert<br>C. execute<br>D. read | 1 | CO4 |
| 9. | If a transaction acquires an exclusive lock, then it can perform.....operation.<br>A. read<br>B. write<br>C. read and write<br>D. update | 1 | CO4 |
| 10. | …….. is a specific concurrency problem where in two transactions depend on each other for something.<br>A. phantom read problem<br>B. transaction read a problem<br>C. deadlock<br>D. locking | 1 | CO4 |
| 11. | Transaction ..... ensures that the transaction is being executed successfully.<br>A. concurrency<br>B. consistency<br>C. serializability<br>D. non-serialiasability | 1 | CO4 |
| 12. | …… protocol grantees that a set of transactions becomes serializable.<br>A. two-phase locking<br>B. two-phase commit<br>C. transaction locking<br>D. checkpoints | 1 | CO4 |
| 13. | A transaction processing system is also called as ……..<br>A. processing monitor<br>B. transaction monitor<br>C. TP monitor<br>D. monitor | 1 | CO4 |
| 14. | In....., we have many mini transactions within the main transaction.<br>A. transaction control<br>B. chained transaction<br>C. nested transaction | 1 | CO4 |

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| | D. calling transaction | | |
| 15. | In a two-phase locking protocol, a transaction release locks in …… phase.<br>A. shrinking phase<br>B. growing phase<br>C. running phase<br>D. initial phase | 1 | CO4 |

| | FILLIN THEBLANKS<br>½ MARKQUESTIONS | BT Level | Course Outcome |
|---|---|---|---|
| 1. | If the transaction is rolled back, all the database changes made inside the transaction are ---------- | 1 | CO3 |
| 2. | A …… ensures that transactions are performed as expected. | 1 | CO3 |
| 3. | A transaction that completes its execution successfully is said to be ……. | 1 | CO3 |
| 4. | …….. means that a transaction must execute exactly once completely or not at all. | 1 | CO3 |
| 5. | …….. means that when it ends, a transaction must leave the database in a consistent state | 1 | CO3 |
| 6. | The number of transactions executed in a given amount of time is called …… | 1 | CO4 |
| 7. | …….. deals with individual transactions. | 1 | CO4 |
| 8. | ……. helps solve the concurrency problem | 1 | CO4 |
| 9. | If a transaction acquires a shared lock, then it can perform ..... operation. | 1 | CO4 |
| 10. | A system is in a _____state if there exists a set of transactions such that every transaction in the set is waiting for another transaction in the set. | 1 | CO4 |
| | **MATCHTHEFOLLOWING 1 MARKQUESTIONS** | **BT Level** | **Course Outcome** |
| 1. | 1. ACID Property of Transactions — A) Rollback<br>2. Transaction Processing System — B) Atomicity<br>3. Undo The Work of Transaction — C) Commit<br>4. Makes The Transaction Permanent — D) TP Monitor | 1 | CO3 |
| 2. | 1. Own Begin and Commit Points — A) Human-Oriented Workflows<br>2. Single Start and End Point — B) System-Oriented Workflows<br>3. Humans in Performing the Tasks — C) Flat Transactions<br>4. Tasks That Can Be Executed by a Computer — D) Nested Transactions | 1 | CO3 |
| 3. | 1. Concurrency Control — A) Read Lock and Write Lock<br>2. Locking — B) Concurrency Control Mechanisms<br>3. Optimistic — C) Isolation<br>4. Lock Modes — D) Concurrency Problem | 1 | CO4 |
| 4. | 1. Centralized 2PL — A) Validation, Read, Computation and Write<br>2. Distributed 2PL — B) Lock Managers at Each Site<br>3. Phases of Pessimistic Transaction Execution — C) Read, Compute, Validate<br>4. Phases of Optimistic Transaction Execution — D) Primary Site 2PL | 1 | CO4 |

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| 5. | 1. Transactions Wait for One Another A)Allocating Resources<br>2. Deadlock Avoidance B) Deadlock<br>3. Deadlock Can Be Prevented by C) Centralized Dead Detection<br>4. Deadlock detection and resolution D) Deadlock situation is detected in Advance | 1 | CO4 |
| **PARTB** | | | |
| **5MARKS QUESTIONS** | | | |
| 1 | Discuss about Transaction Management with example | 2 | CO3 |
| 2 | Explain properties of Transaction Management | 2 | CO3 |
| 3 | What is Transaction? Explain about ACID properties with suitable examples | 2 | CO3 |
| 4 | Write and explain Types of Transactions | 2 | CO3 |
| 5 | Differentiate Workflow Transaction with Nested Transactions | 4 | CO3 |
| 6 | Explain Concurrency Control | 2 | CO3 |
| 7 | Explain Serializability with examples | 2 | CO3 |
| 8 | Write Concurrency Control Mechanisms with examples | 1 | CO4 |
| 9 | Describe about Locking-Based Concurrency Control Algorithms | 2 | CO4 |
| 10 | Explain Timestamp-Based Concurrency Control Algorithms with example. | 2 | CO4 |
| 11 | Write and explain Optimistic Concurrency Control Algorithm | 2 | CO4 |
| 12 | Discuss about Deadlock Management with examples. | 2 | CO4 |
| 13 | Explain Deadlock States in Transaction Management | 2 | CO4 |

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| | **SRI INDU COLLEGE OF ENGG & TECH**<br>**QUESTION BANK**<br><br>**(Regulation: R22) Department of Information Technology** | **R22** |

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| **Sub. Code & Title** | **R22CSE3146 DISTRIBUTED DATABASES** | |
| **AcademicYear:2024-25** | **Year/Sem.** | **III/I** |
| **Faculty Name & Designation** | **J.SASIREKHA, Assistant Professor** | |

**QUESTION BANK WITH BLOOMS TAXONOMY LEVEL(BTL)**

1.Remembering2.Understanding 3.Applying4.Analyzing5. Evaluating6.Creating

| **UNIT–IV** | | | |
|---|---|---|---|
| | **OBJECTIVETYPEQUESTIONS (½MARKQUESTIONS)** | **BT Level** | **Course Outcome** |
| 1. | Which of the following parallel database architectures involves dividing data across multiple processors?<br>A) Shared Disk Architecture<br>B) Shared Memory Architecture<br>C) Shared Nothing Architecture<br>D) Hierarchical Architecture | 1 | CO5 |
| 2. | What is the primary goal of parallel database systems?<br>A) To reduce storage costs<br>B) To improve data security<br>C) To increase query performance<br>D) To simplify database administration | 1 | CO5 |
| 3. | Which of the following distributed system architectures is more fault-tolerant?<br>A) Centralized architecture<br>B) Decentralized architecture<br>C) Hierarchical architecture<br>D) Peer-to-peer architecture | 1 | CO5 |
| 4. | Which of the following reliability metrics is used to measure the frequency of failures?<br>A) Failure Rate (λ)<br>B) Mean Time To Failure (MTTF)<br>C) Mean Time Between Failures (MTBF)<br>D) Reliability Function (R(t)) | 1 | CO5 |
| 5. | Which of the following types of failures can occur in DDBMS?<br>A) Site failure<br>B) Network partitioning<br>C) Data inconsistency<br>D) All of the above | 1 | CO5 |

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| 6. | What is a site failure in a distributed system?<br>A) Failure of the communication network<br>B) Failure of a single node or site<br>C) Failure of the entire system<br>D) Failure of the database software | 1 | CO5 |
| 7. | What is the primary goal of parallel data placement in a distributed system?<br>A) To minimize data transfer between nodes<br>B) To maximize data availability<br>C) To optimize data retrieval performance<br>D) To reduce storage costs | 1 | CO5 |
| 8. | What is intra-query parallelism in parallel query processing?<br>A) Executing multiple queries concurrently<br>B) Executing a single query across multiple processors<br>C) Executing a single query using multiple algorithms<br>D) Executing a single query on a single processor | 1 | CO5 |
| 9. | Which of the following load balancing techniques involves distributing incoming requests across multiple servers?<br>A) Round-Robin<br>B) Least Connection<br>C) IP Hash<br>D) All of the above | 1 | CO5 |
| 10. | What is the primary benefit of using a database cluster?<br>A) Improved data security<br>B) Increased data storage capacity<br>C) Enhanced database performance and availability<br>D) Simplified database administration | 1 | CO5 |
| 11. | Which of the following parallel query processing algorithms is designed for join operations?<br>A) Sort-merge join<br>B) Hash join<br>C) Parallel hash join<br>D) All of the above | 1 | CO5 |
| 12. | What is a database cluster?<br>A) A collection of multiple databases on a single server<br>B) A group of multiple servers that work together to provide a single database service<br>C) A type of database replication<br>D) A database backup and recovery technique | 1 | CO5 |
| 13. | Which of the following site failure types is characterized by a sudden and complete loss of service?<br>A) Fail-stop failure<br>B) Fail-silent failure<br>C) Byzantine failure<br>D) Transient failure | 1 | CO5 |
| 14. | What is the purpose of site recovery in a distributed system?<br>A) To prevent site failures<br>B) To detect site failures<br>C) To restore service after a site failure<br>D) To improve system performance | 1 | CO5 |

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| 15. | Which of the following parallel query processing techniques involves dividing a query into smaller sub-queries?<br>A) Pipelining<br>B) Partitioning<br>C) Fragmentation<br>D) Parallelization | 1 | CO5 |
| | **FILLIN THEBLANKS<br>½ MARKQUESTIONS** | **BT Level** | **Course Outcome** |
| 1. | A data cluster is a group of _____that work together to provide a single system image. | 1 | CO5 |
| 2. | Load balancing can be achieved using various algorithms, including ---------- and least connection. | 1 | CO5 |
| 3. | Fault tolerance in distributed systems is achieved by using _____ techniques to detect and recover from failures. | 1 | CO5 |
| 4. | _____ is a parallel query processing technique that involves executing multiple queries concurrently. | 1 | CO5 |
| 5. | A parallel database system architecture that uses multiple processors to execute a single query is known as a _____architecture. | 1 | CO5 |
| 6. | The primary advantage of a data cluster is that it can provide---------- and scalability. | 1 | CO5 |
| 7. | Site failures can be categorized into two types: _____failures and Byzantine failures. | 1 | CO5 |
| 8. | Parallel query processing involves the use of multiple _____to execute a single query. | 1 | CO5 |
| 9. | In a shared-nothing cluster, each node has its own _____and disk storage. | 1 | CO5 |
| 10. | _____ is a data placement technique that uses a hash function to map data to specific nodes. | 1 | CO5 |
| | **MATCHTHEFOLLOWING 1 MARKQUESTIONS** | **BT Level** | **Course Outcome** |
| 1. | 1. Round-Robin A) Distributes data across nodes in a cyclical manner<br>2. Hash-Based B) Distributes data across nodes based on a hash function<br>3. Range-Based C) Distributes data across nodes based on a range of values<br>4. Random D) Distributes data across nodes randomly | 1 | CO5 |
| 2. | 1. Interconnect A) Connects multiple nodes in a parallel database system.<br>2. Node B) A single processor that execute database queries.<br>3. Disk Controller C) Manages disk storage and retrieval operations.<br>4. Network Interface D)Enables communication between nodes in parallel database system. | 1 | CO5 |
| 3. | 1. Intra-Query Parallelism A) Executing multiple queries concurrently<br>2. Inter-Query Parallelism B) Executing a single query across multiple processors<br>3. Pipelining C) Breaking down a query into smaller tasks and executing them in a pipeline fashion<br>4. Partitioning D) Dividing data into smaller chunks and processing them in parallel | 1 | CO5 |

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| 4. | 1. Check pointing A) Involves saving the system state at regular intervals to facilitate recovery.<br>2. Rollback Recovery B) Involves restoring the system to a previous correct state after a failure.<br>3. Replication C) Involves maintaining multiple copies of data or services to ensure availability.<br>4. Redundancy D) Involves duplicating critical components or systems to ensure continued operation. | 1 | CO5 |
| 5. | 1. Transaction Failure A. Failure that occurs during the execution of a single transaction<br>2. System Failure B. Failure that affects the entire database system<br>3. Media Failure C. Failure that occurs due to a problem with the storage media<br>4. Network Failure D. Failure that occurs due to a problem with communication network | 1 | CO5 |
| | **PARTB** | | |
| | **5MARKS QUESTIONS** | | |
| 1 | Discuss the concepts and measures of reliability in distributed DBMS. | 2 | CO5 |
| 2 | Describe various fault-tolerance techniques used in distributed databases. | 2 | CO5 |
| 3 | Explain the different architectures of parallel database systems. | 2 | CO5 |
| 4 | Discuss parallel query processing and its impact on database performance. | 2 | CO5 |
| 5 | List the challenges of load balancing in parallel database systems? | 1 | CO5 |
| 6 | What are local and distributed reliability protocols? | 2 | CO5 |
| 7 | Illustrate the role of Parallel Data Placement in parallel database systems? | 3 | CO5 |
| 8 | Discuss about database cluster in the context of parallel database systems? | 2 | CO5 |
| 9 | What is network partitioning? How does it affect reliability in a distributed database system? | 1 | CO5 |
| 10 | Differentiate Local and Distributed reliability protocols. | 4 | CO5 |
| 11 | Explain general architecture of a parallel database system and shared memory architecture? | 2 | CO5 |
| 12 | Explain the concept of database clusters and their role in improving performance and reliability in parallel database systems. | 1 | CO5 |
| 13 | How can site failures be handled in Distributed DBMS? | 2 | CO5 |

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| | **SRI INDU COLLEGE OF ENGG & TECH**<br>**QUESTION BANK**<br><br>**(Regulation: R22) Department of Information Technology** | **R22** |

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| **Sub. Code & Title** | **R22CSE3146 DISTRIBUTED DATABASES** | |
| **AcademicYear:2024-25** | **Year/Sem.** | **III/I** |
| **Faculty Name & Designation** | **J.SASIREKHA, Assistant Professor** | |

**QUESTION BANK WITH BLOOMS TAXONOMY LEVEL(BTL)**

(1. Remembering2.Understanding3.Applying4.Analyzing5. Evaluating6.Creating)

| **UNIT–V** | | | |
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| | **OBJECTIVETYPEQUESTIONS (½MARKQUESTIONS)** | **BT Level** | **Course Outcome** |
| 1. | Which of the following is a fundamental concept of an object in an object-oriented database management system (OODBMS)<br>A. Relation<br>B. Method<br>C. Attribute<br>D. Tuple | 1 | CO6 |
| 2. | What does the term "object identity" refer to in an object-oriented data model?<br>A. The name of the object<br>B. The unique identifier of an object<br>C. The data type of the object<br>D. The object's methods | 1 | CO6 |
| 3. | In distributed object systems, which technique is commonly used to manage data consistency across nodes?<br>A. Object replication<br>B. Data normalization<br>C. Indexing<br>D. Aggregation | 1 | CO6 |
| 4. | Which of the following is an architectural issue in designing a distributed object database system?<br>A. Data encapsulation<br>B. Transaction management<br>C. Method overriding<br>D. Class hierarchy | 1 | CO6 |
| 5. | Which of the following best describes an advantage of OODBMS over ORDBMS?<br>A. Ability to handle complex data types natively<br>B. Use of SQL for querying<br>C. Better support for relational data models<br>D. Simpler schema design | 1 | CO6 |
| 6. | When designing an object-oriented database system to handle a complex real-world scenario, which feature is crucial for maintaining relationships between different objects?<br>A. Encapsulation<br>B. Inheritance | 1 | CO6 |

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| | C. Polymorphism<br>D. Association | | |
| 7. | In an object-oriented data model, the ability of a subclass to inherit properties from a superclass is known as:<br>A. Abstraction<br>B. Encapsulation<br>C. Inheritance<br>D. Polymorphism | 1 | CO6 |
| 8. | Persistent programming languages are designed to:<br>A. Allow object methods to be executed<br>B. Ensure that objects can be stored and retrieved across sessions<br>C. Provide runtime error handling<br>D. Facilitate the design of user interfaces | 1 | CO6 |
| 9. | In distributed object storage, which method helps in reducing the latency of data access?<br>A. Data fragmentation<br>B. Object serialization<br>C. Caching<br>D. Object migration | 1 | CO6 |
| 10. | Which of the following issues is typically considered when evaluating the performance of object query processing in a distributed object database?<br>A. Data partitioning strategy<br>B. Object method binding<br>C. Class hierarchy design<br>D. User interface layout | 1 | CO6 |
| 11. | Which aspect of object-oriented databases provides a major advantage for managing complex relationships compared to relational databases?<br>A. SQL support<br>B. Direct support for complex data types<br>C. Table-based schemas<br>D. Query optimization | 1 | CO6 |
| 12. | Which factor is most important when comparing OODBMS and ORDBMS for applications requiring complex data relationships?<br>A. SQL query support<br>B. Schema flexibility<br>C. Support for complex data types and relationships<br>D. Data normalization | 1 | CO6 |
| 13. | Design a strategy for distributed object storage that balances performance and data consistency. Which methods would you incorporate?<br>A. Object migration and data fragmentation<br>B. Object replication and caching<br>C. Serialization and indexing<br>D. Encapsulation and inheritance | 1 | CO6 |
| 14. | Propose a solution to optimize object query processing in a distributed database system dealing with high transaction volumes.<br>A. Use data fragmentation and object serialization<br>B. Implement load balancing and query caching<br>C. Apply object migration and indexing<br>D. Utilize method overloading and object identity | 1 | CO6 |
| 15. | In an object-oriented data model, what is the primary purpose of an attribute?<br>A. To define a unique identifier for the object | 1 | CO6 |

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| | B. To perform operations on the object's data<br>C. To store data within an object<br>D. To describe the behavior of an object | | |
| | **FILLIN THEBLANKS<br>½ MARKQUESTIONS** | **BT Level** | **Course Outcome** |
| 1. | In object-oriented programming, a _____defines the structure and behavior that objects of that class will have. | 1 | CO6 |
| 2. | An object's _____is its unique identifier that distinguishes it from other objects.<br>. | 1 | CO6 |
| 3. | The process of _____involves converting an object into a format suitable for storage or transmission. | 1 | CO6 |
| 4. | In a distributed object system, _____ensures that all nodes in the network reflect the same data state. | 1 | CO6 |
| 5. | To handle high volumes of concurrent transactions, distributed databases often use _____to distribute the load evenly across multiple servers. | 1 | CO6 |
| 6. | To maintain object state across different user sessions, _____techniques are used in persistent programming languages. | 1 | CO6 |
| 7. | When dealing with complex data relationships, an _____database management system has the advantage over relational systems due to its direct support for these relationships. | 1 | CO6 |
| 8. | The primary challenge of _____in distributed object databases is to ensure that multiple concurrent transactions do not lead to inconsistent data states. | 1 | CO6 |
| 9. | Object-oriented databases are particularly effective in handling complex data types due to their inherent support for _____, allowing them to model real-world entities more naturally. | 1 | CO6 |
| 10. | When comparing OODBMS and ORDBMS, the main advantage of an OODBMS is its ability to handle _____relationships directly without needing complex joins. | 1 | CO6 |
| 11. | For improving the efficiency of object query processing in a distributed environment, techniques such as _____and _____are crucial. | 1 | CO6 |
| 12. | To design an effective distributed object storage system, one must balance between _____for consistency and _____for performance. | 1 | CO6 |
| 13. | The concept of _____in object-oriented databases allows objects to be accessed and modified in a consistent manner across distributed nodes. | 1 | CO6 |
| 14. | When an object needs to be accessed quickly in a distributed system, _____ helps by storing a copy of the object in a faster-access location. | 1 | CO6 |

| | MATCHTHEFOLLOWING<br>1 MARKQUESTIONS | BT Level | Course Outcome |
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| 1. | A. Class 1. A unique identifier for an object.<br>B. Object Identity 2. A blueprint that defines attributes and methods.<br>C. Attribute 3. An instance of a class containing data and behavior.<br>D. Method 4. A function or procedure that operates on the data of an object. | 1 | CO6 |
| 2. | A. Object Replication 1. Ensures data consistency across nodes.<br>B. Data Fragmentation 2. Divides data into smaller pieces for distribution.<br>C. Load Balancing 3. Distributes workload across multiple servers.<br>D. Caching 4. Reduces access time by storing frequently accessed data. | 1 | CO6 |
| 3. | A. Scalability 1. The ability to manage and recover from failures.<br>B. Fault Tolerance 2. The capacity to handle increasing load or data size.<br>C. Data Consistency 3. Ensures that data remains accurate and consistent across all nodes.<br>D. Transaction Management 4. The process of handling multiple concurrent operations reliably | 1 | CO6 |
| 4. | A. Inheritance 1. A feature allowing classes to inherit properties and behaviors from other classes.<br>B. Object Identity 2. A unique identifier that distinguishes one object from another.<br>C. Encapsulation 3. The bundling of data and methods that operate on the data within a class.<br>D. Polymorphism 4. The ability of different classes to be treated as instances of the same class through a common interface. | 1 | CO6 |
| 5. | A. OODBMS 1. Stores objects as data with their relationships directly.<br>B. ORDBMS 2. Extends relational databases with object-oriented features.<br>C. Persistence 3. The capability of an object to maintain its state across different sessions.<br>D. Object Serialization 4. The process of converting an object into a format that can be easily stored and retrieved. | 1 | CO6 |
| | **PARTB** | | |
| | **5 MARKS QUESTIONS** | | |
| 1 | Explain about fundamental object Concepts and Object Models. | 2 | CO6 |
| 2 | Explain about Object Distribution Design. | 2 | CO6 |
| 3 | List the Architectural Issues of distributed object DBMS with neat diagram. | 1 | CO6 |
| 4 | Discuss about Object Identifier Management & its types. | 2 | CO6 |
| 5 | Draw the diagram for page server architecture. | 4 | CO6 |
| 6 | Differentiate Horizontal and Vertical class partitioning. | 4 | CO6 |
| 7 | Discuss about object migration with four states. | 2 | CO6 |
| 8 | Explain about Distributed object storage. | 2 | CO6 |
| 9 | Explain briefly about Object Query Processing with examples.. | 2 | CO6 |
| 10 | Explain about Query Execution Algorithm with examples. | 2 | CO6 |
| 11 | Write the features and drawbacks of Object DBMS. | 1 | CO6 |
| 12 | Explain about the Object Oriented Data Model. | 2 | CO6 |
| 13 | Explain about Inheritance and its types with example. | 2 | CO6 |

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| 14. | Define Persistent Programming Language and explain with example. | 1 | CO6 |
| 15. | Differentiate OODBMS and ORDBMS. | 4 | CO6 |