

# **SRR & CVR Government Degree & PG College**

*An Autonomous & ISO 9001: 2015 Certified Institution:: Ranked by NIRF in 101-150 band at NIRF-2020 & 151-200 band in NIRF 2019  
NAAC accredited Institution with grade B+ with C.G.P.A 2.6 during March, 2017*

**Machavaram, Vijayawada, Krishna District, AP-520 004**

## **Board of Studies Meeting (2021-22)**

**I & II M. Sc Computer Science  
(With Effect from Admitted Batch 2020-2021)**



**Department of Computer Science**

**1601 : M.Sc Computer Science**

# SRR & CVR Government Degree & PG College

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**Machavaram, Vijayawada, Krishna District, AP-520 004**

## **Department of Computer Science**

### **Report on 2<sup>nd</sup> Board of Studies Meeting for PG Programmes of the Department for AY-2021-22**

The 2<sup>nd</sup> meeting of the Board of Studies in PG Programmes of Computer Science was convened on 2<sup>nd</sup> December 2021 at 11.00 A.M. in Department of Computer Science with Smt. Lakshmi Sarvani Videla Lecturer incharge PG Computer Science, SRR & CVR Govt. Degree College (Autonomous), Vijayawada – 520004 for the Academic year 2021-22. The composition of Board of Studies are as follows:

#### **Composition of the BoS of M.Sc Computer Science**

| S.No | Category                    | Designation in BoS                      | Name of the person  |
|------|-----------------------------|---|---|
| 1.   | Chairman                    | The Board of Studies for M.Sc Programme | <b>Smt. Lakshmi Sarvani Videla</b><br>PG in-charge of Computer Science  |
| 2.   | University Representative   | Member                                  | <b>Dr. Y. K. Sundara Krishna</b><br>Professor (Senior Scale),<br>Department of Computer Science,<br>Krishna University, Machilipatnam.                              |
| 4.   | In-Charge of the department | Member                                  | <b>Sri. G. Vijayadeep</b><br>Lecturer-in-charge   |
| 4.   | Subject Expert              | Member                                  | <b>Dr. P. Bharathi Devi</b><br>Computer Science Lecturer,<br>Department of Computer Science,<br>SKBRGDC, Macherla<br>Guntur District                                |
| 5.   | Subject Expert              | Member                                  | <b>Mr. A.S.A.L.G.G Gupta</b><br>Assistant Professor,<br>Department of Computer Science,<br>Koneru Lakshmaiah Education Foundation,<br>Vaddeswaram, Guntur District. |
| 6.   | Industry Representative     | Member                                  | <b>Mr. G. Rama Krishna Srinivas</b><br>Associate Analyst,<br>Happiest Minds Pvt. Ltd,<br>Bangalore,<br>Karnataka  |

|     |                           |        |   |
|-----|---------------------------|--------|---|
| 7.  | Faculty of the Department | Member | <b>Sri. Ch. Bharat Kumar</b><br>Lecturer in Computer Science                            |
| 8.  | Faculty of the Department | Member | <b>Smt. J. Sarada Lakshmi</b><br>Lecturer in Computer Science                           |
| 9.  | Faculty of the Department | Member | <b>Sri. D. P. V. Phani Raja Kumar</b><br>Guest Lecturer in Computer Science             |
| 10. | Faculty of the Department | Member | <b>Smt.G. Karuna Latha</b><br>Guest Lecturer in Computer Science                        |
| 11. | Alumni                    | Member | <b>Mr. O. Wycliffe</b><br>M Graduate Trainee,<br>Cognizant India Pvt. Ltd<br>Hyderabad, |

## PREFACE

SRR & CVR Govt. Degree College (Autonomous), Vijayawada, is one of the prestigious educational institutions, located in a historically important place like Vijayawada in Krishna District, Andhra Pradesh. Vijayawada is a place of historical and cultural significance and importance. In the same way SRR & CVR Govt. Degree College, has also acquired its significance and prominence in and around Vijayawada by moulding the lives of many students to become great personalities. This college is named after late Sri Raja Rangayyappa Rao and late Sri Chunduru Venkata Reddy, who have been great and noble donors of the city Vijayawada, by whose generosity the college has reached and attained such and this elevated status by way of shaping the lives of many generations of students making them worthy citizens of the country. This college has acquired great standards academically by the contributions of great teachers as well because in the history of any educational institution its teachers play a vital role. The college was established in 1937. It offers 27 undergraduate and 10 post graduate academic programmes with 86 regular faculty members. The college has total strength of around 2,800 students. which includes 1550 boys and 650 girl students at present. The institution was accredited with grade B+ with C.G.P.A 2.6 during March, 2017 by NAAC and got ISO 9001: 2015 certificate during 2019. The college was ranked by NIRF in 101-150 band at NIRF-2020 & 151-200 band in NIRF 2019.

The Department of Computer Science has been successfully spreading its branches since 1998. Initially, the Department has offered courses like B.Sc. (Computer Science, Mathematics & Physics), B.Sc.(Computer Science, Statistics & Mathematics) B.Sc.(Computer Science, Electronics & Mathematics) and B.Sc(Computer Science & Electronic Technology). In 2001 M.Sc(Computer Science) Course Introduced. But keeping in view the research output and industry requirements the Department has stemmed out new courses like B.Sc.(Computer Science, Chemistry and Maths) was started in 2018 and B.Sc. (Data Science) in 2020.

A good number of PG students are being placed through campus placements in major IT, ITES, and core MNCs like Infosys, IBM, Tech Mahindra, Accenture, Cognizant and so on with good packages of more than 5 to 8 lakhs per annum. Global excellence and local relevance in research, teaching and technology development is the main motto of the department, to achieve this, the students are encouraged to carry out innovative research in their relevant fields and deliver quality services to match the needs of the technical edification, industry and society

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## **Department of Computer Science**

**2<sup>nd</sup> BOARD OF STUDIES MEETING FOR M.Sc PROGRAMME**

**AGENDA**

**ACADEMIC YEAR: 2021-22**

The members, Board of Studies, Department of Computer Science will discuss the syllabus in CBCS pattern, additional inputs, model question papers, Co-curricular activities, list of examiners and blue prints. The agenda includes::

1. Proposal for implementation of Course structure of II M. Sc Computer Science (Program code: 1601) for the admitted batch 2020-21.
2. Implementation of syllabi for newly introduced Courses in Semester III & IV under CBCS with Learning Outcomes for the academic year 2021-22.
3. Implementation of revised syllabus (in previous year BOS meeting) for Semester I & II.
4. To consider and approve to include “Introduction to data science with R” course as second elective course under Generic Elective Courses with 4 credits in third semester.
5. To consider and approve to conduct MOOC course in IV semester as additional paper and the marks must not be considered for calculating the percentage.
6. To consider and approve to include “Introduction to computer vision and image processing” 6-week Coursera course as MOOC course in IV semester.
7. To consider and approve the Student Evaluation Policy and Procedure and split- up of CIA & SEE.
8. To consider and approve the list of Question paper setters and examiners.
9. To consider and approve the Departmental Activities Calendar.
10. To consider and approve the Students Centered Pedagogy Policy to enrich the curriculum.
11. Any other with the permission of the chair.

### Members Presented

| S.No | Name of the person   | Designation in BoS        | Signature |
|------|--|---------------------------|-----------|
| 1.   | <b>Smt. Lakshmi Sarvani Videla</b><br>In-charge of PG Computer Science   | Chairman of BoS           |           |
| 2.   | <b>Dr. Y. K. Sundara Krishna</b><br>Professor (Senior Scale),<br>Department of Computer Science,<br>Krishna University, Machilipatnam.                                 | University Representative |           |
| 3.   | <b>Sri. G. Vijayadeep</b><br>Lecturer-in-charge  | Member                    |           |
| 4.   | <b>Dr. P. Bharathi Devi</b><br>Computer Science Lecturer,<br>Department of Computer Science,<br>SKBRGDC, Macherla<br>Guntur District                                   | Subject Expert            |           |
| 5.   | <b>Mr. A.S.A.L.G.G Gupta</b><br>Assistant Professor,<br>Department of Computer Science,<br>Koneru Lakshmaiah Education<br>Foundation,<br>Vaddeswaram, Guntur District. | Subject Expert            |           |
| 6.   | <b>Mr. G. Rama Krishna Srinivas</b><br>Associate Analyst,<br>Happiest Minds Pvt. Ltd,<br>Bangalore,<br>Karnataka   | Industry Representative   |           |
| 7.   | <b>Sri. Ch. Bharat Kumar</b><br>Lecturer in Computer Science   | Member                    |           |
| 8.   | <b>Smt. J. Sarada Lakshmi</b><br>Lecturer in Computer Science  | Member                    |           |
| 9.   | <b>Sri. D. P. V. Phani Raja Kumar</b><br>Guest Lecturer in Computer Science  | Member                    |           |
| 10   | <b>Smt.G. Karuna Latha</b><br>Guest Lecturer in Computer Science   | Member                    |           |
| 11   | <b>Mr. O. Wycliffe</b><br>M Graduate Trainee,<br>Cognizant India Pvt. Ltd<br>Hyderabad,  | Alumni                    |           |

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## **Department of Computer Science**

**2<sup>nd</sup> BOARD OF STUDIES MEETING FOR M. Sc PROGRAMME CONDUCTED ON  
2<sup>nd</sup> DECEMBER, 2021  
MINUTES  
ACADEMIC YEAR: 2021-22**

The Minutes of 1<sup>st</sup> Board of Studies meeting in M.Sc which was convened on 2<sup>nd</sup> December, 2021 at 11.00 A.M. under Chairmanship of Smt. Lakshmi Sarvani V, the In- Charge of the PG department is as follows:

### **Minutes and Resolutions of Board of Studies Meeting**

**Agenda 1: 1. Proposal for implementation of Course structure of II M. Sc Computer Science (Program code: 1601) for the admitted batch 2020-21.**

**Proposal:** The Chairperson, Smt. Lakshmi Sarvani V, the In- Charge of the PG department welcomed the members of BoS and initiated discussion on agenda points. She proposed 106 credits for two years M.Sc Programme with programme code of 1601.

**Discussion:** The University Representative, Dr. Y. K. Sundra Krishna enquired above the changes made in the course titles, credits of courses, and framework of the courses. There are no notable changes in course titles credits of courses, and framework of the courses.

**Resolution 1:** It is resolved to approve the Programme Structure of M.Sc Computer Science (Programme Code: 1601) from the Academic year 2020-21 onwards.

**Agenda 2: Implementation of syllabi for newly introduced Courses in Semester III & IV under CBCS with Learning Outcomes for the academic year 2021-22**

**Proposal:** The proposed syllabi for the courses in Semester III and Semester IV for M.Sc Computer Science is placed before the participants for approval.

**Discussion:** Prof. Dr. Y. K. Sundra Krishna, the University Representative, Dr. P. Bharati Devi, the subject expert enquired the level of changes made in courses. The faculty members explained the changes made in the courses and rationality behind the assigning number of teaching hours per each Unit in the courses.

**Resolution 2:** It is resolved to approve the Programme Structure of M.Sc Computer Science (Programme Code: 1601) for courses in Semester III & IV under CBCS for the Academic year 2020-21 onwards.

**Agenda 3: *Implementation of revised syllabus (in previous year BOS meeting) for Semester I & II.***

**Proposal:** The proposed syllabi for the courses in Semester I and Semester II is placed before the participants for approval.

**Discussion:** The BoS chairman explained the syllabi for the programme and course outcomes of each course. In pursuance of the programmes specific outcomes, Sri. A. S. A.L.G.G. Gupta Subject Expert and Sri G. Rama Krishna Srinivas industry representative suggested that in depth knowledge must be drill in concepts like binary search and hashing. They also suggested to include frequency measuring techniques, prefix sums and implicit binary trees. The members agreed to teach these concepts.

**Resolution 3:** It is resolved to approve the Programme Structure of M.Sc Computer Science (Programme Code: 1601) for courses in Semester I & II under CBCS for the Academic year 2020-21 onwards.

**Agenda 4: *To consider and approve to include “Introduction to data science with R” course as second elective course under Open Elective Courses with 4 credits in third semester.***

**Proposal:** As per Krishna University (Parent University) - M.Sc Programme structure, there are two open electives, they are (i) Fundamentals of Computers And Problem Solving Techniques, (ii) Basics Of Cyber Security. Here it is proposed to include “Introduction to Data Science with R” course as third open elective course under Open Elective Courses with 4 credits in third Semester.

**Discussion:** As organisations are turning towards Machine Learning, Big Data, and Artificial Intelligence, the demand for data science roles is seeing a sustained and accelerating upward surge, the representatives of University and Industry unanimously agreed for the course inclusion. All the participants discussed about course outcomes and methodology.

**Resolution 4:** It is resolved to include “Introduction to data science with R” course as second elective course under Open Elective Courses with 4 credits in third semester.

**Agenda 5: *To consider and approve to conduct MOOC course in IV semester as additional paper and the marks must not be considered for calculating the percentage.***

**Proposal:** As MOOC course is evaluated online and the result may not be available before semester end, it is proposed to be considered as additional paper.

**Discussion:** The University Representative, Dr. Y. K. Sundra Krishna suggested to conduct exam

offline in the college. He suggested to allow students to take the course online and evaluation be done offline.

**Resolution 5:** It is resolved to conduct the external examination for the MOOC subject in line with other regular subjects based on the syllabi of the respective subject provided in the curriculum, the department can conduct midterm examinations.

**Agenda 6:** To consider and approve to include “Introduction to computer vision and image processing” 6-week Coursera course as MOOC course in IV semester.

**Proposal:** BoS chairman proposed the following MOOC courses. 1. Ethical hacking, [https://onlinecourses.nptel.ac.in/noc22\\_cs13/preview](https://onlinecourses.nptel.ac.in/noc22_cs13/preview). 2. Data Analytics With Python, [https://onlinecourses.nptel.ac.in/noc22\\_cs08/preview](https://onlinecourses.nptel.ac.in/noc22_cs08/preview), 3. Introduction to internet of things, [https://onlinecourses.nptel.ac.in/noc21\\_cs17/preview](https://onlinecourses.nptel.ac.in/noc21_cs17/preview) 4. Cybersecurity for Everyone, <https://www.coursera.org/learn/cybersecurity-for-everyone>. 5. Introduction to computer vision and image processing, <https://www.coursera.org/learn/introduction-computer-vision-watson-opencv/home/welcome>

**Discussion:** The University Representative, Dr. Y. K. Sundra Krishna suggested to follow university guidelines at that time. He also suggested to take student’s interest into consideration in opting MOOC course.

**Resolution 6:** It is resolved to consider students interests into consideration at the time of choosing MOOC course.

**Agenda :** *To consider and approve the Student Evaluation Policy and Procedure and split- up of CIA & SEE.*

**Proposal:** The chairman proposed the evaluation system in each course will be 40 : 60 for Internal Continuous Internal Evaluation (CIA) and Semester End Evaluation (SEE).

**Discussion:** The members of BoS discussed about the merits, demerits and feasibility for the implementation of (40% CIA & 60% SEE) proportion and split-up of CIA. Faculty members of the department expressed their willingness to frame question papers based on the active verbs used to frame question paper pattern on **Blooms Taxonomy**.

**Resolution 7:** It is resolved to approve the Student Evaluation Policy and Procedure and split-up of CIA & SEE.

**Agenda 8:** *To consider and approve the list of Question paper setters and Examiners.*

**Proposal:** The chairman placed the list of Question paper setters and Examiners before the participants for seeking their approval.

**Discussion:** The Faculty members of the department identified subject experts and prepared the list of Paper setters as well as Examiners for Semester End Examinations.

**Resolution 8:** It is unanimously resolved to approve the list of Question paper setters and Examiners.

**Agenda 9:** *To consider and approve the Departmental Activities Calendar.*

**Proposal:** The chairman placed the list Departmental Activities for PG for the Academic year 2021-22.

**Discussion:** The delegates suggested to organize Workshops, Seminars, Field Trips, Guest / Extension Lectures, Observation of Important Days and Internships for the Academic Year 2021-22.

**Resolution 9:** It is unanimously resolved to approve the Departmental Activities Calendar.

**Agenda 10:** *To consider and approve the Students Centered Pedagogy Policy to enrich the curriculum.*

**Proposal:** On par with the vision of National Education Policy 2020, the department proposed to followed study material/ Case study based/mapped teaching pedagogy.

**Discussion:** At present the faculty members in the department follow Students Centered Pedagogy which are included Classroom teaching; students seminars, Blended teaching through moodleCloud, Google class room, CCE- LMS. In addition to these, the members of the Board of studies brainstormed on the appropriate pedagogical strategies that could be used for effective transaction of Commerce Curriculum. The faculty members are assured to adopt outcome based leaning pedagogical matrix. It will be used to review the attainment of goal at each end of each topic/unit in the syllabi.

**Resolution 10:** It is resolved to adopt the Students Centered Pedagogy Policy to enrich the curriculum.

**Agenda 11:** *Any other with the permission of the chair.*

**(Lakshmi Sarvani Videla)**  
Chairman, the Board of Studies

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## **Department of Computer Science**

**Programme Structure of 1601: M.Sc (Computer Science)**

**w.e.f Academic Year - 2020-21**

### **Programme Specific Outcomes (PSOs):**

By the end of the Programme, students will be able:

PSO1. Scientific knowledge: Apply the knowledge of mathematics, science, and computing to the solution of complex scientific problems.

PSO2. Problem analysis: Identify, formulate, research literature, and analyze complex scientific problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and applied sciences.

PSO3. Design/development of solutions: Design solutions for complex problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PSO4. Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PSO5. Modern tools usage: Create, select, and apply appropriate techniques, resources, and modern computing and IT tools including prediction and modeling to complex scientific activities with an understanding of the limitations.

PSO6. The software engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional practice.

PSO7. Environment and sustainability: Understand the impact of the professional software engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PSO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the scientific practice.

PSO9. Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PSO10. Communication: Communicate effectively on complex activities with the scientific

community and with the society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PSO11. Project management: Demonstrate knowledge understanding of the scientific and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

**Programme Structure of  
1601: M. Sc (Computer Science)**

| Course Code          | Title of the Course                              | Instruction Hours per week |   |   | Credits   | Evaluation |            |                   |
|----------------------|--|----------------------------|---|---|-----------|------------|------------|-------------------|
|                      |  | L                          | T | P |           | CIA MARKS  | SEE        |                   |
|                      |  |                            |   |   |           |            | MARKS      | DURATION          |
| <b>SEMESTER – I</b>  |  |                            |   |   |           |            |            |                   |
| PMCS 101             | Data Structures                                  | 4                          | - | - | 4         | 40         | 60         | 4 Hrs.            |
| PMCS 102             | Programming and Problem Solving using Python     | 4                          | - | - | 4         | 40         | 60         | 4 Hrs.            |
| PMCS 103             | Computer Organization                            | 4                          | - | - | 4         | 40         | 60         | 4 Hrs.            |
| PMCS 104             | Formal Languages and Automata Theory             | 4                          | - | - | 4         | 40         | 60         | 4 Hrs.            |
| PMCS 105             | Programming and Problem Solving using Python Lab | -                          | - | 8 | 4         | 40         | 60         | 8 Hrs.            |
| PMCS 106             | Data Structure Lab                               | -                          | - | 8 | 4         | 40         | 60         | 8 Hrs.            |
| <b>Total</b>         |  |                            |   |   | <b>24</b> | <b>240</b> | <b>360</b> | 32 hours per week |
| <b>SEMESTER – II</b> |  |                            |   |   |           |            |            |                   |
| PMCS201              | Design and Analysis of Algorithms                | 4                          | - | - | 4         | 40         | 60         | 4 Hrs.            |
| PMCS202              | Software Engineering                             | 3                          | 1 | - | 4         | 40         | 60         | 4 Hrs.            |
| PMCS203              | Operating Systems                                | 4                          | - | - | 4         | 40         | 60         | 4 Hrs.            |
| PMCS204              | Database Management Systems                      | 4                          | - | - | 4         | 40         | 60         | 4 Hrs.            |
| POMCS205             | Open Elective –I                                 | 4                          | - | - | 4         | 40         | 60         | 4 Hrs.            |
| PMCS206              | Unix Operating Systems Lab                       | -                          | - | 8 | 4         | 40         | 60         | 8 Hrs.            |
| PMCS207              | Database Management Systems Lab                  | -                          | - | 8 | 4         | 40         | 60         | 8 Hrs.            |
| <b>Total</b>         |  |                            |   |   | <b>28</b> | <b>280</b> | <b>420</b> | 36 hours per week |

| Course Code                  | Title of the Course   | Instruction Hours per week |   |   | Credits    | Evaluation |            |             |
|------------------------------|---|----------------------------|---|---|------------|------------|------------|-------------|
|                              |   | L                          | T | P |            | CIA MARKS  | SEE        |             |
|                              |   |                            |   |   |            |            | MARKS      | DURATION    |
| <b>SEMESTER – III</b>        |   |                            |   |   |            |            |            |             |
| PMCS301                      | Compiler Design   | 4                          | - | - | 4          | 40         | 60         | 4 Hrs.      |
| PMCS302                      | Computer Networks   | 4                          | - | - | 4          | 40         | 60         | 4 Hrs.      |
| PMCS303                      | Principles of Programming Language  | 4                          | - | - | 4          | 40         | 60         | 4 Hrs.      |
| PMCS 304                     | Artificial Intelligence   | 4                          | - | - | 4          | 40         | 60         | 4 Hrs.      |
| POMCS305                     | Open Elective-II  | 4                          | - | - | 4          | 40         | 60         | 4 Hrs.      |
| PMCS306                      | Compiler Design Lab   | -                          | - | 8 | 4          | 40         | 60         | 8 Hrs.      |
| PMCS307                      | Computer Networks Lab   | -                          | - | 8 | 4          | 40         | 60         | 8 Hrs.      |
| <b>Total</b>                 |   |                            |   |   | <b>28</b>  | <b>280</b> | <b>420</b> | 36 hrs/week |
| <b>SEMESTER – IV</b>         |   |                            |   |   |            |            |            |             |
| PMCS 401                     | <b>MOOCS:</b><br>NPTEL/SWAYAM/edX/Coursera/<br>Stanford Online/Udacity/ Open<br>Classrooms/ Open2Study/ ALISON/<br>Khan Academy/ NSE-<br>NCFM/IRDA/NISM/ Any course<br>related to M.Sc from the authentic<br>sources with prior permission. | 4                          | - | - | 4          | 40         | 60         | 4Hrs.       |
| PMCS402.1<br>Or<br>PMCS402.2 | Elective-I Big DataAnalytics<br>Or<br>MachineLearning   | 4                          | - | - | 4          | 40         | 60         | 4 Hrs.      |
| PMCS403.1<br>Or<br>PMCS403.2 | Elective-II<br>Cloud computing<br>Or<br>DNA Computing   | 4                          | - | - | 4          | 40         | 60         | 4 Hrs.      |
| PMCS404                      | Web Technologies  | 4                          | - | - | 4          | 40         | 60         | 4 Hrs.      |
| PMCS405                      | Web Technologies Lab  | -                          | - | 4 | 2          | 40         | 60         | 4 Hrs.      |
| PMCS406                      | Project   | -                          | - | 8 | 8          |            | 200        | -.          |
| <b>Total</b>                 |   |                            |   |   | <b>26</b>  | -          | -          | -           |
| <b>Over All Programme</b>    |   |                            |   |   | <b>106</b> |            |            | <b>2700</b> |

**Summary of Programme Structure for  
1601: M. Sc (Computer Science)  
Total credits and Marks**

| S.No         | Semester     | Credits    | Marks       |
|--------------|--------------|------------|-------------|
| 1            | I Semester   | 24         | 600         |
| 2            | II Semester  | 28         | 700         |
| 3            | III Semester | 28         | 700         |
| 4            | IV Semester  | 26         | 700         |
| <b>Total</b> |              | <b>106</b> | <b>2700</b> |

**Signatures of members**

| S.No | Name of the person   | Designation in BoS        | Signature |
|------|--|---------------------------|-----------|
| 1.   | <b>Smt. Lakshmi Sarvani Videla</b><br>In-charge of PG Computer Science   | Chairman of BoS           |           |
| 2.   | <b>Dr. Y. K. Sundara Krishna</b><br>Professor (Senior Scale),<br>Department of Computer Science,<br>Krishna University, Machilipatnam.                                 | University Representative |           |
| 3.   | <b>Sri. G. Vijayadeep</b><br>Lecturer-in-charge  | Member                    |           |
| 4.   | <b>Dr. P. Bharathi Devi</b><br>Computer Science Lecturer,<br>Department of Computer Science,<br>SKBRGDC, Macherla<br>Guntur District                                   | Subject Expect            |           |
| 5.   | <b>Mr. A.S.A.L.G.G Gupta</b><br>Assistant Professor,<br>Department of Computer Science,<br>Koneru Lakshmaiah Education<br>Foundation,<br>Vaddeswaram, Guntur District. | Subject Expect            |           |
| 6.   | <b>Mr. G. Rama Krishna Srinivas</b><br>Associate Analyst,<br>Happiest Minds Pvt. Ltd,<br>Bangalore, Karnataka  | Industry Representative   |           |
| 7.   | <b>Sri. Ch. Bharat Kumar</b><br>Lecturer in Computer Science   | Member                    |           |
| 8.   | <b>Smt. J. Sarada Lakshmi</b><br>Lecturer in Computer Science  | Member                    |           |
| 9.   | <b>Sri. D. P. V. Phani Raja Kumar</b><br>Guest Lecturer in Computer Science  | Member                    |           |
| 10   | <b>Smt.G. Karuna Latha</b><br>Guest Lecturer in Computer Science   | Member                    |           |
| 11   | <b>Mr. O. Wycliffe</b><br>M Graduate Trainee,<br>Cognizant India Pvt. Ltd<br>Hyderabad,  | Alumni                    |           |

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## **Department of Computer Science**

### **Blueprint for 4 credit courses**

| <b>Section</b>   |                               | <b>Unit-1</b> | <b>Unit-2</b> | <b>Unit-3</b> | <b>Unit-4</b> | <b>Unit-5</b> | <b>Total questions</b> | <b>No of questions answered</b> | <b>Marks allotted</b> |
|------------------|-------------------------------|---------------|---------------|---------------|---------------|---------------|------------------------|---------------------------------|-----------------------|
| <b>Section-A</b> | <b>Short Answer Questions</b> | <b>2</b>      | <b>2</b>      | <b>2</b>      | <b>2</b>      | <b>2</b>      | <b>10</b>              | <b>5</b>                        | <b>5X 4=20</b>        |
| <b>Section-B</b> | <b>Essay Questions</b>        | <b>2</b>      | <b>2</b>      | <b>2</b>      | <b>2</b>      | <b>2</b>      | <b>10</b>              | <b>5</b>                        | <b>5X8=40</b>         |

**Total Marks = 60**

**In Section –B for each question internal choice has to be given**

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**Machavaram, Vijayawada, Krishna District, AP-520 004**

## **Department of Computer Science**

### **Student Evaluation Policy and Procedure**

#### **1. EVALUATION POLICY ANDPROCEDURE:**

Students are evaluated for 100 marks in each course. These 100 Marks are splitted into Continuous Internal Assessment (CIA) and Semester End Evaluation (SEE). 40 marks are allocated to CIA and 60 marks for SEE.

##### **1.1. CONTINUOUS INTERNAL ASSESSMENT (CIA) FOR 40MARKS:**

1.1.1 Out of a maximum of 100 marks in each theory paper, 40 marks shall normally be allotted for continuous internal assessment. The Assessment shall be made by the teacher handling that paper in the manner prescribed here under. Where the same paper is handled by two or more teachers, the Head of the Department shall decide upon the teacher, who shall make the internal assessment or fix the proportion of the marks among the teachers for the internal assessment of thestudents.

1.1.2 **Out of these 40 marks, 10 marks are allotted to Continuous Internal Exams.** Two Continuous Internal exams are conducted for 20 marks in each exam and the average of these two exams scale down to 10 marks, shall be deemed as the marks obtained by the student in Continuous Internal Exams. Out of these two exams, one exam is conducted through online using Google class room/ moodleCloud/ gnomio/ any other online platform.

1.1.3 **Out of these 40 marks, 10 marks are allotted to Assignments.** Two assignments are given to the students during the course. 5 marks are allotted for each assignment and total of these two assignments are included in Continuous Internal Assessment. The students can submit assignments through blendedmode.

1.1.4 **Out of these 40 marks, 10 marks are allotted to Project Work/ Group Discussion.** Students will be assigned student study project for 10 Marks under CIA. Then the student has to submit a project report under the supervision of Faculty Member. These 10 marks may also be assigned to group discussion also. Student will be evaluated here based on his/her way of expression, conceptual strength, attitude, listening -understanding skills and level of participation in thediscussion.

**1.1.5 Out of these 40 marks, 5 marks are allotted to Student Seminar and 5 marks for Viva-Voce.** Each Student may give student seminar to the peer team. This student seminar will carry 5 marks. Here feedback will be collected on 5 points scale from the participants in the student seminar [or] Viva- Voce will be conducted by the concerned subject faculty for 5marks.

**The summarized continuous internal assessment is:**

|   |          |                 |
|---|----------|-----------------|
| <b>1. Average of Two Continuous Internalexams</b> | <b>-</b> | <b>10 Marks</b> |
| <b>2. Total of TwoAssignments</b>                 | <b>-</b> | <b>10 Marks</b> |
| <b>3. Project Work/GroupDiscussion</b>            | <b>-</b> | <b>10 Marks</b> |
| <b>4. StudentSeminar</b>                          | <b>-</b> | <b>5 Marks</b>  |
| <b>5. Feedback/Viva-Voce</b>                      | <b>-</b> | <b>5 Marks</b>  |

## **1.2 CIA IN OPEN ELECTIVECOURSES:**

**1.2.1 Out of 50 marks, 20 marks are allotted to Continuous Internal Exams.** Three Continuous Internal exams are conducted for 20 marks in each exam and the average of these three exams are scale down to 20 marks, shall be deemed as the marks obtained by the student in Continuous Internal Exams. Out of these three exams, one exam is compulsorily conducted through online using Google class room/ moodle/ gnomio/ any other online platform with multiple choice questions.

**The summarized CIA in Generic Elective Courses is:**

|   |          |                 |
|---|----------|-----------------|
| <b>1. Average of Three Continuous Internalexams</b> | <b>-</b> | <b>20 Marks</b> |
| <b>2. Total of TwoAssignments</b>                   | <b>-</b> | <b>10 Marks</b> |
| <b>3. Project Work/GroupDiscussion</b>              | <b>-</b> | <b>10 Marks</b> |
| <b>4. StudentSeminar</b>                            | <b>-</b> | <b>5 Marks</b>  |
| <b>5. Feedback/Viva-Voce</b>                        | <b>-</b> | <b>5 Marks</b>  |

## **1.3 CIA IN PROJECT WORK AND COMPREHENSIVESEMINAR:**

Each student has to conduct Industry oriented Research work in his/her interested area and has to prepare Project Report by using either primary data or secondary data. This is different from student study project. It is research oriented Industrial project conducted under the supervision of Faculty Member of the department. The students have to submit the project work report to the supervision of Faculty Member 15 days before commencement of IV Semester End Evaluation process. After submitting project work report, the students have to give Comprehensive Seminar by explaining their research in the industry. Project Work carries 50 Marks and Comprehensive Seminar carries 50 Marks.

- 1.4 Every student is required, to take every test for Continuous internal Assessment, unless he/she is permitted by the Principal to write at a later date on valid reasons, before the test is conducted. In case where permission is not obtained, the decision of the Principal to hold or not to hold separate examination for such candidate is final.
- 1.5 Permission to write Internal Assessment test at the end of corresponding Semester – end exams may be given on medical grounds and other valid grounds. For such candidates, test/s is/are conducted by the faculty member concerned in consultation with the Head of the Department with a different question paper.
- 1.6 The Student has to get minimum 40 per cent (16 Marks) marks in the Continuous Internal Assessment to complete the Course Paper.

***Suggestive Question Paper Pattern for CIA & SEE (Based on Blooms Taxonomy):***

Though the faculty concerned is empowered to adopt their own pattern for question paper, a general and suggestive model for question paper is given below based on Blooms Taxonomy.

| S.No         | Learning Objective         | Percentage of Marks |
|--------------|----------------------------|---------------------|
| 1            | Memory based (Remember)    | 10                  |
| 2            | Understand (Comprehension) | 10                  |
| 3            | Application                | 15                  |
| 4            | Analysis                   | 15                  |
| 5            | Evaluation                 | 25                  |
| 6            | Creativity                 | 25                  |
| <b>Total</b> |                            | <b>100</b>          |

**Active verbs developed based on Bloom's Taxonomy**

| Knowledge | Understand    | Apply       | Analyze       | Evaluate     | Create      |
|-----------|---------------|-------------|---------------|--------------|-------------|
| define    | explain       | solve       | analyze       | reframe      | design      |
| identify  | describe      | apply       | compare       | criticize    | compose     |
| describe  | interpret     | illustrate  | classify      | evaluate     | create      |
| label     | paraphrase    | modify      | contrast      | order        | plan        |
| list      | summarize     | use         | distinguish   | appraise     | combine     |
| name      | classify      | calculate   | infer         | judge        | formulate   |
| state     | compare       | change      | separate      | support      | invent      |
| match     | differentiate | choose      | explain       | compare      | hypothesize |
| recognize | discuss       | demonstrate | select        | decide       | substitute  |
| select    | distinguish   | discover    | categorize    | discriminate | write       |
| examine   | extend        | experiment  | connect       | recommend    | compile     |
| locate    | predict       | relate      | differentiate | summarize    | construct   |
| memorize  | associate     | show        | discriminate  | assess       | develop     |
| quote     | contrast      | sketch      | divide        | choose       | generalize  |
| recall    | convert       | complete    | order         | convince     | integrate   |
| reproduce | demonstrate   | construct   | point out     | defend       | modify      |
| tabulate  | estimate      | dramatize   | prioritize    | estimate     | organize    |
| tell      | express       | interpret   | subdivide     | find errors  | prepare     |
| copy      | Identify      | Manipulate  | survey        | grade        | produce     |
| discover  | indicate      | Paint       | advertise     | measure      | rearrange   |
| duplicate | Infer         | Prepare     | appraise      | predict      | rewrite     |
| enumerate | relate        | produce     | Break down    | rank         | role-play   |

## **2. SEMESTER END EVALUATION(SEE):**

- 21** The maximum marks for Semester End Examinations shall be normally 60 and the duration of the examination shall be 3 hours.
- 22** Semester End Examinations shall be conducted in theory and practical paper at the end of every semester, unless otherwise stated, I, II, III, & IV Semesters.
- 23** The date of Semester End Examinations is fixed by the principal in consultation with the Head of the Departments and the Controller of Examinations.
- 24** For Semester End Examinations, the question papers of part-A and B shall be set by External Paper-setter and the answer scripts shall be valued by the External Examiner.

### **25 Evaluation**

#### I Semester Marks

1. Four theory papers 4X100 = 400
2. Programming and problem solving using Python lab=100
3. Data Structures Lab =100

#### II Semester Marks

1. Five theory papers 5X100 = 500
2. Unix Operating System Lab = 100
3. Database Management Systems Lab = 100

#### III Semester Marks

1. Five theory papers 5X100 = 500
2. Compiler design Lab = 100
3. Computer Networks Lab = 100

#### IV Semester Marks

1. Four Theory 4X100 = 400
2. Practical Lab = 100
3. Project work = 200

Grand total Marks = 600+700+700+700= 2700

1. Open Elective / Non-core I of student choice from other departments 100M
2. Open Elective / Non-core II of student choice from other departments 100M

Note: Open Elective/Non-core 200 marks will not be considered for division / percentage. The total marks will be 2500 only.

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## **Department of Computer Science**

### **List of Question paper setters and examiners**

1. Dr.Y.K.Sundara Krishna(Krishna University Machilipatnam)
2. Dr.M. Babu Reddy (Krishna University Machilipatnam)
3. Dr. Vijaya lakshmi (Krishna University Machilipatnam)
4. Mr. A.S.A.L.G.G. Gupta (KL Deemed to be University, Vaddeswaram)
5. Mr. V. Uday Kumar (KL Deemed to be University, Vaddeswaram)
6. Dr. P. Bharathi Devi(SKBRGDC, Macherla)
7. Smt. N. Swarna Jyothi (V.S.R Government Degree College, Movva)
8. Smt. Lavanya A L ( GDC ,Kanchikacherla)
9. Mr. T. Jaya Krishna(YVNR Government Degree College, Kaikaluru)
10. Dr. K.B.S Sastry (Andhra Loyola College Vijayawada)
11. Dr.B.V.Subba Rao(P.V.P Siddartha Engineering college ,Vijayawada)
12. Dr. T.S.Ravi Kiran (P.B.Siddartha College Vijayawada)

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## Department of Computer Science Activities Calendar

| Details                                      | Date                            |
|--|---------------------------------|
| Commencement of Class Works for I Semester   | 27/01/2021                      |
| I Internal Examinations                      | 04/03/2021 to 06/03/2021        |
| II Internal Examinations                     | 15/04/2021 to 17/04/2021        |
| Closure of Instruction                       | 15/05/2021                      |
| Practical Examinations                       | 21/05/2021 to 22/05/2021        |
| End Semester –I Examinations                 | 27/05/2021 to 02/06/2021        |
| <b>Semester Break</b>                        | <b>03/06/2021 to 08/06/2021</b> |
| Commencement of Class Works for II Semester  | 09/06/2021                      |
| I Internal Examinations                      | 15/07/2021 to 17/07/2021        |
| II Internal Examinations                     | 26/08/2021 to 28/08/2021        |
| Closure of Instruction                       | 21/09/2021                      |
| Practical Examinations                       | 24/09/2021 to 25/09/2021        |
| End Semester –II Examinations                | 30/09/2021 to 08/10/2021        |
| Semester Break                               | 09/10/2021 to 19/10/2021        |
| Commencement of Class Works for III Semester | 20/10/2021                      |
| I Internal Examinations                      | 26/11/2021 to 30/11/2021        |
| II Internal Examinations                     | 05/01/2022 to 07/1/2022         |
| Closure of Instruction                       | 25/02/2022                      |
| Practical Examinations                       | 28/02/2022 to 04/03/2022        |
| End Semester –III Examinations               | 07/03/2022 to 11/03/2022        |
| Semester Break                               | 12/03/2022 to 20/03/2022        |
| Commencement of Class Works for IV Semester  | 21/03/2022                      |
| I Internal Examinations                      | 04/05/2022 to 06/05/2022        |
| II Internal Examinations                     | 16/06/2022 to 18/06/2022        |
| Closure of Instruction                       | 23/07/2022                      |
| Practical Examinations                       | 26/07/2022 to 30/07/2022        |
| End Semester –IV Examinations                | 04/08/2022 to 10/18/2022        |

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## Department of Computer Science

### Detailed Course Syllabus for Semester -III

#### 1601: M.Sc (Computer Science)

| Course Code                            | Title of the Course   | Instruction Hours per week |   |   | Credits   | Evaluation |            |             |
|--|---|----------------------------|---|---|-----------|------------|------------|-------------|
|  |   | L                          | T | P |           | CIA MARKS  | SEE        |             |
|  |   |                            |   |   |           |            | MARKS      | DURATION    |
| <b>SEMESTER – III</b>                  |   |                            |   |   |           |            |            |             |
| PMCS301                                | Compiler Design   | 4                          | - | - | 4         | 40         | 60         | 4 Hrs.      |
| PMCS302                                | Computer Networks   | 4                          | - | - | 4         | 40         | 60         | 4 Hrs.      |
| PMCS303                                | Principles of Programming Language  | 4                          | - | - | 4         | 40         | 60         | 4 Hrs.      |
| PMCS 304                               | Artificial Intelligence   | 4                          | - | - | 4         | 40         | 60         | 4 Hrs.      |
| POMCS305.1<br>POMCS305.2<br>POMCS305.3 | Open Elective-II<br>Introduction to data science with R<br>Python3 programming<br>C programming | 4                          | - | - | 4         | 40         | 60         | 4 Hrs.      |
| PMCS306                                | Compiler Design Lab   | -                          | - | 8 | 4         | 40         | 60         | 8 Hrs.      |
| PMCS307                                | Computer Networks Lab   | -                          | - | 8 | 4         | 40         | 60         | 8 Hrs       |
| <b>Total</b>                           |   |                            |   |   | <b>28</b> | <b>280</b> | <b>420</b> | 36 hrs/week |

### List of courses offered as Open Electives II

COURSE CODE: POMCS305 (to be taken by another department students)

POMCS305.1. Introduction to Data Science With R

POMCS305.2. Python3 programming

POMCS305.3. C programming

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**Department of Computer Science**

**Revised syllabus 2021-2022**

**PMCS301: COMPILER DESIGN**

**COURSE OBJECTIVES**

- Learn the fundamentals of compiling.
- To understand the lexical analysis and syntax analysis.
- Design syntax direct translation.
- To understand the runtime environment.
- Introduce concepts in code generation and code optimisation.

**COURSE OUTCOMES:**

After successful completion of the course, student will be able to:

- An ability to design top down parser and bottom of parser.
- An ability to construct SDT.
- Identify the code generation and optimisation.

**Detailed Syllabus**

|                |  |
|----------------|--|
| <b>Unit-I</b>  | <b>Introduction to Compiling:</b> Compilers, Analysis of the source program, The phases of a compiler, Cousins of the compiler, The grouping of phases, Compiler-construction tools A Simple One-Pass Compiler: Overview, Syntax definition, Syntax-directed translation, Parsing, A translator for simple expressions, Lexical analysis, Incorporating a symbol table, Abstract stack machines, Putting the techniques together<br><b>Lexical Analysis:</b> The role of the lexical analyzer, Input buffering, Specification of tokens, Recognition of tokens, A language for specifying lexical analyzers, Finite automata, From a regular expression to an NFA, Design of a lexical analyzer generator, Optimization of DFA-based pattern matchers. |
| <b>Unit-II</b> | <b>Syntax Analysis:</b> The role of the parser, Context-free grammars, Writing a grammar, Top-down parsing, Bottomup parsing, Operator-precedence parsing, LR parsers, Using ambiguous grammars, Parser generators<br><b>Syntax-Directed Translation:</b> Syntax-directed definitions, Construction of syntax trees, Bottom-up evaluation of S-attributed definitions, L-attributed definitions, Top-down translation, Bottom-up evaluation of inherited attributes, Recursive evaluators, Space for attribute values at compile time, Assigning space at compile time, Analysis of syntax-directed definitions.   |

|                 |   |
|-----------------|---|
| <b>Unit-III</b> | <b>Type Checking:</b> Type systems, Specification of a simple type checker, Equivalence of type expressions, Type conversions, Overloading of functions and operators, Polymorphic functions, An algorithm for unification Run-Time Environments: Source language issues, Storage organization, Storage-allocation strategies, Access to nonlocal names, parameter passing, Symbol tables, Language facilities for dynamic storage allocation, Dynamic storage allocation techniques, Storage allocation in Fortran.  |
| <b>Unit-IV</b>  | <b>Intermediate Code Generation:</b> Intermediate languages, Declarations, Assignment statements, Boolean expressions, Case statements, Back Patching, Procedure calls<br><b>Code generation:</b> Issues in the design of a code generator, The target machine, Run-time storage management, Basic blocks and flow graphs, Next-use information, A Simple code generator, Register allocation and assignment, The dag representation of basic blocks, Peephole optimization, Generating code from dags, Dynamic programming code-generation algorithm, Code-generator generators. |
| <b>Unit-V</b>   | <b>Code Optimization:</b> Introduction, The Principal sources of optimization, Optimization of basic blocks, Loops in flow graphs, Introduction to global data-flow analysis, Iterative solution of data-flow equations, Codeimproving transformations, Dealing with aliases, Data-flow analysis of structured flow graphs, Efficient data-flow algorithms, A tool for data-flow analysis, Estimation of types, Symbolic debugging of optimized code.   |

### Text Books

- Alfred V. Aho, Ravi Sethi, Jeffrey D. Ullman - Compilers – Principles, Techniques and Tools - Pearson Education

### Reference Books

1. J.P. Bannett - Introduction to Compiling techniques - McGraw Hill
2. Tremblay & Sorenson - Compiler Writing - McGraw Hill
3. Dhamdhere - Compiler Construction - MacMilan

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**Machavaram, Vijayawada, Krishna District, AP-520 004**

**MSC (Computer Science) Semester: III**

**PMC301: COMPILER DESIGN**

**(w.e.f admitted batch 2020-21)**

**Time: 3 Hours**

**Max. Marks: 60**

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## **SECTION - A**

**Answer ANY FIVE question**

**5 X 4 = 20 Marks**

1. What are the different types of Language Processors?
2. What happens in Analysis and Synthesis phases of compilation?
3. Define an ambiguous grammar?
4. What is three-address code? Give an example?
5. What is syntax-directed definition?
6. Advantages of Parser.
7. What does heap and stack areas of run-time memory store?
8. What is CISC machine?
9. What is Code generation?
10. Define Dead code elimination.

## **SECTION - B**

**Answer All Questions**

**5 X 8 = 40 Marks**

### **UNIT – I**

11. a) Explain the Structure of a Compiler. .

(OR)

- b) Explain Applications of Compiler Technology.

### **UNIT – II**

12. a) Explain the role of the Lexical Analyzer.

(OR)

- b) Explain the role of the Parser

### **UNIT – III**

- 13.a) Explain Applications of Syntax-Directed Translation.

(OR)

- b) Discuss about Type checking

### **UNIT – IV**

14. a) What are the limitations of Access Links? How displays solve those issues?

(OR)

- b) Generate code for the following three-address statements assuming stack allocation, where register SP points to the top of the stack. call p call q return call r return return

### **UNIT – V**

15. a) Discuss Issues in the Design of a Code Generator.

(OR)

- b) Discuss about copy propagation and dead code elimination.

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**Revised syllabus 2021-2022**

**PMCS301: COMPILER DESIGN QUESTION BANK**

**UNIT-I**

1. What is Compiler? Design the Analysis and Synthesis Model of Compiler.
2. Write down the five properties of compiler.
3. What is translator? Write down the steps to execute a program.
4. Discuss all the phases of compiler with a with a diagram.
5. Write a short note on:
  - a. YACC
  - b. Pass
  - c. Bootstrapping
  - d. LEX Compiler
  - e. Tokens, Patterns and Lexemes

6. Write the steps to convert Non-Deterministic Finite Automata (NFA) into Deterministic Finite Automata (DFA).

7. Let  $M = (\{q_0, q_1\}, \{0, 1\}, \delta, q_0, \{q_1\})$ . Be NFA where

$$\delta(q_0, 0) = \{q_0, q_1\}, \delta(q_1, 1) = \{q_1\}$$

$$\delta(q_1, 0) = \emptyset, \delta(q_1, 1) = \{q_0, q_1\}$$

Construct its equivalent DFA.

8. Convert the given NFA to DFA:

| Input/State      | 0                       | 1  |
|------------------|-------------------------|----|
| $\rightarrow$ q0 | {q0, q1}                | q0 |
| q1               | q2                      | q1 |
| q2               | q3                      | q3 |
| q3 (final state) | $\phi$ (null character) | q2 |

9. What is Regular Expression? Write the regular expression for:
  - a.  $R = R_1 + R_2$  (Union operation)
  - b.  $R = R_1.R_2$  (concatenation Operation)
  - c.  $R = R_1^*$  (Kleen Clouser)
  - d.  $R = R^+$  (Positive Clouser)
  - e. Write a regular expression for a language containing strings which end with “abb” over  $\Sigma = \{a, b\}$ .
  - f. Construct a regular expression for the language containing all strings having any number of a’s and b’s except the null string.
10. Construct Deterministic Finite Automata to accept the regular expression:  $(0+1)^* (00+11) (0+1)^*$
11. Derivation and Parse Tree:
  - a. Let G be a Context Free Grammar for which the production Rules are given below:
 

$S \rightarrow aB|bA$

$A \rightarrow a|aS|bAA$

$B \rightarrow b|bS|aBB$

Derive the string *aaabbabbba* using the above grammar (using Left Most Derivation and Right most Derivation).

## UNIT 2

1. Explain the parsing techniques with a hierarchical diagram.
2. What are the problems associated with Top Down Parsing?
3. Write the production rules to eliminate the left recursion and left factoring problems.
4. Consider the following Grammar:

$A \rightarrow ABd|Aa|a$

$B \rightarrow Be|b$

Remove left recursion.

5. Do left factoring in the following grammar:

$A \rightarrow aAB|aA|a$

$B \rightarrow bB|b$

6. Write a short note on:
  - a. Ambiguity (with example)
  - b. Recursive Descent Parser
  - c. Predictive LL(1) parser (working)
  - d. Handle pruning
  - e. Operator Precedence Parser
7. Write Rules to construct FIRST Function and FOLLOW Function.
8. Consider Grammar:

$E \rightarrow E+T|T$

$T \rightarrow T*F|F$

$F \rightarrow (E)|id$

9. Write the algorithm to create Predictive parsing table with the scanning of input string.

10. Show the following Grammar:

$S \rightarrow AaAb|BbBa$

$A \rightarrow \epsilon \quad B \rightarrow \epsilon$

Is LL(1) and parse the input string "ba".

11. Consider the grammar:

$E \rightarrow E+E$

$E \rightarrow E*E$

$E \rightarrow id$

Perform shift reduce parsing of the input string "id1+id2+id3".

12. Write the properties of LR parser with its structure. Also explain the techniques of LR parser.

13. Write a short note on:

- a. Augmented grammar
- b. Kernel items
- c. Rules of closure operation and goto operation
- d. Rules to construct the LR(0) items

14. Consider the following grammar:

$S \rightarrow Aa|bAc|Bc|bBa$

$A \rightarrow d \quad B \rightarrow d$

Compute closure and goto.

15. Write the rules to construct the SLR parsing table.

16. Consider the following grammar:

$E \rightarrow E+T|T$

$T \rightarrow TF|F$

$F \rightarrow F^*|a|b$

Construct the SLR parsing table and also parse the input "a\*b+a"

17. Write the rules to construct the LR(1) items.

18. What is LALR parser? Construct the set of LR(1) items for this grammar:

$S \rightarrow CC$

$C \rightarrow aC \quad C \rightarrow d$

19. Show the following grammar

$S \rightarrow Aa|bAc|Bc|bBa$

$A \rightarrow d \quad B \rightarrow d$

Is LR(1) but not LALR(1).

20. Write the comparison among SLR Parser, LALR parser and Canonical LR Parser.

### UNIT 3

1. What is syntax directed translation (SDD)?

2. Write short note on:

- Synthesized attributes
- Inherited attributes
- Dependency graph
- Evaluation order
- Directed Acyclic Graph (DAG)

3. Draw the syntax tree and DAG for the following expression:  $(a*b)+(c-d)*(a*b)+b$

4. Differentiate between synthesized translation and inherited translation.

5. What is intermediate code and write the two benefits of intermediate code generation.

6. Write the short note on:

- Abstract syntax tree
- Polish notation
- Three address code
- Backpatching

7. Construct syntax tree and postfix notation for the following expression:

$(a+(b*c)^d-e)/(f+g)$

8. Write quadruples, triples and indirect triples for the expression:

$-(a*b)+(c+d)-(a+b+c+d)$

9. Write the three address statement with example for:

- Assignment
- Unconditional jump (goto)
- Array statement (2D and 3D)

- d. Boolean expression
- e. If-then-else statement
- f. While, do-while statement
- g. Switch case statement

#### **UNIT 4**

1. Write the definition of symbol table and procedure to store the names in symbol table.
2. What are the data structures used in symbol table?
3. What are the limitations of stack allocation?
4. Write two important points about heap management.
5. Write the comparison among Static allocation, Stack allocation and Heap Allocation with their merits and limitations.
6. What is activation record? Write the various fields of Activation Record.
7. What are the functions of error handler?
8. Write a short note on Error Detection and Recovery.
9. Classify the errors and discuss the errors in each phase of Compiler.

#### **UNIT 5**

1. What are the properties of code generation phase? Also explain the Design Issues of this phase.
2. What are basic blocks? Write the algorithm for partitioning into Blocks.
3. Write a short note on:
  - a. Flow graph (with example)
  - b. Dominators
  - c. Natural loops
  - d. Inner loops
  - e. Reducible flow graphs
4. Consider the following program code:

```
Prod=0;
I=1;
Do{ Prod=prod+a[i]*b[i]; I=i+1;
}while (i<=10);
```

  - a. Partition in into blocks
  - b. Construct the flow graph
5. What is code optimization? Explain machine dependent and independent code optimization.
6. What is common sub-expression and how to eliminate it? Explain with example.
7. Write a short note with example to optimize the code:
  - a. Dead code elimination
  - b. Variable elimination
  - c. Code motion
  - d. Reduction in strength
8. What is control and data flow analysis? Explain with example.

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**Machavaram, Vijayawada, Krishna District, AP-520 004**

**Department of Computer Science**

**Revised syllabus 2021-2022**

**MCS 302: COMPUTER NETWORKS**

**COURSE OBJECTIVES**

- Build an understanding of the fundamental concepts of data communication and computer networking.
- Understand how errors detected and corrected that occur in transmission
- How collisions to be handled when many stations share a single channel
- Know about routing mechanisms and different routing protocols
- Understand transport layer functions
- Know about different application layer protocols

**COURSE OUTCOMES**

Upon Completion of the course, the students should be able to:

- Describe the general principles of data communication.
- Describe how computer networks are organized with the concept of layered approach.
- Describe how signals are used to transfer data between nodes.
- Implement a simple LAN with hubs, bridges and switches.
- Describe how packets in the Internet are delivered.
- Analyze the contents in a given data link layer packet, based on the layer concept.
- Design logical sub-address blocks with a given address block.
- Decide routing entries given a simple example of network topology
- Describe what classless addressing scheme is.
- Describe how routing protocols work.
- Use C programming language to implement network programs.

|                      |  |
|----------------------|--|
| <p><b>Unit 1</b></p> | <p><b>Uses of Computer Networks:</b> Business Application, Home Applications, Mobile Users - Social Issues. Network Hardware : Local Area Networks - Metropolitan Area Networks - Wide Area Networks - Wireless Networks - Home Networks – Internetworks-<b>Network Topologies.</b> Network Software: Protocol Hierarchies — Design Issues for the Layers - Connection Oriented and Connectionless Services - Service Primitives -The relationship of Services to Protocols.</p> <p><b>Reference Models:</b> The OSI ReferenceModel - The TCP/IP Reference Model - A Comparison of OSI and TCP/IP reference Model.</p> <p><b>Physical Layer:</b> Guided Transmission Media: Magnetic Media — Twisted Pair — Coaxial Cable — Fiber Optics</p> <p><b>Data Link Layer:</b> Data Link Layer Design Issues: Services Provided to the Network Layer — Framing — Error Control — Flow Control. Error Detection and Correction: Error correcting Codes — Error Detecting Codes.</p> <p><b>Elementary Data Link Protocols :</b> An unrestricted Simplex Protocol — A simplex Stop and wait Protocol — A simplex Protocol for a Noisy channel. Sliding Window Protocols: A one-bit sliding Window Protocol — A Protocol using Go Back N —A Protocol using selective Repeat. Example Data Link Protocols: HDLC — The Data Link Layer in the Internet.</p> |
| <p><b>Unit 2</b></p> | <p><b>The Medium Access Control Sublayer:</b> Ethernet : Ethernet Cabling-Manchester Encoding — The Ethernet MAC sublayer Protocol - The Binary Exponential Backoff Algorithm - Ethernet Performance - Switched Ethernet - Fast Ethernet - Gigabit Ethernet - IEEE 802.2: Logical Link Control - Retrospective on Ethernet. Wireless Lans: The 802.11 Protocol Stack - The 802.11 Physical Layer – The 802.11 MAC sublayer Protocol - The 802.11 Frame Structure. <b>Bluetooth:</b> Bluetooth Architecture-Bluetooth Applications-The Bluetooth Protocol Stack -The Bluetooth Radio Layer – The Bluetooth Baseband Layer -The Bluetooth L2CAP layer - The Bluetooth Frame Structure. <b>Data Link Layer Switching:</b> Bridges from 802.x to 802.y - Local Internetworking - Spanning Tree Bridges - Remote Bridges - Repeaters, Hubs, Bridges, Switches, Routers and Gateways - Virtual LANs</p>  |

|               |   |
|---------------|---|
| <b>Unit 3</b> | <p><b>The Network Layer:</b> Network Layer Design Issues : Store and Forward Packet Switching -Services Provided to the Transport Layer - Implementation of Connectionless Services -Implementation of Connection Oriented Services - Comparison of Virtual Circuit and Datagram subnets. Routing Algorithms : The Optimality Principle — Shortest Path Routing — Flooding — Distance Vector Routing — Link State Routing - Hierarchical Routing — Broadcast Routing — Multicast Routing — Routing for Mobile Hosts. Internetworking : How Networks Differ — How Networks can be connected — Concatenated Virtual Circuits — Connectionless Internetworking — Tunneling — Internet work Routing — Fragmentation. The Network Layer in the Internet: The IP Protocol — IP address — Internet Control Protocols — OSPF — The Internet Gateway Routing Protocol — BGP — The Exterior Gateway Routing Protocol.</p> |
| <b>Unit 4</b> | <p><b>The Transport Layer:</b> The Transport Service: Services provided to the Upper Layers — Transport Services Primitives — Berkeley Sockets. Elements of Transport Protocols : Addressing — Connection Establishment — Connection Release — Flow Control and Buffering — Multiplexing — Crash Recovery. TheInternet Transport Protocols :<b>UDP</b>:Introduction to UDP — Remote Procedure Call — The Real Time Transport Protocol. The Internet Transport Protocols: TCP Introduction to TCP — The TCPService Model — the TCP Protocol — The TCP segment header — TCP connection establishment — TCP connection release — Modeling TCP connection management- TCP Transmission Policy — TCP congestion Control — TCP Timer Management — Wireless TCP and UDP — Transactional TCP.</p>   |
| <b>Unit 5</b> | <p><b>The Application Layer:</b> DNS : The Domain Name System : The DNS Name Space — Resource Records — Name Servers. Electronic Mail : Architecture and Services — The User Agent — Message Formats — Message Transfer — Final Delivery. The World Wide Web: Architecture Overview — Static Web Documents — Dynamic Web Documents – HTTP-- The Hyper Text Transfer Protocol — Performance Enhancements The Wireless Web. Multimedia: Introduction to Digital Audio — Audio Compression — Streaming Audio Internet Radio — Voice Over IP —Introduction to Video — Video Compression — Video on Demand.</p>  |

### Text books

|   | Author             | Title              | Publisher |
|---|--------------------|--------------------|-----------|
| 1 | Andrew S.Tanenbaum | Computer Networks. | PHI       |

### Reference books

|   | Author                                  | Title  | Publisher                                     |
|---|---|--|---|
| 1 | James F. Kurose,<br>Keith W.Ross        | Computer Networking                                    | 3 <sup>rd</sup> edition, Pearson<br>Education |
| 2 | Michael A. Gallo,<br>William M. Hancock | Computer Communications and<br>Networking Technologies | Cengage Learning (2008)                       |
| 3 | Behrouz A Ferouzan                      | Data Communications and<br>Networking                  | 4 <sup>th</sup> edition, TMH (2007)           |

# **SRR & CVR Government Degree & PG College**

**Machavaram, Vijayawada, Krishna District, AP-520 004**

**MSC (Computer Science) Semester: III**

**PMCS302: COMPUTER NETWORKS**

**(w.e.f admitted batch 2020-21)**

**Time: 3 Hours**

**Max. Marks: 60**

## **SECTION - A**

**Answer ANY FIVE questions**

**5 X 4 = 20 Marks**

1. What are the different types of networks?
2. What is flow control?
3. What are the responsibilities of data link layer?
4. Discuss about bridge and router.
5. Advantages of Ethernet.
6. Define Bluetooth.
7. What is OSPF?
8. What is multiplexing?
9. Define Berkeley socket.
10. What is SMTP?

## **SECTION - B**

**Answer All Questions**

**5 X 8 = 40 Marks**

### **UNIT – I**

11. a) Discuss about OSI reference model.

(OR)

- b) Describe the guided transmission media.

### **UNIT – II**

12. a) Explain error correction and detection method with an example.

(OR)

- b) Explain IEEE 802.11 protocol stack and Frame structures

### **UNIT – III**

13. a) Explain Distance Vector Routing algorithm with example.

(OR)

- b) Discuss about IP protocol.

### **UNIT – IV**

14. a) Explain TCP protocol Header format.

(OR)

- b) Explain transport service primitives and TCP connection establishment.

### **UNIT – V**

15. a) Discuss about DNS.

(OR)

- b) Explain video compression and audio compression.

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**Department of Computer Science**

**Revised syllabus 2021-2022**

**PMCS302: COMPUTER NETWORK QUESTION BANK**

**Essay Questions**

1. Define the term “Computer Networks” and explain briefly various types of networks with their advantages and disadvantages? \*
2. various Uses of Networks are as follows \*
  - a. Business Applications
  - b) Home Applications
  - c) Mobile Users
3. What is Topology? Explain various types of topologies with neat sketch?
4. Explain how internet works with Connection less and Connection oriented Networks?
5. Briefly Explain OSI Reference Model with different layers? \*
6. Briefly Explain TCP/IP Reference Model? \*
7. Explain about simplex Stop and wait Protocol? \*
8. Explain about A one-bit sliding Window Protocol using Go Back N \*
9. Briefly Explain about the Binary Exponential Backoff Algorithm?
10. Write about the 802.11 MAC sublayer Protocol and Frame Structure?
11. Explain IEEE 802.11 protocol stack and Frame structures?
12. Briefly Explain about a) Blue Tooth Architecture and b) Blue Tooth Frame Structure
13. Explain Various Network Devices of Remote Bridges - Repeaters, Hubs, Bridges, Switches, Routers
14. Explain about Routing Algorithms of i) Shortest Path Routing and ii) Flooding?
15. Explain about Distance Vector Routing Algorithm with Example?
16. Briefly Explain about various IP protocols and IP Address?
17. Write about various services provided to the upper layer by the Transport Layer?
18. Briefly Explain TCP Service Model?
19. Explain about the Domain name System ?
20. Briefly explain about the Architecture and Services of the Electronic mail?

**Short Questions**

1. What are the different types of networks?
2. What is flow control?
3. What is Topology? Explain various topologies?
4. What are the responsibilities of data link layer?
5. Write about Error Correcting and Error Detecting Codes?
6. Discuss about bridge and router?
7. Advantages of Ethernet?
8. Define Bluetooth?
9. What is OSPF?
10. What is multiplexing?
11. Define Berkeley socket?
12. What is SMTP?

**SRR & CVR Government Degree & PG College**  
**Machavaram, Vijayawada, Krishna District, AP-520 004**  
**Department of Computer Science**

**Revised syllabus 2021-2022**

**PMCS303: PRINCIPLES OF PROGRAMMING LANGUAGE**

**COURSE OBJECTIVES**

The following are the official course goals agreed upon by the faculty for this course:

- Knowledge of, and ability to use, language features used in current programming languages.
- An ability to program in different language paradigms and evaluate their relative benefits.
- An understanding of the key concepts in the implementation of common features of programming languages.

**COURSE OUTCOMES**

Upon Completion of the course, the students should be able to:

- Manipulate and generate lambda-terms, extending a system such as Church numerals; check and assign types to lambda terms.
- Solve simple recursive equations by determining the limit of the Kleene fix point construction.
- Design and extend operational and denotational definitions for basic programming language constructs.
- Prove properties of programs by various formal means, including structural and fix point induction.
- Demonstrate correspondences between grammars, languages and automata.
- Use standard parser and lexer generator tools to construct and implement translations such as a very simple compiler.

## Details of the Syllabus

|               |  |
|---------------|--|
| <b>Unit 1</b> | <p><b>Introduction :</b> What is a programming language, Abstractions in programming languages, Computational paradigms, Language definition, Language translation, Language design.</p> <p><b>History:</b> The first programmer, The 1950s : The first programming languages, The 1960s : An explosion in programming languages, The 1970s : Simplicity, abstraction, study, The 1980s : New directions and the rise of object –orientation, The 1990s : Consolidation, The Internet, libraries and scripting, The future.</p> <p><b>Language Design Principles:</b> History and design criteria, Efficiency, regularity, Further language design principles, C++ : A Case study in language design.</p> <p><b>Syntax :</b> Lexical structure of programming languages, Context-free grammars and BNFs, Parse trees and Abstract syntax trees, Ambiguity, Associativity and precedence, EBNFs and syntax diagrams, Parsing techniques and tools, Lexical vs Syntax vs Semantics</p> |
| <b>Unit 2</b> | <p><b>Basic Semantics:</b> Attributes, binding and semantic functions, Declarations, blocks and scope, The symbol table, Name resolution and overloading, Allocation, Lifetimes and the environment, Variables and Constants, Aliases, Dangling references and garbage. <b>Data Types :</b> Data types and type information, Simple types, Type constructors, Type equivalence, Type Checking, Type conversion, Polymorphic type checking, Explicit polymorphism.</p>  |
| <b>Unit 3</b> | <p><b>Control – I:</b> Expressions and Statements: Expressions, Conditional Statements and Guards, Loops and Variation on “while”, The “goto” controversy, Exception handling. <b>Control – II :</b> Procedures and Environments : Procedure definition and activation, Procedure semantics, Parameter passing mechanisms, Procedure environments, activations and allocation, Dynamic memory management, Exception handling and environments.</p> <p><b>Abstract data types and Modules :</b> The algebraic specification of abstract data types, Abstract data type mechanisms and modules, Separate compilation in C, C++ name spaces and Java packages, Ada packages, Modules in ML, Modules in earlier languages, Problems with abstract data type mechanisms, The mathematics of abstract data types.</p>  |

|               |   |
|---------------|---|
| <b>Unit 4</b> | <p>objects, Classes and methods, Inheritance, Dynamic binding, C++, Small Talk, Design issues in object – oriented languages, Implementation issues in object – oriented languages. <b>Functional Programming:</b> Programs as functions, Functional programming in an imperative language, Scheme : A Dialect of LISP, ML : Functional programming with static typing, Delayed Evaluation, Haskell – A fully curried lazy language with overloading, The Mathematics of functional programming I : Recursive functions, The Mathematics of functional programming II : Lambda calculus.</p> <p><b>Logic Programming :</b> Logic and Logic programs, Horn clauses, Resolution and Unification, The language Prolog, Problems with logic programming, Extending logic programming : Constraint logic programming and Equational systems.</p> |
| <b>Unit 5</b> | <p><b>Formal Semantics:</b> A Sample small language, Operational semantics, Denotation semantics, Axiomatic semantics, Proofs of program corrections.</p> <p><b>Parallel programming :</b> Introduction to parallel processing, Parallel processing and programming languages, Threads, Semaphores, Monitors, Message passing, Parallelism in non-imperative languages.</p>   |

### Text books

|   | Author            | Title   | Publisher   |
|---|-------------------|---|---|
| 1 | Kenneth C. Louden | Programming Languages Principles and Practice | Second Edition, Cengage Learning(2008).<br>Chapters:1through 14 |

### Reference books

|   | Author                                  | Title   | Publisher                                |
|---|---|---|--|
| 1 | Terrence W. Pratt & Mervin V. Zelkowitz | Programming Languages Design and Implementation | Fourth Edition, Pearson Education (2008) |
| 2 | Robert W. Sebesta                       | Concepts of Programming Languages               | Pearson Education 2001                   |

# **SRR & CVR Government Degree & PG College**

**Machavaram, Vijayawada, Krishna District, AP-520 004**

**MSC (Computer Science) Semester: III**

**MCS 303: PRINCIPLES OF PROGRAMMING LANGUAGES**

**(w.e.f admitted batch 2020-21)**

**Time: 3 Hours**

**Max.**

**Marks: 60**

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## **SECTION - A**

**Answer ANY FIVE questions**

**5 X 4 = 20 Marks**

1. What is a programming language?
2. Define internet.
3. Explain Parse trees and Abstract syntax trees.
4. Difference between syntax and semantics.
5. What is overloading?
6. Explain explicit polymorphism.
7. Explain parameter passing mechanism.
8. What is Abstract data type?
9. Define Recursive function.
10. Define Threads.

## **SECTION - B**

**Answer All Questions**

**5 X 8 = 40 Marks**

### **UNIT – I**

- 1.a) Describe the structure of Context free grammars with an example.

(OR)

- b) Discuss criteria for design of programming languages.

### **UNIT – II**

- 2.a) Discuss in detail about function overloading and operator overloading with example.

(OR)

- b) Show the working procedure of the type checker for the expression in C  $a[i]+I$  in detail.

### **UNIT – III**

- 3.a) Discuss about handling of exceptions in Object Oriented programming languages.

(OR)

- b) Write about the modules of abstract data type.

### **UNIT – IV**

- 4.a) How to create classes and objects in Java? Explain with suitable examples.

(OR)

- b) Discuss the problems of Logic programming with suitable examples.

### **UNIT – V**

- 5.a) Explain in detail about Bounded Buffer Problem.

(OR)

- b) Compare and Contrast shared and Distributed memory system

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**Machavaram, Vijayawada, Krishna District, AP-520 004**  
**Department of Computer Science**

**Revised syllabus 2021-2022**

**PMCS303: PRINCIPLES OF PROGRAMMING LANGUAGE**

**Question Bank**

Essay Questions

1. Explain the Evolution of the Programming languages?
2. Describe the structure of Context free grammars with an example?.
3. Explain about the lexical Structure of Programming Languages?
4. Discuss criteria for design of programming languages.?
5. Discuss in detail about function overloading and operator overloading with example.
6. Explain about attributes, Semantic Functions and Declarations of Symantics?
7. Show the working procedure of the type checker for the expression in C  $a[i]+I$  in detail.
8. Explain about various Data types with examples supported in various languages?
9. Explain the following
  - a. Type Constructor.
  - b. Type equivalence.
  - c. Type Checking
10. Explain about various conditional statements in OOPS?
11. Discuss about handling of exceptions in Object Oriented programming languages.
12. Write about the modules of abstract data type.
13. How to create classes and objects in Java? Explain with suitable examples.
14. Discuss the problems of Logic programming with suitable examples.
15. Explain about the concept of inheritance in OOPS with example?
16. Discuss the Recursive functions with suitable example?
17. Explain in detail about Bounded Buffer Problem.
18. Compare and Contrast shared and Distributed memory system
19. Explain about Logic and Logic Programming with their limitations?
20. Write about Constraint a logic programming and equation system

Short Answer questions

1. What is a programming langugae?
2. Define internet.
3. Explain Parse trees and Abstract syntax trees.
4. Difference between syntax and semantics.
5. What is overloading?
6. Explain explicit polymorphism.
7. Explain parameter passing mechanism.
8. What is Abstract data type?
9. Define Recursive function.
10. Define Threads.

# **SRR & CVR Government Degree & PG College**

**Machavaram, Vijayawada, Krishna District, AP-520 004**

## **Department of Computer Science**

### **Revised syllabus 2021-2022**

#### **PMCS304: ARTIFICIAL INTELLIGENCE**

#### **COURSE OBJECTIVES**

- To have a basic proficiency in a traditional AI language including an ability to write simple to intermediate programs and an ability to understand code written in that language.
- To have an understanding of the Representations and Mappings.
- To learn the reasoning and implementation issues.
- To understand the Planning Techniques.

#### **Course Outcomes:**

After successful completion of the course, student will be able to:

- Demonstrate fundamental understanding of the history of artificial intelligence (AI) and its foundations.
- Apply basic principles of AI in solutions that require problem solving, inference, perception, knowledge representation, and learning.

#### **Details of the Syllabus**

|               |   |
|---------------|---|
| <b>Unit 1</b> | <b>What is AI?</b> : The AI Problems, The Underlying Assumption, What is AI Technique?, The level of the Model, Criteria for Success. Problems, Problem spaces & Search: Defining the Problem as a State Space Search, Production Systems, Problem Characteristics, Production System Characteristics.  |
| <b>Unit 2</b> | Knowledge Representation Issues: Representations and Mappings, Approaches to Knowledge Representation, Issues in Knowledge Representation, The Frame Problem Using Predicate Logic: Representing Simple Facts in Logic, Representing Instance and Isa Relationships.  |
| <b>Unit 3</b> | Symbolic Reasoning under Uncertainty: Introduction to Non monotonic Reasoning, Logics for Non monotonic Reasoning, Implementation Issues, Augmenting a Problem Solver, Implementation: Depth-First Search, Implementation: Breadth-First Search Weak slot & filler Structures: Semantic Nets, Frames.   |
| <b>Unit 4</b> | Planning : Overview, An Example Domain : The Blocks World, Components of a Planning System, Goal Stack Planning, Non-linear Planning Using Constraint Posting, Hierarchical Planning, Reactive Systems, Other Planning Techniques Natural Language Processing: Introduction, Syntactic Processing, Semantic Analysis, Discourse and Pragmatic Processing. |
| <b>Unit 5</b> | Common-sense: Qualitative Physics, Common-sense Ontologies, Memory Organisation, Case Based Reasoning Expert Systems: Representing and Using  |

|  |   |
|--|---|
|  | Domain Knowledge, Expert System Shells, Explanation, Knowledge Acquisition. |
|--|---|

**Text Books**

Rich & Knight - Artificial Intelligence -TMH (1991)

**Reference books**

Winston. P.H - Winston. P.H Artificial Intelligence - Addison Wesley (1993)

# **SRR & CVR Government Degree & PG College**

**Machavaram, Vijayawada, Krishna District, AP-520 004**

**MSC (Computer Science) Semester: III  
MCS 304 ARTIFICIAL INTELLIGENCE  
(w.e.f admitted batch 2020-21)**

**Time: 3 Hours**

**Max. Marks: 60M**

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## **SECTION - A**

**Answer ANY FIVE question**

**5 X 4 = 20 Marks**

1. Define AI.
2. Define problem characteristics.
3. What is the mapping.
4. What are the issues in knowledge representation.
5. Define Non-Monotonic reasoning.
6. Discuss about the implementation issues.
7. What are components of a planning system.
8. What is a semantic analysis.
9. Define qualitative physics.
10. What is expert system shells.

## **SECTION - B**

**Answer All Questions**

**5 X 8 = 40 Marks**

### **UNIT – I**

11. a) What is AI technique and explain levels of the model.  
(OR)
11. b) Describe the problem spaces and search.

### **UNIT – II**

12. a) Explain the approach to knowledge representation.  
(OR)
- b) How to representing simple facts.

### **UNIT – III**

13. a) Explain the non monotonic reasoning.  
(OR)
- b) Explain the implementation of DFS.

### **UNIT – IV**

14. a) Explain the components of planning system.  
(OR)
- b) Explain the discourse and pragmatic processing.

### **UNIT –V**

15. a) Explain about the qualitative physics.  
(OR)
- b) Discuss about the representing domain knowledge.

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**Machavaram, Vijayawada, Krishna District, AP-520 004**

**MSC (Computer Science) Semester: III**

**PMCS 304 ARTIFICIAL INTELLIGENCE QUESTION BANK**

**(w.e.f admitted batch 2020-21)**

## **UNIT-1**

1. What is A.I technique.
2. Explain the levels of the Model.
3. Defining the problem as a state.
4. Explain the production characteristics.
5. Discuss about the problem characteristics.

## **UNIT -2**

1. Explain the knowledge Representation and mapping.
2. Explain the issues in knowledge representation.
3. Discuss about the representing simple facts in logic.
4. What is the representing instance and isa relationship.
5. What is the frame problem.

## **UNIT - 3**

1. Discuss about the implementation issues
2. Explain the Non monotonic reasoning
3. How to represent simple facts
4. Explain the D.F.S
5. Explain the B.F.S

## **UNIT - 4**

1. Explain about the components of planning system
2. Explain the Discourse and pragmatic system
3. What is the Hierarchical planning
4. Discuss about syntactic processing
5. What is the Reactive system

## **UNIT -5**

1. Explain about the Qualitative physics
2. Discuss about the representing Domain Knowledge
3. What is Except System Levels
4. Explain Memory organization
5. Explain the System shells

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**Machavaram, Vijayawada, Krishna District, AP-520 004**  
**Department of Computer Science**

**Revised syllabus 2021-2022**

**PMCS306: COMPILER DESIGN LAB**

(w.e.f admitted batch 2020-21)

**List of Programs**

1. Implementation of symbol table.
2. Develop a lexical analyzer to recognize a few patterns in c (ex. Identifiers, constants, comments, operators etc.)
3. Implementation of lexical analyzer using lex tool.
4. Generate yacc specification for a few syntactic categories.
  - a) Program to recognize a valid arithmetic expression that uses operator +, -, \* and /.
  - b) Program to recognize a valid variable which starts with a letter followed by any number of letter or digits.
  - c) Implementation of calculator using lex and yacc.
5. Convert the bnf rules into yacc form and write code to generate abstract syntax tree.
6. Implement type checking
7. Implement control flow analysis and data flow analysis.
8. Implement any one storage allocation strategies(heap, stack, static)
9. Construction of DAG
10. Implement the back end of the compiler which takes the three address code and produces the 8086 assembly language instructions that can be assembled and run using a 8086 assembler. The target assembly instructions can be simple move , add, sub, jump. Also simple addressing modes are used.
11. Implementation of simple code optimization techniques (constant folding. etc.)

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**Revised syllabus 2021-2022**

**PMCS307: COMPUTER NETWORKS LAB**  
**(w.e.f admitted batch 2020-21)**

**List of Programs:**

1. Write a program to implement data link layer framing method bit stuffing.
2. Write a program to implement data link layer framing method character stuffing.
3. Write a program to implement data link layer framing method character count.
4. Write a program to implement Cyclic Redundancy Check(CRC 12, CRC 16 and CRC CCIR) on a data set of characters.
5. Write a program to implement Dijkstra's algorithm to compute the shortest path through a graph.
6. Write a program to implement subnet graph with weights indicating delay between nodes. Now Obtain routing table at each node using distance vector routing algorithm.
7. Write a program to implement subnet of hosts to obtain Broadcasting
8. Write a program to implement by taking a 64 bit playing text and encrypt the same using DES algorithm.
9. Write a program to implement break DES coding.
10. Write a program to implement RSA algorithm to encrypt a text data and decrypt the same

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**Department of Computer Science**

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**OPEN ELECTIVE-II**

**POMCS305.1: INTRODUCTION TO DATA SCIENCE WITH R**  
**COURSE OBJECTIVE**

Data Science is a fast-growing interdisciplinary field, focusing on the analysis of data to extract knowledge and insight. This course will introduce students to the collection, preparation, analysis, modelling and visualization of data, covering both conceptual and practical issues. Examples and case studies from diverse fields will be presented, and hands-on use of statistical and data manipulation software will be included.

**COURSE OUTCOMES**

- Recognize the various disciplines that contribute to a successful data science effort.
- Understand the processes of data science: identifying the problem to be solved, data collection, preparation, modelling, evaluation and visualization.
- Be aware of the challenges that arise in data sciences.
- Develop an appreciation of the many techniques for data modelling and mining.
- Be cognizant of ethical issues in many data science tasks.
- Be comfortable using commercial and open source tools such as the R language and its associated libraries for data analytics and visualization.

**COURSE SYLLABUS**

**Unit-I**

Introduction to the field of data science, different types of data (Data Base data, data Warehouse data, Transaction Data, Stock Exchange Data, Time Series and Biological data); data collection.

**Unit-II**

Experimental design; data attributes; data cleaning; data characterization and analysis.

**Unit-III**

Data modelling and mining techniques; model evaluation; visualization; application of data science introducing to R – R Data structures – Help functions in R

**Unit-IV**

Vectors-Scalars-Declarations- recycling-Common Vector operations – Using all and any Vectorized operations-NA and NULL values – Filtering – Vectorized if- then else-Vector Equality – Vector Element names.

Creating matrices –Matrix operations-Applying Functions to Matrix Rows and Columns – Adding and deleting rows and columns.

## **Unit-V**

Vector /Matrix Distinction –Avoiding Dimension Reduction –Higher Dimensional arrays – lists- Creating lists – General list operations – Accessing list components and values – applying functions to lists –recursive lists. Creating Data Frames – Matrix –like operations in frames – Merging Data Frames – Applying function to Data frames.

## **References**

1. Nina Zumel, John Mount, “Practical Data Science with R”, Manning Publications, 2014. 2.Jure Leskovec, Anand Rajaraman, Jeffrey D.Ullman, “Mining of Massive Datasets”, Cambridge University Press, 2014.
2. Mark Gardener, “Beginning R - The Statistical Programming Language”, John Wiley & Sons, Inc., 2012.
3. W. N. Venables, D. M. Smith and the R Core Team, “An Introduction to R”, 2013. 5.Tony Ojeda, Sean Patrick Murphy, Benjamin Bengfort, Abhijit Dasgupta, “Practical Data Science Cookbook”, Packt Publishing Ltd., 2014.
4. Nathan Yau, “Visualize This: The FlowingData Guide to Design, Visualization, and Statistics”, Wiley, 2011.
5. Boris lublinsky, Kevin t. Smith, Alexey Yakubovich, “Professional Hadoop Solutions”, Wiley, ISBN: 9788126551071, 2015.

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**Revised syllabus 2021-2022**

**OPEN ELECTIVE-II**

**POMCS305.1: INTRODUCTION TO DATA SCIENCE WITH R**  
**MODEL PAPER**

**Time: 3hrs**

**Max Marks:60**

**SECTION-A**

**Answer Any FIVE of the following Questions**

**5 X 4= 20 marks**

1. Define data science and applications of data science?
2. Write short notes on data collection ?
3. Write about data attributes ?
4. Write about Help functions in R?
5. Briefly explain about R studio ?
6. How to declare Vector and Scalars in R?
7. Explain procedure to add and delete rows and columns in matrix ?
8. Explain difference between a Vector and Matrix in R?
9. Write short notes on recursive lists R?
10. Explain about merging of Data Frames in R?

**SECTION – B**

**Answer All the following questions**

**5 X 8=40M.**

11 a) Explain about different types of Databases in data Science?

OR

b) Explain about Data collection methods?

12.a) Explain about Data Cleaning methods ?

OR

b) Explain about Data Characterisation and Analysis ?

13.a) Explain about data structures in R language ?

OR

b) Explain about Data Modelling and Mining techniques in R ?

14.a). What is Vector and explain about common vector operations ?

OR

b) Explain about various functions applied on matrix rows and columns?

15. a) What is List? Explain about various operations on Lists?

OR

b) What is Data Frame ? Explain procedure to create Data Frame with example?

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**OPEN ELECTIVE-II**

**POMCS305.1: INTRODUCTION TO DATA SCIENCE WITH R**  
**QUESTION BANK**

**SHORT ANSWER QUESTIONS**

-

**4 MARKS**

1. Define data science and applications of data science?
2. Write short notes on data collection ?
3. Write about data attributes ?
4. Write about Help functions in R?
5. Briefly explain about R studio ?
6. How to declare Vector and Scalars in R?
7. Explain procedure to add and delete rows and columns in matrix ?
8. Write short notes on Filtering ?
9. Explain difference between a Vector and Matrix in R?
10. Write short notes on recursive lists R?
11. Explain about merging of Data Frames in R?
12. Explain about Recursive Lists?

**LONG ANSWER QUESTIONS**

**8 MARKS**

1. Explain about different types of Databases in data Science?
2. Explain about Data collection methods?
3. Explain about Data Cleaning methods ?
4. Explain about Data Characterisation and Analysis ?
5. Explain about data structures in R language ?
6. Explain about Data Modelling and Mining techniques in R ?
7. What is Vector and explain about common vector operations ?
8. Explain about various functions applied on matrix rows and columns?
9. What is List? Explain about various operations on Lists?
10. What is Data Frame ? Explain procedure to create Data Frame with example?

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**OPEN ELECTIVE-II**

**POMCS305.2: PYTHON3 PROGRAMMING**

**COURSE OBJECTIVES:**

- Describe the core syntax and semantics of Python programming language.
- Illustrate the process of structuring the data using lists, dictionaries, tuples, strings and sets.
- Discover the need for working with the functions, modules and packages.

**COURSE OUTCOMES:**

CO-1: To understand the basic concepts in Python programming.

CO-2: Learn how to write, debug and execute Python program using conditional and loops.

CO-3: Demonstrate proficiency in handling Strings.

Create, run and manipulate Python Programs using core data structures like Lists, Dictionaries.

CO-4: Use and apply the different libraries available in python

CO-5: Ability to develop basic user interfaces

**SYLLABUS**

| <b>Unit</b> | <b>Topic</b>   | <b>Number of Teaching Hours</b> |
|-------------|--|---------------------------------|
| Unit 1      | Introduction to Python: Downloading and installing Python, Displaying Output with the Print Function, Comments, Variables, Reading Input from the Keyboard, Performing Calculations, run a simple program on Python interpreter and IDLE. Python basic Operators, Understanding python blocks, Python Data Types. Type conversions, Expressions, More about Data Output. | 8                               |
| Unit 2      | Python Program Flow Control Conditional blocks: if, else and else if, Simple for loops in python, For loop using ranges, string, list and dictionaries. Use of while loops in python, Loop manipulation using pass, continue, break and else. Programming using Python conditional and loop blocks.  | 8                               |
| Unit 3      | Python Complex data types: Using string data type and string operations, Defining list and list slicing. String, List and Dictionary, String manipulation methods, List manipulation. Dictionary manipulation, Programming using string, list and dictionary in-built functions. Python Functions, Organizing python codes using functions.                              | 8                               |

|        |  |   |
|--------|--|---|
| Unit 4 | Python packages: Simple programs using the built-in functions of packages seaborn, numpy, pandas etc.  | 8 |
| Unit 5 | Installing and Exploring different python libraries used in Graphical User Interface designing (tkinter), Tkinter examples. Python programming with IDE. | 8 |

**Text Books:**

1. Reema Thareja ,”Python programming using problem solving approach “, Oxford university press.
2. Allen Downey,” Think Python: How to Think Like a Computer Scientist”, O’Reilly publications,2nd Edition.
3. Wesley J. Chun, “Core Python Applications Programming”, 3rd Edition , Pearson Education
4. Charles Dierbach, “Introduction to Computer Science using Python”, Wiley.

**Reference Books:**

1. Mark Lutz, Programming Python, O`Reilly, 4th Edition

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**OPEN ELECTIVE-II**

**POMCS305.2: PYTHON3 PROGRAMMING**  
**MODEL QUESTION PAPER**

**Time: 3Hours**

**Max.Marks: 60M**

**I. Answer any 5 questions**

**5x4=20Marks**

1. How to perform a user input in Python? Explain with example.
2. Write short notes on types of operators in python with appropriate example
3. Write a python program to check whether given year is leap year or not.
4. Write a python program to print first 10 even natural numbers.
5. What is String? How do u create a string in Python?
6. Write a few methods that are used in Python Lists.
7. Write a small python code to drop a row from dataframe labeled as 0.
8. Explain about set() function available under seaborn module.
9. What is the need of Tkinter module in python?
10. What is a Graphical user interface

**II. Answer Five Questions Choosing One Question from Each Unit.**

**All Questions Carry Equal Marks.**

**5x8=40Marks**

**UNIT-I**

1. a) Write a python program to print sum of first n natural numbers  
b) Write a python program to convert Celsius to Fahrenheit  
(OR)  
c) Write python program to swap two numbers without using temporary variable  
d) Write python program to find the average of 3 number.

**UNIT-II**

2. a) Write a program to print the quadrant in which the given coordinate point lie  
b) Write a python program to print the multiplication table  
(OR)  
c) Write a python program to check whether a given number is positive, negative or zero.  
d) Write a python program to check whether a given number is Armstrong or not

### **UNIT-III**

3.a) .What are the basic list operations that can be performed in Python? Explain each operation with its syntax and example

(OR)

b) What is Dictionary? Explain Python dictionaries in detail discussing its operations and methods.

### **UNIT-IV**

4.a) Explain about different categories of plot in Seaborn.

(OR)

b) Define the different ways a DataFrame can be created in pandas?

c) Define DataFrame in Pandas?

### **UNIT-V**

5.a) Explain about different tkinter widgets

(OR)

b) Explain how to organize Layouts And Widgets in a window

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**OPEN ELECTIVE-II**

**POMCS305.3: C- PROGRAMMING**

**COURSE LEARNING OBJECTIVES:**

This course is designed to provide complete knowledge of C-language and able to develop the logics which will help them to create programs, applications in C.

**COURSE LEARNING OUTCOME(S):**

From this course students will be learn to implement the algorithms and draw flow charts for solving mathematical problems and understanding the concepts of computer programming language.

**SYLLABUS**

**UNIT-I**

Overview of C- Constants – variables - Data types - operators and expressions. [Chapters 2, 3 & 4of the Text Book]

**UNIT-II**

Managing Input and output operations-Decision making–branching-decision making and looping. [Chapters 5, 6 & 7 of the Text Book]

**UNIT-III**

Arrays–one dimensional, two dimensional and multi dimensional-Handling of character strings [Chapters 8 & 9 of the Text Book]

**UNIT-IV**

Functions-user defined functions-.Pointers-Pointers and arrays–Pointers and functions. [Chapters10 & 11of the Text Book]

**UNIT-V**

Structure and Unions-file management in C [Chapter12and13ofthe Text Book]

**Prescribed Text Book:**

1. C Programming and Data Structures–E. Balaguruswamy, Second Edition, Tata McGraw-Hill Publishing Company (Weshouldverify4thedition).

**Reference Books:**

1. Fundamental of C Programming by E. Balaguruswamy
2. Programming in C by D. Ravichandran, 1998, New Age International.
3. C and Data Structures by Ashok N. Karthane, Pearson Education.

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## **Machavaram, Vijayawada, Krishna District, AP-520 004**

**MSC (Computer Science) Semester: III**

**Paper Title :C – LANGUAGE Code: POMCS305.3 Open Elective - II**  
**(w.e.f admitted batch 2021-22)**

**Time: 3 Hour**

**Max. Marks: 60**

### **SECTION - A**

**Answer ANY FIVE questions 5 X 4 = 20 Marks**

1. Define data?
2. List out various Header files?
3. Write about I/O functions in C?
4. What is ternary operator?
5. Differentiate between entry level and exit level statements?
6. Write a Program to find the Second largest of given 3 no.s?
7. Write a program using For statement?
8. Define Array? Explain with Matrix Addition?.
9. What Pointer?
10. Define Union?

### **SECTION - B**

**Answer All Questions**

**5 X 8 = 40 Marks**

#### **UNIT – I**

11. a) Discuss about the various data types available in C-Language.

(OR)

- b) Explain about Operators offered by C – Language?

#### **UNIT – II**

12. a) Explain about Control Statements with an example?

(OR)

- b) Explain about looping statements with Example.

#### **UNIT – III**

13. a) Define Array? Explain about Two Dimensional Array with an Example?

(OR)

- b) Explain about the various String Functions?

#### **UNIT – IV**

14. a) Define a Function list and explain various functions in detail?

(OR)

- b) What is Recursive function explain with an example?

#### **UNIT – V**

15. a) Explain about the Structures with example program?

(OR)

- b) Discuss about Files in C- Language?

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**OPEN ELECTIVE-II**

**POMCS305.3: C PROGRAMMING QUESTION BANK**

**Essay Questions**

1. Write about the Structure of C-language?
2. Discuss about the various data types available in C-Language.
3. Explain about Operators offered by C – Language?
4. Explain various I-O functions in C-Language?
5. Write about the procedure for Editing, Compiling, Saving and Executing a C-Program?
6. Explain about Control Statements with an example?
7. Explain about looping statements with Example.
8. Define Array? Explain about Two Dimensional Array with an Example?
9. Write a Program on Matrix Multiplication?
10. Explain about the various String Functions?
11. Define a Function? List and explain various functions in detail?
12. What is Recursive function explain with an example?
13. Explain about the Structures with example program?
14. Differentiate between Structures and Unions?
15. Discuss about Files in C- Language?

**Short Answer Questions**

1. Define Data and Data Type?
2. List out various Header files?
3. Write about I/O functions in C?
4. Write about Formatting Specifiers?
5. Explain about back slash codes?
6. What is ternary operator?
7. What is typecasting?
8. List out various errors in C-Language?
9. Write about the syntax of nested if loops?
10. Differentiate between entry level and exit level statements?
11. Define Array? Explain with Matrix Addition?.
12. Write about Recursive Function?
13. What is Pointer?
14. What is Structure?
15. Define Union?