# Appendix – A
## Teaching & Examination Scheme
## Bachelor of Science (Artificial Intelligence)
## Three Year (SIX SEMESTER) DEGREE COURSE
## BSc (AI) Part I (Semester I)

**BSc (AI) - I (Semester I)**

| Course code | Course Name | Teaching scheme | | | Credits | Examination Scheme | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Theory | | | | | Practical | | | |
| | | Th + Tu (Periods) | Pr. (Periods) | Total Periods | | Duration Hours | Max Marks Th. Papers | Max Marks IA | Total | Min Passing Marks | Duration Hours | Max Marks Practical | Min Passing Marks | Total (Th, Pr., IA) |
| 1AIT01 | English | 4 +1 | - | 4+1 | 5 | 3 | 60 | 15 | 75 | 30 | - | - | - | 75 |
| 1AIT02 | Marathi/Hindi/ Urdu/ Gujrati /Sanskrit/ Supp. Eng. | 3 | - | 3 | 3 | 3 | 60 | 15 | 75 | 30 | - | - | - | 75 |
| 1AIT03 | Programming in C++ | 4 | | 4 | 4 | 3 | 80 | 20 | 100 | 40 | - | - | - | 100 |
| 1AIT04 | Probability and Statistics | 4 | | 4 | 4 | 3 | 80 | 20 | 100 | 40 | - | - | - | 100 |
| 1AIT05 | Operating System | 4 | | 4 | 4 | 3 | 80 | 20 | 100 | 40 | - | - | - | 100 |
| 1AIP01 | Programming in C++ Lab | - | 2*1=2 | 2 | 2 | - | - | - | - | - | 6-8* | 50 | 20 | 50 |
| 1AIP02 | Probability and Statistics Lab | - | 2*1=2 | 2 | 2 | - | - | - | - | - | 6-8* | 50 | 20 | 50 |

Note:
1. Th = Theory; Pr = Practical; Tu = Tutorial; IA = Internal Assessment; @ = Tutorials wherever applicable; * = If required, for two days.
2. Minimum marks for passing will be 40% of the total marks allotted to that paper / practical.
3. Candidate has to pass theory papers and practical separately
- The strength of Batch of Practical and Tutorial for Under Graduates classes shall be 16 with an additional; of 10% with the permission of Hon'ble Vice-Chancellor.
- Details of Course of Languages shall be as per B.Sc. I

**Grand Total of Semester I: 400 + 150 each semester = TOTAL – 550 Marks per semester**
**Total Credits for Semester I : 24 Credits**

## B.Sc. (AI) Part I (Semester II)

| Course code | Course Name | Teaching scheme | | | Credits | Examination Scheme | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Theory | | | | | Practical | | | |
| | | Th + Tu (Periods) | Pr. (Periods) | Total Periods | | Duration Hours | Max Marks Th. Papers | Max Marks IA | Total | Min Passing Marks | Duration Hours | Max Marks Practical | Min Passing Marks | Total (Th, Pr., IA) |
| 2AIT01 | English | 4 +1 | - | 4+1 | 5 | 3 | 60 | 15 | 75 | 30 | - | - | - | 75 |
| 2AIT02 | Second Language Marathi/Hindi/ Urdu/ Gujrati /Sanskrit/ Supp. Eng. | 3 | - | 3 | 3 | 3 | 60 | 15 | 75 | 30 | - | - | - | 75 |
| 2AIT03 | Programming in Java | 4 | | 4 | 4 | 3 | 80 | 20 | 100 | 40 | - | - | - | 100 |
| 2AIT04 | Data Structure | 4 | | 4 | 4 | 3 | 80 | 20 | 100 | 40 | - | - | - | 100 |
| 2AIT05 | Discrete Mathematics and Graph Theorys | 4 | | 4 | 4 | 3 | 80 | 20 | 100 | 40 | - | - | - | 100 |
| 2AIP01 | Programming in Java Lab | - | 2*1=2 | 2 | 2 | - | - | - | - | - | 6-8* | 50 | 20 | 50 |
| 2AIP02 | Data Structure Lab | - | 2*1=2 | 2 | 2 | - | - | - | - | - | 6-8* | 50 | 20 | 50 |

Note:

1. Th = Theory; Pr = Practical; Tu = Tutorial; IA = Internal Assessment; @ = Tutorials wherever applicable; * = If required, for two days.
2. Minimum marks for passing will be 40% of the total marks allotted to that paper / practical.
3. Candidate has to pass theory papers and practical separately

- The strength of Batch of Practical and Tutorial for Under Graduates classes shall be 16 with an additional; of 10% with the permission of Hon'ble Vice-Chancellor.
- Details of Course of Languages shall be as per B.Sc. I

**Grand Total of Semester I: 400 + 150 each semester = TOTAL – 550 Marks per semester**
**Total Credits for Semester I : 24 Credits**

## B.Sc. (AI) Part II (Semester III)

| Course code | Course Name | Teaching scheme | | | Credits | Examination Scheme | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Theory | | | | | Practical | | | |
| | | Th + Tu (Periods) | Pr. (Periods) | Total Periods | | Duration Hours | Max Marks Th. Papers | Max Marks IA | Total | Min Passing Marks | Duration Hours | Max Marks Practical | Min Passing Marks | Total (Th, Pr., IA) |
| 3AIT01 | Relational Database Management System | 4 | | 4 | 4 | 3 | 80 | 20 | 100 | 40 | - | - | - | 100 |
| 3AIT02 | Python Programming | 4 | | 4 | 4 | 3 | 80 | 20 | 100 | 40 | - | - | - | 100 |
| 3AIT03 | Design and Analysis of Algorithms | 4 | | 4 | 4 | 3 | 80 | 20 | 100 | 40 | - | - | - | 100 |
| 3AIT04 | Introduction to Artificial Intelligence | 4 | | 4 | 4 | 3 | 80 | 20 | 100 | 40 | - | - | - | 100 |
| 3AIT05 | Digital Electronics and Microprocessor | 4 | | 4 | 4 | 3 | 80 | 20 | 100 | 40 | - | - | - | 100 |
| 3AIP01 | RDBMS Lab | - | 2*1=2 | 2 | 2 | - | - | - | - | - | 6-8* | 50 | 20 | 50 |
| 3AIP02 | Python Programming Lab | - | 2*1=2 | 2 | 2 | - | - | - | - | - | 6-8* | 50 | 20 | 50 |

Note:
1. Th = Theory; Pr = Practical; IA = Internal Assessment; * = If required, for two days.
2. Minimum marks for passing will be 40% of the total marks allotted to that paper / practical.
3. Candidate has to pass theory papers and practical separately

**Grand Total of Semester III: Total = 600 Marks**
**Total Credits for Semester III : 24 Credits**

## B.Sc. (AI) Part II (Semester IV)

| Course code | Course Name | Teaching scheme | | | Credits | Examination Scheme | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Theory | | | | | Practical | | | |
| | | Th + Tu (Periods) | Pr. (Periods) | Total Periods | | Duration Hours | Max Marks Th. Papers | Max Marks IA | Total | Min Passing Marks | Duration Hours | Max Marks Practical | Min Passing Marks | Total (Th, Pr., IA) |
| 4AIT01 | Computer Graphics | 4 | | 4 | 4 | 3 | 80 | 20 | 100 | 40 | - | - | - | 100 |
| 4AIT02 | R - Programming | 4 | | 4 | 4 | 3 | 80 | 20 | 100 | 40 | - | - | - | 100 |
| 4AIT03 | Fundamentals of IoT | 4 | | 4 | 4 | 3 | 80 | 20 | 100 | 40 | - | - | - | 100 |
| 4AIT04 | Data Communication and Network | 4 | | 4 | 4 | 3 | 80 | 20 | 100 | 40 | - | - | - | 100 |
| 4AIT05 | Introduction to Data Science | 4 | | 4 | 4 | 3 | 80 | 20 | 100 | 40 | - | - | - | 100 |
| 4AIP01 | Computer Graphics Lab | - | 2*1=2 | 2 | 2 | - | - | - | - | - | 6-8* | 50 | 20 | 50 |
| 4AIP02 | R - Programming Lab | - | 2*1=2 | 2 | 2 | - | - | - | - | - | 6-8* | 50 | 20 | 50 |

Note:
1. Th = Theory; Pr = Practical; IA = Internal Assessment; * = If required, for two days.
2. Minimum marks for passing will be 40% of the total marks allotted to that paper / practical.
3. Candidate has to pass theory papers and practical separately

**Grand Total of Semester IV: Total = 600 Marks**
**Total Credits for Semester IV : 24 Credits**

## B.Sc. (AI) Part III (Semester V)

| Course code | Course Name | Teaching scheme | | | Credits | Examination Scheme | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Theory | | | | | Practical | | | |
| | | Th + Tu (Periods) | Pr. (Periods) | Total Periods | | Duration Hours | Max Marks Th. Papers | Max Marks IA | Total | Min Passing Marks | Duration Hours | Max Marks Practical | Min Passing Marks | Total (Th, Pr., IA) |
| 5AIT01 | Introduction to Machine Learning | 4 | | 4 | 4 | 3 | 80 | 20 | 100 | 40 | - | - | - | 100 |
| 5AIT02 | Big Data Analysis | 4 | | 4 | 4 | 3 | 80 | 20 | 100 | 40 | - | - | - | 100 |
| 5AIT03 | Cyber Security | 4 | | 4 | 4 | 3 | 80 | 20 | 100 | 40 | - | - | - | 100 |
| 5AIT04 | Cloud Computing | 4 | | 4 | 4 | 3 | 80 | 20 | 100 | 40 | - | - | - | 100 |
| 5AIP01 | Machine Learning Lab | - | 2*1=2 | 2 | 2 | - | - | - | - | - | 6-8* | 50 | 20 | 50 |
| 5AIP02 | Big Data Analysis Lab | - | 2*1=2 | 2 | 2 | - | - | - | - | - | 6-8* | 50 | 20 | 50 |
| 5AIPR01 | Minor Project | - | 2*1=2 | 2 | 2 | - | - | | | - | 6-8* | 100 ** | 40 | 100 |

Note:
1. Th = Theory; Pr = Practical; IA = Internal Assessment; * = If required, for two days. ** = The Practical and Project shall be evaluated by both External and Internal Examiner in the respective Department / Center / Affiliated College as per guidelines appended with this direction.
2. Minimum marks for passing will be 40% of the total marks allotted to that paper / practical.
3. For Minor project evaluation 50 marks will be (Internal Assessment) and 50 Marks will be (External Assessment)
4. Candidate has to pass theory papers and practical separately

**Grand Total of Semester V: Total = 600 Marks**
**Total Credits for Semester V : 22 Credits**

**B.Sc. (AI) Part III (Semester VI)**

| Course code | Course Name | Teaching scheme | | | Credits | Examination Scheme | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Theory | | | | | Practical | | | |
| | | Th + Tu (Periods) | Pr. (Periods) | Total Periods | | Duration Hours | Max Marks Th. Papers | Max Marks IA | Total | Min Passing Marks | Duration Hours | Max Marks Practical | Min Passing Marks | Total (Th, Pr., IA) |
| 6AIT01 | Natural Language Processing | 4 | | 4 | 4 | 3 | 80 | 20 | 100 | 40 | - | - | - | 100 |
| 6AIT02 | Reinforcement Learning | 4 | | 4 | 4 | 3 | 80 | 20 | 100 | 40 | - | - | - | 100 |
| 6AIT03 | Elective I (any one out of four) | 4 | | 4 | 4 | 3 | 80 | 20 | 100 | 40 | - | - | - | 100 |
| 6AIT04 | Elective II (any one out of four) | 4 | | 4 | 4 | 3 | 80 | 20 | 100 | 40 | - | - | - | 100 |
| 6AITPR01 | Major Project | 4 | | 4 | 4 | 3 | | 100 | 100 | 40 | - | 100 ** | 40 | 200 |

Note:
1. Th = Theory; Pr = Practical; IA = Internal Assessment; * = If required, for two days. ** = The Project shall be evaluated by both External and Internal Examiner in the respective Department / Center / Affiliated College as per guidelines appended with this direction.
2. Minimum marks for passing will be 40% of the total marks allotted to that paper / practical.
3. Candidate has to pass theory papers and practical separately

**Grand Total of Semester VI: Total = 600 Marks**
**Total Credits for Semester VI : 20 Credits**

| Electives for Semester VI | | | |
|---|---|---|---|
| **Sr. No.** | **6AIT03 Electives-1** | **Sr. No.** | **6AIT04 Electives-2** |
| 1 | Theory of Computation | 1 | Cryptography and Network Security |
| 2 | Operation Research | 2 | Information Security and Cyber Law |
| 3 | Data Mining | 3 | Text Analytics |
| 4 | Parallel Computing | 4 | Data Visualization |

## Appendix - B:

**Internal Assessment:**

Guidelines for Internal Assessment are appended herewith.

a) The internal assessment marks assigned to each theory paper as mentioned in **Appendix - A** shall be awarded on the basis of assignments like class test, attendance, project assignments, seminar, study tour, industrial visits, visit to educational institutions and research organizations, field work, group discussions or any other innovative practice / activity.

b) There shall be two assignments (as described above) per Theory paper.

c) At the beginning of each semester, every teacher shall inform his / her students unambiguously the method he / she proposes to adopt and the scheme of marking for internal assessment.

d) Teacher shall announce the schedule of activity for internal assessment in advance in consultation with HOD / principal.

e) Final submission of internal marks to the University shall be before the commencement of the University Theory examinations.

2 Assignments – 6+6 = 12
Marks Performance & Conduct – 4
Marks Attendance - 4 Marks
**TOTAL – 20 MARKS**

**Theory Papers:**

1) All Theory papers shall be divided into four units.

2) Each theory paper will be of 80 marks (60 marks for Languages) each.

3) The theory question papers shall be of 3 hours duration and comprise of 5 questions with equal weightage to all units.

4) The pattern of question papers is appended herewith.

Theory paper will be of 80 marks each. All questions are compulsory and will carry equal marks. Question paper for any theory paper will comprise of five questions of 16 marks each. Question No. 1 to 4 will be from four units each with an internal choice. The questions can be asked in the form of long answer type for 16 marks or two questions of 8marks each. Question No. 5 shall be compulsory with four questions / notes of very short answer type from each of the four units having 4 mark each.

**Practical Papers:**

Practical's will be based on the relevant semester subjects

**Valuation Pattern for practical examination:-**

The valuation scheme of practical examination will be as under.

1. Record - 10
2. Viva - 10
3. Writing - 15
4. Execution - 15

**TOTAL – 50**

**Valuation Pattern for Major and Minor project Evaluation:-**

| Minor Project | | |
|---|---|---|
| | **Internal Evaluation** | **External Evaluation** |
| Two Seminar | 20 | - |
| Project Report | 30 | 30 |
| Viva | - | 20 |
| Total | 50 | 50 |

| Major Project | | |
|---|---|---|
| | **Internal Evaluation** | **External Evaluation** |
| Two Seminar | 40 | - |
| Project Report | 60 | 60 |
| Viva | - | 40 |
| Total | 100 | 100 |

**Minor and Major Project:**

Minor project will be based on the Syllabus and recent trends, which will be accessed by internal in Semester V on the basis of two Seminars and viva voce along submission of Spiral Binding report.

Major project will be based on the Syllabus and recent trends, and student have to submit Dissertation reports along with minimum two Seminars based on Major project in Semester – VI

**Group projects will be allowed in both minor and major project with group not exceeding more than two students in a group.**

**Appendix - C:**

QUESTION PAPER PATTERN

**First / Second / Third / Fourth / Fifth / Sixth Semester**

**B.Sc. Artificial Intelligence Examination**

**Subject Name**

**Time: 3 Hours** **Paper – III** **Total Marks: 80M**

N. B. - a) Draw well labelled diagram wherever necessary.

b) All questions are compulsory.

| | | |
|---|---|---|
| **Either** | | |
| 1 a) | Based on Unit - I | 8M |
| 1 b) | | 8M |
| **or** | | |
| 1 c) | Based on Unit - I | 8M |
| 1 d) | | 8M |
| **Either** | | |
| 2 a) | Based on Unit - II | 8M |
| 2 b) | | 8M |
| **or** | | |
| 2 c) | Based on Unit - II | 8M |
| 2 d) | | 8M |
| **Either** | | |
| 3 a) | Based on Unit - III | 8M |
| 3 b) | | 8M |
| **or** | | |
| 3 c) | Based on Unit - III | 8M |
| 3 d) | | 8M |
| **Either** | | |
| 4 a) | Based on Unit - IV | 8M |
| 4 b) | | 8M |
| **or** | | |
| 4 c) | Based on Unit - IV | 8M |
| 4 d) | | 8M |

**5) All Questions are Compulsory**

a) Based on Unit – I 4M

b) Based on Unit – II 4M

c) Based on Unit – III 4M

d) Based on Unit – IV 4M

**APPENDIX –D**

**(A) Project and Classification of Marks on Project**

Towards the end of the second year of study, a student will be examined in the course —"Project Work".

a. Project Work may be done individually or in groups (Maximum 3 students) in case of bigger projects. However if project is done in groups, each student must be given a responsibility for a distinct module and care should be taken to monitor the progress of individual student.

b. The Project Work should be done using the tools covered in BSC (AI).

c. The Project Work should be of such a nature that it could prove useful or be relevant from the commercial / management angle.

d. The project work will carry 100 marks.

e. Project Work can be carried out in the Institute or outside with prior permission of the Institute.

f. The external viva-voce examination for Project Work would be held as per the Examination Time Table of the third year of study, by a panel of one external and one Internal Examiner.

**Types of Project**

As majority of the students are expected to work out a project in some industry/research and development laboratories/educational institutions/software export companies, it is suggested that the project is to be chosen which should have some direct relevance in day-today activities of the candidates in his/her institution. The Applications Areas of project - Financial/Marketing/Database Management System/ Relational Database Management System/E-Commerce /Internet/ Manufacturing/ web Designing / Scientific / ERP etc.

**Project Proposal (Synopsis)**

The project proposal should be prepared in consultation with the guide. The project guide must be a person having minimum Qualification M.Sc. (Computer Science/Information Technology/Mathematics / Electronics / Statistics / Physics) /MCA / Post B.Sc. Diploma in Computer Science & Application). The project proposal should clearly state the objectives and environment of the proposed project to be undertaken. It should have full details in the following form:

**Format of Synopsis for Desktop Application**

1. Title of the Project.
2. Objectives of the Project.
3. Project Category (DBMS/RDBMS/OOPSetc.).
4. Tools/Platform and Languages to be used.
5. Complete Structure of the System:
    i. Numbers of Modules and its Description.
    ii. Modular Chart / System Chart.
    iii. Data Structures or Tables.
    iv. Process Logic of each Module.
    v. Types of Report Generation.
6. References.

Note: Synopsis should not be more than 3-4 pages.

**Format of Synopsis for Web Application**

1. Title of the Project.
2. Objectives of the Project.
3. Project Category (DBMS/RDBMS/OOPSetc.).
4. Tools/Platform and Languages to be used.
5. Complete Structure of the System:
    i. Number of pages and links their short description.
    ii. Use / Information of Pages.
    iii. Feedback Form (if any).
6. References.

Note: Synopsis should not be more than 3-4 pages.

## Project Report Formulation

Front Page.

College Certificate Page.

Declaration Page.

Acknowledgment Page.

Project Profile.

**Index or Content Page**

i. *Contents ——————————.

Appendices

i. List Figures, Tables & Charts.

ii. Approved copy of Synopsis.

Glossary

* Contents.

i. Introduction.

ii. Objectives.

iii. Preliminary System Analysis.

- Preliminary Investigation.
- Present System in Use.
- Flaws in Present System.
- Need of New System.
- Feasibility Study.
- Project Category.

iv. Software Engineering Paradigm Applied

- Modules
- System / Modular Chart.

v. Software & Hardware Requirement Specification.

vi. Detailed System Analysis.

- Data Flow Diagram.
- Numbers of Modules and Process Logic.
- Data Structures and Tables.
- Entity-Relationship Diagram.

vii. System Design.

- Form Design.
- Source Code.
- Input screen & Output Screen.

viii. Testing &Validation Checks.

ix. System Security Measures.

x. Implementation, Evaluation and Maintenance.

xi. Future Scope of the project.

xii. Suggestion & Conclusion

xiii. Bibliography& References.

Note :-

i. A Student is expected to complete the Assignments based on Syllabus of Practical subjects and submit the same in the form of a files (assignment Record) at the end of Academic Session for the evaluation purpose.

ii. A student should submit internal assessment of each theory paper prescribed by the subject teacher.

iii. A Student is expected to deliver a seminar on any course curricular subject / latest trends in IT relevant subject per semester for internal assessment.

## (B) Practical and Classification of Marks on Practical

1. Practical exam shall be of 6-8 hours duration.

2. The Practical Record of every student shall carry a certificate as shown below, duly signed by the teacher-in-charge and the Head of the Department.

3. If the student fails to submit his / her certified Practical Record duly signed by the Teacher-In-Charge and the Head of the Department, he / she shall not be allowed to appear for the Practical Examination and no Marks shall be allotted to the student.

4. After Viva-Voce and evaluation of practical records of a student by the Internal & External Examiner, both examiners should sign on the certificate of practical records.

5. The certificate template shall be as follows:

**c) Valuation Pattern for Major and Minor project Evaluation:-**

| Minor Project | | |
|---|---|---|
| | **Internal Evaluation** | **External Evaluation** |
| Two Seminar | 20 | - |
| Project Report | 30 | 30 |
| Viva | - | 20 |
| Total | 50 | 50 |

| Major Project | | |
|---|---|---|
| | **Internal Evaluation** | **External Evaluation** |
| Two Seminar | 40 | - |
| Project Report | 60 | 60 |
| Viva | - | 40 |
| Total | 100 | 100 |

## CERTIFICATE

Name of the college / institution _____

Name of the Department: _____

This is to certify that this Practical Record contains the bonafide record of the Practical work of Shri / Kumari / Shrimati _____ of _____ Semester _____ during the academic year _____. The candidate has satisfactorily completed the experiments prescribed by Rashtrasant Tukdoji Maharaj Nagpur University for the subject _____

Dated ___/___/_____

Signature of the teacher who taught the examinee

1. _____

2. _____

Head of the Department

# B.Sc. Artificial Intelligence
## Three-Year (6-Semester) CBS Programme
## Course Structure

| Course Code | Semester – I | Course Code | Semester – II |
|---|---|---|---|
| 1AIT01 | English | 2AIT01 | English |
| 1AIT02 | Second Language Marathi/Hindi/ Urdu/ Gujrati /Sanskrit/ Supp. Eng. | 2AIT02 | Second Language Marathi/Hindi/ Urdu/ Gujrati /Sanskrit/ Supp. Eng. |
| 1AIT03 | Programming in C++ | 2AIT03 | Programming in Java |
| 1AIT04 | Probability and Statistics | 2AIT04 | Data Structure |
| 1AIT05 | Operating System | 2AIT05 | Discrete Mathematics and Graph Theory |
| 1AIP01 | Programming in C++ Lab | 2AIP01 | Programming in Java Lab |
| 1AIP02 | Probability and Statistics Lab | 2AIP02 | Data Structure Lab |
| Course Code | Semester – III | Course Code | Semester – IV |
| 3AIT01 | Relational Database Management System | 4AIT01 | Computer Graphics |
| 3AIT02 | Python Programming | 4AIT02 | R - Programming |
| 3AIT03 | Design and Analysis of Algorithms | 4AIT03 | Fundamentals of IoT |
| 3AIT04 | Introduction to Artificial Intelligence | 4AIT04 | Data Communication and Network |
| 3AIT05 | Digital Electronics and Microprocessor | 4AIT05 | Introduction to Data Science |
| 3AIP01 | RDBMS Lab | 4AIP01 | Computer Graphics Lab |
| 3AIP02 | Python Programming Lab | 4AIP02 | R - Programming Lab |
| Course Code | Semester – V | Course Code | Semester – VI |
| 5AIT01 | Introduction to Machine Learning | 6AIT01 | Natural Language Processing |
| 5AIT02 | Cloud Computing | 6AIT02 | Reinforcement Learning |
| 5AIT03 | Cyber Security | 6AIT03 | Elective I (any one out of four) |
| 5AIT04 | Big Data Analysis | 6AIT04 | Elective II (any one out of four) |
| 5AIP01 | Machine Learning Lab | 6AIPT01 | Major Project |
| 5AIP02 | Big Data Analysis Lab | | |
| 5AIPR01 | Minor Project | | |

**Semester VI Electives (Select any one from the respective Electives)**

| Course Code | Elective - I | Course Code | Elective - II |
|---|---|---|---|
| 6AIT03 | Theory of Computation | 6AIT04 | Cryptography and Network Security |
| | Operation Research | | Information Security and Cyber Law |
| | Data Mining | | Text Analytics |
| | Parallel Computing | | Data Visualization |

## B.Sc. (Artificial Intelligence)
## Semester – 1
## Paper – I
## Compulsory English (1AIT01)

As per defined by RTMNU syllabus for B. Sc. – I (Semester – I)

## B.Sc. (Artificial Intelligence)
## Semester – 1
## Paper – II
## Second Language (1AIT02)

As per defined by RTMNU syllabus for B. Sc. – I (Semester – I)

| B. Sc. (Artificial Intelligence) | | Semester – I | |
|---|---|---|---|
| Course Name : Programming in C++ (Paper – III) | | Course Code: (1AIT03) | |
| Periods per week (1 Period is 60 minutes) | | 4 | |
| Credits | | 4 | |
| | | Hours | Marks |
| Evaluation Scheme | Theory Examination | 3 | 80 |
| | Internal Assessment | -- | 20 |
| | | Total Marks | 100 |

**Learning Objectives:**

The course is designed to provide broad knowledge of C++ language. Students will be able to develop logics which will help them to create applications in C++, and learn the basic programming skills through which they can easily switch over to any other language in future. Also, Students will be able to learn the basic concepts of data structure and use C++ to implement them.

**Learning Outcomes:**

After completion of this course successfully the students will be able to:

1. Describe the procedural and object oriented paradigm with concepts of streams, classes, functions, data and objects.
2. Understand dynamic memory management techniques using pointers, constructors, destructors, etc
3. Describe the concept of function overloading, operator overloading, virtual functions and polymorphism.
4. Demonstrate the use of various OOPs concepts with the help of programs.

**B.Sc. Artificial Intelligence**
**Semester – I**
**Paper – III**
**Programming in C++ (1AIT03)**

**UNIT – I**
**Development Tools:** Algorithm, Flowcharts and Pseudo code (Definition and its characteristics), **Introduction to Object Oriented Programming:** Introduction, Characteristics of OOPs, Advantages of OOPs, Disadvantages of OOPs, **Data Types, Operators and Expressions:** Identifiers & Keywords, Data Types, C++ Operators, Type Conversion. **Input and Output Streams:** Comments, Declaration of Variables, Simple C++ Programs, Manipulator Functions, Input and Output (I/O) **Control Statements:** Conditional Expressions, Loop Statements, Nested Control Structures, Break and continue Statements.

**UNIT – II**
**Functions:** Introduction, Defining a Function, Return Statement, Types of Functions, Actual & Formal Arguments, Local & Global Variables, Default Arguments, Structure of C++ Program, Order of the Function Declaration, Scope Rules, Storage Class Specifiers, Recursive Function **Arrays:** Introduction, Array Notation, Array Declaration, Array Initialization, Processing with Arrays, Character Array. **Pointers and Strings:** Introduction, Pointer Arithmetic, Pointers and Functions, Pointers and Arrays, Pointer and Strings.
**Structures and Unions** Introduction, Declaration of Structure, Processing with Structures, Initialization of Structures, Functions and Structures, Array of Structure, Pointer and Structure, Unions.

**UNIT – III**
**Classes and Objects:** Introduction, Structures and Classes, Declaration of Class, Member Functions, Defining the Object of a Class, Accessing a Member of Class, Array of Class Objects, Pointer and Classes. **Special Member Function:** Introduction, Constructors, Destructors, Inline Member Functions, Static Class Members, Friend Function, This Pointer. **Single and Multiple Inheritance:** Introduction, Single Inheritance, Types of Base Classes, Type of Derivation, Multiple Inheritance, Member Access Control.

**UNIT-IV**
**Overloading Functions and Operators:** Function Overloading, Operator Overloading, Overloading of Binary Operators, Overloading of Unary Operators. **Polymorphism and Virtual Functions:** Polymorphism, Virtual Functions, Pure Virtual Functions, Abstract Base Classes, Virtual Base Classes.

**Text Book**
1. D. Ravichandran, Programming with C++, McGraw-Hill.

**Reference Books**
1. E. Balaguruswamy, Object Oriented Programming with C++, McGraw-Hill.
2. Rohit Khurana, Object Oriented Programming with C++, Vikas Publishing House Pvt. Ltd.
3. Anirban Das, Goutam Panigrahi, Object Oriented Programming with C++, Vikash Publishing House Pvt. Ltd.
4. Herbert Schildt, The Complete Reference – C++, McGraw-Hill.

| B. Sc. (Artificial Intelligence) | | Semester - I | |
|---|---|---|---|
| Course Name : Probability and Statistics (Paper – IV) | | Course Code: (1AIT04) | |
| Periods per week (1 Period is 60 minutes) | | 4 | |
| Credits | | 4 | |
| | | Hours | Marks |
| Evaluation Scheme | Theory Examination | 3 | 80 |
| | Internal Assessment | -- | 20 |
| | | Total Marks | 100 |

**Learning Objectives:**

1. To compute various measures of central tendency.
2. To compute various measures of dispersion, skewness and kurtosis and to calculate range of variables and the deviation of specific data point.
3. To compute the correlation coefficient for bivariate data and calculate the simple linear regression equation for a set of data.
4. Learn the basic and advance concepts of Probability theory
5. Find and understand the applications of Probabilities in data science

**Learning Outcomes:**

1. To understand measures of central tendency and measures of dispersion
2. To understand the concept of correlation and regression as well as able to apply various techniques for the modelling.
3. Understand and use Probability theory to solve real problem.
4. Understand and use various Probability distributions for different machine learning related task

**B.Sc. Artificial Intelligence**
**Semester – I**
**Paper – IV**
**Probability and Statistics (1AIT04)**

**Unit – I Descriptive Statistics**
**Statistics and Measures of Central Tendency:**
Concept of Central Tendancy, majors of central tendency- Mean, Median, Mode, Weighted mean, Geometric Mean and Harmonic Mean Measures of Dispersion: Range, Mean Deviation, Standard Deviation, Quartile Deviation, Co-efficient of variation Skewness and Kurtosis : Absolute Measures of skewness, relative measures of skewness, Karl Pearson's co-efficient of skewness, Bowley's Co-efficient of skewness and Kurtosis

**Unit – II Correlation and Regression**
Concept of correlation, Types of correlation, Properties of correlation, Karl Pearson's co-efficient of correlation, Probable error, Interpretation of "r", Rank correlation method. Concept of regression, Lines of Regression, Co-efficient of Regression

**Unit III:**
**Probability**
Concept of Probability, Approaches of Probability — Classical and relative frequency approach to Probability. Richard Von Mises, Cramer and Kolmogorov's approaches to Probability.
Random Experiment, sample space, an event, mutually exclusive and exhaustive events. Axiomatic definition of probability. Conditional Probability, independence of events,

**UNIT IV:**
**Random Variable and its Probability distribution**
Random variables, Types of random variable and its distribution. expectation of a random variable and its properties. Probability distribution – Binomial Distribution, Poisson Distribution, Normal Distribution, Moments, Moment Generating Function and its properties.

**Text Books:**
1. Statistical Methods, S.P.Gupta (2014), Sultan Chand & sons
2. Business Management and Statistics,N G Das, J K Das, McGraw-Hill.3. Fundamentals of Mathematical Statistics, Gupta,S.C. and Kapoor, V.K.(2000): 10/e, Sultan Chand and Sons.
4. Principals of mathematical Analysis, Walter Rudin, McGraw-Hill.

**Reference Books:**
1. Statistical Techniques, Dr. Pramod Fating, Dr. Milind Gulhane, Dr. Vijay Badge, Dr. Sarang Javkhedkar – Sir Sahitya Kendra, Nagpur
2. Business Mathematics and Statistics, Dr. S. R. Arora, Dr. Kavita Gupta, Business Mathematics and Statistics, Taxmann.
3. Business Mathematics, Mrintunjay Kumar, Vikas Publishing House Pvt. Ltd.
4. Mathematics & Statistics, Ajay Goel, Alka Goel, Taxmann.

| B. Sc. (Artificial Intelligence) | | Semester - I | |
|---|---|---|---|
| Course Name : Operating System (Paper – V) | | Course Code: (1AIT05) | |
| Periods per week (1 Period is 60 minutes) | | 4 | |
| Credits | | 4 | |
| | | Hours | Marks |
| Evaluation Scheme | Theory Examination | 3 | 80 |
| | Internal Assessment | -- | 20 |
| | | Total Marks | 100 |

**Learning Objectives:**

The course gives an introduction to operating systems. The central focus is on how an operating system, in an efficient or fair way, provides an abstracted interface to the hardware resources for programs. The purpose of this course is to understand the mechanisms of the Operating Systems like Process Management, Process Synchronization, Memory Management, File System Implementation, Storage Structures used in OS and Protection Principles. How effectively the OS is utilizing the CPU resources with the help of these mechanisms.

**Learning Outcomes:**

1. Fundamental understanding of the role of Operating Systems.
2. To understand the concept of a process and thread.
3. To apply the concept of process synchronization, mutual exclusion and the deadlock.
4. To realize the concept of I/O management and File system. And understand the various memory management techniques.

**B.Sc. Artificial Intelligence**
**Semester – I**
**Paper – V**
**Operating System (1AIT05)**

**UNIT – I :**
Structure of Operating System, Operating System functions, Characteristics of Modern OS. **Process Management**: Process states, Creation, Termination, Operations on Process, Concurrent process, Processes Threads, Multithreading, Micro Kernels
**CPU Scheduling**: Schedulers, Scheduling Methodology, CPU Scheduling Algorithm: FCFS, SJF, RR, Priority Scheduling.

**UNIT – II:**
Performance comparison: Deterministic Modeling , Queuing analysis, Simulators.
**Deadlock and Starvation:** Resource Allocation Graph, Conditions for Dead Lock, Dead Lock Prevention, Dead Lock Detection, Recovery from Deadlock.

**UNIT - III:**
**Memory Management:** Logical Vs. Physical Address Space, Swapping, Memory Management Requirement, Dynamic Loading and Dynamic Linking, Memory Allocation Method: Single Partition allocation, Multiple Partitions, Compaction, paging, segmentation, Segmentation with paging. Protection.

**UNIT - IV:**
**I/O Management**: I/O hardware, I/O Buffering, Disk I/O, Raid, Disk Cache. **File Management:** File Management system, File Accessing Methods, File Directories, File Allocation Methods, File Space Management, Disk Space Management, Record blocking. **Protection Mechanisms**: Cryptography, Digital Signature, User Authentication.

**Text Books:**
1. Operating Systems by P. Balakrishna Prasad [Scitech Publication]
2. Operating System Concept : Silbershaz (Addision Education)
3. Operating Systems - H.M. Deitel - Addision Wesley.
4. Operating Systems- John J. Donoven.

**Reference Books:**
1. Operating System : A. S. Godbole (TMH)
2. Modern Operating Systems : Tannenbaum (Pearson Education)
3. Operating System : Peterson.

## RASHTRASANT TUKADOJI MAHARAJ NAGPUR UNIVERSITY, NAGPUR

**THREE YEAR BACHELOR OF SCIENCE (B. Sc.) ARTIFICIAL INTELLIGENCE DEGREE COURSE**

**(C B S)**

| **B. Sc. (Artificial Intelligence)** | | **Semester - I** | |
|---|---|---|---|
| Course Name : Programming in C++ Lab | | Course Code: (1AIP01) | |
| Periods per week (1 Period is 60 minutes) | | 2 | |
| Credits | | 2 | |
| | | Hours | Marks |
| Evaluation Scheme | Practical Examination | 6-8* | 50 |
| | | Total Marks | 50 |

**Practical's based on Programming in C++**

## RASHTRASANT TUKADOJI MAHARAJ NAGPUR UNIVERSITY, NAGPUR

**THREE YEAR BACHELOR OF SCIENCE (B. Sc.) ARTIFICIAL INTELLIGENCE DEGREE COURSE**

**(C B S)**

| **B. Sc. (Artificial Intelligence)** | | **Semester - I** | |
|---|---|---|---|
| Course Name : Probability and Statistics Lab | | Course Code: (1AIP02) | |
| Periods per week (1 Period is 60 minutes) | | 2 | |
| Credits | | 2 | |
| | | Hours | Marks |
| Evaluation Scheme | Practical Examination | 6-8* | 50 |
| | | Total Marks | 50 |

**Practical's based on Probability and Statistics**

## B.Sc. (Artificial Intelligence)
## Semester – 2
## Paper – I
## Compulsory English (2AIT01)

As per defined by RTMNU syllabus for B. Sc. – I (Semester – I)

## B.Sc. (Artificial Intelligence)
## Semester – 2
## Paper – II
## Second Language (2AIT02)

As per defined by RTMNU syllabus for B. Sc. – I (Semester – I)

| **B. Sc. (Artificial Intelligence)** | | **Semester - II** | |
|---|---|---|---|
| Course Name : Programming in Java (Paper – III) | | Course Code: (2AIT03) | |
| Periods per week (1 Period is 60 minutes) | | 4 | |
| Credits | | 4 | |
| | | Hours | Marks |
| Evaluation Scheme | Theory Examination | 3 | 80 |
| | Internal Assessment | -- | 20 |
| | | Total Marks | 100 |

**Learning Objectives:**

This course aims to provide an in-depth understanding of object oriented programming: abstract data types, encapsulation, inheritance and polymorphism Fundamental features of an object oriented language like Java: object classes and interfaces, exceptions and libraries of object collections Using Graphics, Animations and Multithreading for designing Simulation and Game based applications. Design and develop GUI applications using Abstract Windowing Toolkit (AWT), and Event Handling.

**Learning Outcomes:**

1. Use the syntax and semantics of java programming language and basic concepts of OOP.
2. Develop reusable programs using the concepts of inheritance, polymorphism, interfaces and packages.
3. Apply the concepts of Multithreading and Exception handling to develop efficient and error free codes.
4. Design event driven GUI and web related applications which mimic the real word scenarios.

**B.Sc. Artificial Intelligence**
**Semester – II**
**Paper – III**
**Programming in Java (2AIT03)**

**UNIT - I :**
**Introduction to Java:** -History of Java, features of Java, getting started with Java. **Java programs:**-Introduction of Application & Applets. **Variables:** -Variable naming, variable initialization, assign values, Rules of variables, Scope of variable. **Operators:** -Arithmetic, Assignment, Unary, Comparison, Shift, Bit- Wise, Logical, Conditional, New, Special, Relational. **Data types:**-Integers, Char, String, Float etc. **Typecasting, Tokens:** -Java tokens Order of precedence of operators **Streams:** - Input and output.

**UNIT - II :**
**Creating a class & subclass:** -Declaring a class, Naming class, Rules to assign Class & Subclass, Creating a new object, Class of an object. **Data members:** -Declaring data member, Naming variables, using class members. **Methods:** -Using data members, Invoke a method, passing arguments to a method, calling method. **Access Specifier & Modifiers:** -Public, Private, Protected, Static & Final. **Overloading:** -Method overloading, Constructor overloading. **Java class library:** - Different types of classes. **Decision making & loops:**-If-then-else, Switch,? : operator, While-loop, do-while loop, for. **Array:** -Creating an array, one-dimensional array, two-dimensional array. String: -String array, string methods. **Inheritance:** -Single & multiple inheritances Interfaces: -Defining interfaces, extending interfaces, implementing interfaces.

**UNIT - III :**
**Packages:** -Java API packages, creating packages, accessing packages, adding a class to packages. Import statement: - Introduction & implementation of import statement. **Applets:**-Introduction to Applets & Application, how applets application are different creating An applet. Applets life cycle, designing a web page, creating an executable applet, running the applet, applet tags, passing a parameter to applet, HTML tag, Converting applet to application. **Threads:**-Overview of threads, single & multiple threads, lift cycle of threads, stopping & blocking threads, working with threads, priority to thread, synchronization. **Exceptions & Errors:**-Introduction, types of error, exception, syntax of exception, handling techniques, exception for Debugging.

**UNIT - IV :**
**Event:** -Event driven programming, handling an (AWT) events. Graphic class:-Introduction, the graphic classes, drawing & filling of lines, rectangle, circle & ellipse, arcs, polygons, text & fonts, creating a font class, font objects, text, coloring object. **Streams:**-Introduction, Abstract stream classes, file input & output.AWI Applications: -Creating a GUI using AWT toolkit, using component class, frames. **Components & Control:** -Textfield, textarea class, label, button, choice, list, checkbox, class, and combo. **Menus:** -Creating a popup menus. **Image:** - Type of image, Properties of an image, Displaying an image. **Layouts:** -Using Window Listener interface, Different types of Layout, Layout manager, Flow manager, Grid manager. Container: -Different types of container (Frame, Dialog, Panel)

**Text Books:**
1. Programming with Java a primer II edition:-E Balaguruswamy (Tata McGraw-Hill)
2. Java The Complete Reference 9th Edition, Herbert Schildt, McGraw Hill Education (India) Private Limited, New Delhi.

**Reference Books:**
1. Java Programming (For absolute beginners) Russell PHI
2. Black Book on Java, Steven Holzner, 2001

RASHTRASANT TUKADOJI MAHARAJ NAGPUR UNIVERSITY, NAGPUR
THREE YEAR BACHELOR OF SCIENCE (B. Sc.) ARTIFICIAL INTELLIGENCE DEGREE COURSE
(C B S)

| B. Sc. (Artificial Intelligence) | | Semester - II | |
|---|---|---|---|
| Course Name : Data Structures (Paper – IV) | | Course Code: (2AIT04) | |
| Periods per week (1 Period is 60 minutes) | | 4 | |
| Credits | | 4 | |
| | | Hours | Marks |
| Evaluation Scheme | Theory Examination | 3 | 80 |
| | Internal Assessment | -- | 20 |
| | | Total Marks | 100 |

**Learning Objectives:**

1. To impart the basic concepts of single and double Linked List,.
2. To understand concepts about searching and sorting techniques
3. To Understand basic concepts about recursion, trees and graphs.
4. To understand the algorithms and develop the step by step solutions of problems with the help of data structures.

**Learning Outcomes:**

1. Understand basic data structures such as arrays, linked lists, and operations related to it.
2. Demonstrate how stacks, are represented in the main memory and various operations are performed.
3. Apply Algorithm for solving problems like traversing and describe the hash function and concepts of collision and its resolution methods
4. Solve problem involving graphs, trees and heaps

**B.Sc. Artificial Intelligence**
**Semester – II**
**Paper – IV**
**Data Structures (2AIT04)**

**UNIT - I:**

**LINKED LIST :** Linked List, Representation of Single, Double, Header, Circular Single and Double Linked list, All possible operations on Single and Double linked List using Dynamic representation, Polynomial Representation and its Manipulation.

**UNIT - II :**

**STACKS :** Stacks terminology, Representation of Stacks in Memory, Operation on Stacks, Polish Notations, Translation of infix to postfix & prefix expression, Infix to Postfix Conversion, Evaluation of Postfix Expression, Recursion, Problems on Recursion, Quick Sort and Tower of Hanoi Problem.

**UNIT - III :**

**QUEUE :** Representation of Queues in Memory, Circular Queue. Dequeue and Priority Queue. Operations of above Structure using Array and Linked Representation. **SORTING AND SEARCHING:** Selection Sort, Insertion Sort, Merge Sort, Efficiency of Sorting Methods, Big-O Notations. Hash Tables, Hashing Technique, Collision Resolution Technique.

**UNIT - IV :**

**TREES :** Basic Terminologies, Representation of Binary Trees in Memory, Traversing of Binary tree, Binary Search Tree, Operation on Binary Search Tree, Heap Tree, Operation on Heap Tree, Heap Sort Method **GRAPHS :** Basic Terminologies, Definition and Representation of Graphs in Memory: Linked List and Matrix Representation. **Traversing graphs :** BSF, DFS Method.

**Text Books:**
1. Classical Data Structures : D. Samanta. PHI, New Delhi.
2. Data Structure : Lipsctuz, schum outline series
3. Data structure Using C++ : Y. Kanetkar

**Reference Books:**
1. Data Structures Using C++: Tennenbaum
2. Data structures by Tremblay Sorenson
3. Data structures by Bhagat singh Naps

| B. Sc. (Artificial Intelligence) | | Semester - II | |
|---|---|---|---|
| Course Name : Discrete Mathematics and Graph Theory (Paper – V) | | Course Code: (2AIT05) | |
| Periods per week (1 Period is 60 minutes) | | 4 | |
| Credits | | 4 | |
| | | Hours | Marks |
| Evaluation Scheme | Theory Examination | 3 | 80 |
| | Internal Assessment | -- | 20 |
| | | Total Marks | 100 |

**Learning Objectives:**

To enable the students to understand and create mathematical arguments and solving them with logical skills. This course also enables the students to learn Number Theory, which is applied in data security, Networking, and machine Learning. The topics like Set Theory, Graph Relations, functions are used in various area of computer science such as cryptography, data structures and having key roles in various data science related tool and techniques.

**Learning Outcomes:**

1. Understand the notion of mathematical thinking, mathematical proofs, and algorithmic thinking, and be able to apply them in problem solving.
2. Understand the basics of combinatorics, and be able to apply the methods from these subjects in problem solving.
3. Able to use effectively algebraic techniques to analyse basic discrete structures and algorithms.
4. Understand some basic properties of graphs and related discrete structures, and be able to relate these to practical examples.

**B.Sc. Artificial Intelligence**
**Semester – II**
**Paper – V**
**Discrete Mathematics and Graph Theory (2AIT05)**

**UNIT- I:**

**Fundamental** – Sets and Subsets, operations on sets, sequence, Division in the integer, Matrices, Mathematics Structures. Logic-Proposition and Logical Operation Conditional Statements, Methods of Proof, Mathematical Induction, **Mathematical Logic**- Statements and Notation, Connectives, well-formed formula, Duality law.

**UNIT- II:**

**Functions** - definition, types of function, Invertible functions composition of functions.
**Counting** - Permutation, Combinations, The pigeonhole principle, recurrence relation, Mathematical Induction.

**UNIT- III:**

**Algebraic Structures**
Semi groups & groups: Binary operations, Semi groups, isomorphism and Homomorphism, Product and Quotient of semi groups, Groups, subgroups, products and Quotient of groups.
**Lattices:** - Lattice concepts, isomorphic Lattices, Properties of lattices, Finite Boolean algebras.

**UNIT- IV:**

**Graph Theory:** Basic Terminology, Models and Types, Multigraphs and Weighted Graphs, Graph Representation, Graph Isomorphism, Connectivity, Euler and Hamiltonian Paths and Circuits, Planar Graphs, Graph Coloring, Trees, Basic Terminology and Properties of Trees, Introduction to Spanning Trees

**Text Books:**

1. Discrete Mathematical Structures with applications to computer Science By J,P.Tremblay & R. Manohar, (TMH)
2. Discrete Mathematical Structures by Kolman Busby and Ross (Pearson)
3. Discrete Mathematics By Norman Biggs. (Oxford).

**Reference Books:**

1. Logic and Discrete Mathematics : Grassmann, Tremblay (Pearson)
2. An introduction to the theory of computer science , languages and machines : Sudkamp
3. Kenneth H Rosen Discrete Mathematics & it's Applications TMH

## RASHTRASANT TUKADOJI MAHARAJ NAGPUR UNIVERSITY, NAGPUR

THREE YEAR BACHELOR OF SCIENCE (B. Sc.) ARTIFICIAL INTELLIGENCE DEGREE COURSE

(C B S)

| B. Sc. (Artificial Intelligence) | | Semester - II | |
|---|---|---|---|
| Course Name : Programming in Java Lab | | Course Code: (2AIP01) | |
| Periods per week (1 Period is 60 minutes) | | 2 | |
| Credits | | 2 | |
| | | Hours | Marks |
| Evaluation Scheme | Practical Examination | 6-8* | 50 |
| | | Total Marks | 50 |

### Practical's based on Java Programming

## RASHTRASANT TUKADOJI MAHARAJ NAGPUR UNIVERSITY, NAGPUR

THREE YEAR BACHELOR OF SCIENCE (B. Sc.) ARTIFICIAL INTELLIGENCE DEGREE COURSE

(C B S)

| B. Sc. (Artificial Intelligence) | | Semester - II | |
|---|---|---|---|
| Course Name : Data Structure Lab | | Course Code: (2AIP02) | |
| Periods per week (1 Period is 60 minutes) | | 2 | |
| Credits | | 2 | |
| | | Hours | Marks |
| Evaluation Scheme | Practical Examination | 6-8* | 50 |
| | | Total Marks | 50 |

### Practical's based on Data Structures