या परिष्काराने सर्व संबंधितांना कठिनविषयात येते की, दिनांक ०८ जून २०१९ रोजी संपन झालेल्या ४४व्या माहिती विद्यार्थी परिषद बैठकीली अनेकेवेळा विषय क्र.२१/२४—२०१९, व्या उरावानुसार प्रस्तुत विद्यापीठात्त्व न्यू मोडल डिग्री कॉलेज, हिंगोली वेळील विज्ञान व तंत्रज्ञान विद्याशाखेच्या पदवी स्तरावरील प्रशिक्षण वर्षाचे CBCS Pattern नुसारचे अभ्यासक्रम शैक्षणिक वर्ष २०१९—२० पासून लागू करण्याबाबत.

1. Computer Science

नये परिष्कार व अभ्यासक्रम प्रस्तुत विद्यापीठात्त्व या संक्षेपस्थापूर्व उपलब्ध आहेत. तरी सदरील बाबी ही सर्व संबंधितांच्या निर्देशनासाठी आणून धावी.

सर्वांगीतीमध्ये पाठ्यक्रम/न्युमाध्यकोड/पदवी—
सीवीसीएम अभ्यासक्रम/२०१९—२०/४६७

दिनांक : ११.०७.२०१९.

प्रद माहिती व पुढील कार्यवाहीप्रकार:

१) म. कृत्तिकीवर्ष पाच्याच कार्यालय, प्रस्तुत विद्यापीठ.

२) म. संघीय, परीक्षेवर दृष्टिमान्य मंडळ पाच्याच कार्यालय, प्रस्तुत विद्यापीठ.

३) प्राध्यापक, न्यू मोडल डिग्री कॉलेज, हिंगोली.

४) साहय्यक कृत्तिकीवर्ष पद्वसर विभाग, प्रस्तुत विद्यापीठ.

५) उपकृतिकीवर्ष, पात्र विभाग, प्रस्तुत विद्यापीठ.

६) सिस्टम एक्सपर्ट, शैक्षणिक विभाग, प्रस्तुत विद्यापीठ.
Syllabus of Bachelor in Computer Science

(B.Sc. in Computer Science)

With effective from 2019-2020 and onwards

Swami Ramanand Teerth Marathwada University, Nanded
A Candidate shall be admitted to the first year of the B.Sc. in Computer Science (B.Sc. in C.S.) degree course only if he/she satisfies the following condition:

1. He/ She must have passed the higher secondary (multipurpose) examination conducted by H.S.C. board Government of Maharashtra with science / technical subjects Or an Examination of any statutory University and Board recognized as equivalent thereto.

   OR

   He / She must have passed examination prescribed at the end of second year of the junior college conducted by the H.S.C. board, Government of Maharashtra with English, Second language, Physics, Chemistry, Mathematics and or Biology or one of the technical subjects prescribed at the said examination as the optional or elective subjects or an examination recognized as equivalent thereto.

   OR

   Candidate having offered prescribed vocational course (MCVC) with Computer techniques/I.T./Electronics.

   OR

   Three years Diploma Course in engineering conducted by the board of technical Education, Maharashtra State.

2. He/ She must have passed at qualifying examination.

A candidate who has passed the B.Sc. in Computer Science examination of this university may be allowed to present himself subsequently at the degree examination in a subject or subjects other than those he has taken earlier provided that he puts in three years of attendance as a regular candidate for First, Second and Third year in the subject or subjects concerned excluding compulsory English, Second Language and remaining optional subject(s).

A candidate shall not be allowed to appear for such examination if he has passed the higher examination.

The Degree of Bachelor of Science (Computer Science) shall be conferred on candidate who has pursued a regular course of study consisting of six semesters in the relevant subject as prescribed and has appeared at the end examination and passed under the credit based system in all the examination prescribed for the Degree course in the faculty.
The pattern of the examination and the scope is indicated in the syllabus:

- The Number of students in a theory class shall not exceed 60.
- Maximum number of students in a batch for practical’s in first four semesters shall consist of 20 students and for fifth & sixth semester the batch shall consist of 15 students.
- The rules for admission to the subsequent (next) semesters will be the same as per the University guidelines.
- For Each course the concerned teacher will have to conduct Class tests after completion every 02 units. The mark list of the same is to be submitted to the university authority within 7 working days after the completion of class tests.
- Final Examination will be conducted by the college based on the complete syllabus.
- Final Practical Examination will be conducted by the university and examiners will submit the marks in the prescribed format of students for practical examination to the university.

Student Intake Capacity:

The intake capacity for B.Sc. in Computer Science is 60 students in the first year.

PEO, PO and CO Mappings

1. **Program Name**: B.Sc. (Computer Science) at NDMC

2. **Program Educational Objectives**: After completion of this program, the graduates / students would

<table>
<thead>
<tr>
<th>PEO</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>PEO I: Technical Expertise</td>
<td>Implement fundamental domain knowledge of core courses for developing effective computing solutions by incorporating creativity and logical reasoning.</td>
</tr>
<tr>
<td>PEO II: Successful Career</td>
<td>Deliver professional services with updated technologies in <strong>Computer Science</strong> based career.</td>
</tr>
<tr>
<td>PEO III: Hands on Technology and Professional experience</td>
<td>Develop leadership skills and incorporate ethics, teamwork with effective communication &amp; time management in the profession.</td>
</tr>
<tr>
<td>PEO IV: Interdisciplinary and Life Long Learning</td>
<td>Undergo higher studies, certifications and research programs as per market needs.</td>
</tr>
</tbody>
</table>

3. **Program Outcome(s)**: Students / graduates will be able to

**PO1**: Apply knowledge of mathematics, science and algorithm in solving Computer problems.
**PO2**: Generate solutions by conducting experiments and applying techniques to analyze and interpret data.
**PO3**: Design component, or processes to meet the needs within realistic constraints.
**PO4**: Identify, formulate, and solve problems using computational temperaments.
**PO5**: Comprehend professional and ethical responsibility in computing profession.
**PO6**: Express effective communication skills.
**PO7**: Recognize the need for interdisciplinary, and an ability to engage in life-long learning.
**PO8**: Actual hands on technology to understand it’s working.
**PO9**: Knowledge of contemporary issues and emerging developments in computing profession.
PO10: Utilize the techniques, skills and modern tools, for actual development process
PO11: Function effectively as an individual and as a member or leader in diverse teams and in multidisciplinary settings in actual development work
PO12: Research insights and conduct research in computing environment.

4. **Course Outcome(s):** Every individual course under this program has course objectives and course outcomes (CO). The course objectives rationally match with program educational objectives. The mapping of PEO, PO and CO is as illustrated below

5. **Mapping of PEO& PO and CO**

<table>
<thead>
<tr>
<th>Program Educational Objectives</th>
<th>Thrust Area</th>
<th>Program Outcome</th>
<th>Course Outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td>PEO I</td>
<td>Technical Expertise</td>
<td>PO1,PO2,PO3,PO6</td>
<td>All core courses</td>
</tr>
<tr>
<td>PEO II</td>
<td>Successful Career</td>
<td>PO4,PO5,PO11,</td>
<td>All discipline specific electives courses</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PEO III</td>
<td>Hands on Technology and Professional experience</td>
<td>PO8,PO10</td>
<td>All Lab courses</td>
</tr>
<tr>
<td>PEO IV</td>
<td>Interdisciplinary and Life Long Learning</td>
<td>PO7,PO9,PO12</td>
<td>All open electives and discipline specific electives</td>
</tr>
</tbody>
</table>


Swami Ramanand Teerth Marathwada University’s New Model Degree College,
Hingoli

Course Structure of B.Sc. (Computer Science)* w.e.f-AY 2019-2020
(* As per the strict guidelines of the UGC, New Delhi for syllabi at Model colleges)

<table>
<thead>
<tr>
<th>Sem.</th>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit</th>
<th>Total Credit</th>
</tr>
</thead>
<tbody>
<tr>
<td>First Year B.Sc. (Computer Science)-NMDC</td>
<td>MCBCS- E-101</td>
<td>Functional English</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td></td>
<td>MCBCS-SL-102</td>
<td>Second Language (Marathi/Hindi/)</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>First Sem</td>
<td>MCBCS-103T</td>
<td>Introduction to Information Communication Technology (ICT)</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Major Core</td>
<td>MCBCS-104T</td>
<td>Programming in C</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Major Supportive</td>
<td>MCBCS-105T</td>
<td>Mathematical Foundation for Computer Science</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Major Applied</td>
<td>MCBCS-106P</td>
<td>Expression (Training), Creation (Project) and Self Evaluation based on MCBCS-101T &amp; MCBCS-102T [Comp. Lab.1]</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Life Skill Curriculum</td>
<td>MCBCS-107</td>
<td>University recognized MOOC (NPTEL / SWAYAM / others) OR Intra / Inter Departmental courses OR Communication Skills – 1</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Job Oriented Soft Skill</td>
<td>MCBCS-108</td>
<td>Office Automation</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Value Oriented Courses</td>
<td>MCBCS-201</td>
<td>Functional English</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Second Sem</td>
<td>MCBCS-SL-202</td>
<td>Second Language (Marathi/Hindi/)</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Major Core</td>
<td>MCBCS-203T</td>
<td>Object Oriented Programming using C++</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Major Supportive</td>
<td>MCBCS-204T</td>
<td>Digital Electronics and Microprocessor</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Major Applied</td>
<td>MCBCS-205T</td>
<td>Statistical Method</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Life Skill Curriculum</td>
<td>MCBCS-206P</td>
<td>Expression (Training), Creation (Project) and Self Evaluation based on MCBCS-203T [Comp. Lab.2]</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Job Oriented Soft Skill</td>
<td>MCBCS-207</td>
<td>University recognized MOOC (NPTEL / SWAYAM / others) OR Intra / Inter Departmental courses OR Communication Skills – 2</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Value Oriented Courses</td>
<td>MCBCS-208</td>
<td>Computer System Architecture</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Semester</td>
<td>Language Curriculum</td>
<td>Major Curriculum</td>
<td>Life Skill Curriculum</td>
<td></td>
</tr>
<tr>
<td>----------</td>
<td>---------------------</td>
<td>----------------</td>
<td>---------------------</td>
<td></td>
</tr>
<tr>
<td><strong>Third Sem</strong></td>
<td><strong>MCBCS-E-301</strong> Functional English</td>
<td><strong>MCBCS-303T</strong> RDBMS</td>
<td><strong>MCBCS-307</strong> University recognized MOOC (NPTEL / SWAYAM / others) OR Intra / Inter Departmental courses OR Numerical Abilities</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>MCBCS-SL-302</strong> Second Language (Marathi/Hindi)</td>
<td><strong>MCBCS-304T</strong> Java Programming</td>
<td><strong>MCBCS-306P</strong> Expression (Training), Creation (Project) and Self Evaluation based on MCBCS-303T &amp; MCBCS-304T [Comp. Lab. 3]</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>MCBCS-SL-302</strong></td>
<td><strong>MCBCS-305T</strong> Data Structure and Algorithms</td>
<td><strong>MCBCS-306P</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>MCBCS-305T</strong></td>
<td><strong>MCBCS-306P</strong></td>
<td><strong>MCBCS-307</strong> University recognized MOOC (NPTEL / SWAYAM / others) OR Intra / Inter Departmental courses OR Numerical Abilities</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>MCBCS-SL-302</strong></td>
<td><strong>MCBCS-305T</strong></td>
<td><strong>MCBCS-306P</strong> Expression (Training), Creation (Project) and Self Evaluation based on MCBCS-303T &amp; MCBCS-304T [Comp. Lab. 3]</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>MCBCS-306P</strong></td>
<td><strong>MCBCS-305T</strong></td>
<td><strong>MCBCS-307</strong> University recognized MOOC (NPTEL / SWAYAM / others) OR Intra / Inter Departmental courses OR Numerical Abilities</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>MCBCS-307</strong> Cyber Forensics</td>
<td><strong>MCBCS-308</strong> Cyber Forensics</td>
<td><strong>MCBCS-307</strong> University recognized MOOC (NPTEL / SWAYAM / others) OR Intra / Inter Departmental courses OR Numerical Abilities</td>
<td></td>
</tr>
<tr>
<td><strong>Fourth Sem</strong></td>
<td><strong>MCBCS-E-401</strong> Functional English</td>
<td><strong>MCBCS-403T</strong> Windows Programming using VB</td>
<td><strong>MCBCS-407</strong> University recognized MOOC (NPTEL / SWAYAM / others) OR Intra / Inter Departmental courses OR Logical Reasoning</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>MCBCS-SL-402</strong> Second Language (Marathi/Hindi)</td>
<td><strong>MCBCS-404T</strong> Advanced Operating Systems</td>
<td><strong>MCBCS-408</strong> Multimedia Development</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>MCBCS-SL-402</strong></td>
<td><strong>MCBCS-405T</strong> Data communication and Networking</td>
<td><strong>MCBCS-408</strong> Multimedia Development</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>MCBCS-405T</strong></td>
<td><strong>MCBCS-406P</strong> Expression (Training), Creation (Project) and Self Evaluation based on MCBCS-403T [Comp. Lab. 4]</td>
<td><strong>MCBCS-408</strong> Multimedia Development</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>MCBCS-406P</strong></td>
<td><strong>MCBCS-405T</strong></td>
<td><strong>MCBCS-408</strong> Multimedia Development</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>MCBCS-407</strong> University recognized MOOC (NPTEL / SWAYAM / others) OR Intra / Inter Departmental courses OR Logical Reasoning</td>
<td><strong>MCBCS-406P</strong> Expression (Training), Creation (Project) and Self Evaluation based on MCBCS-403T [Comp. Lab. 4]</td>
<td><strong>MCBCS-408</strong> Multimedia Development</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>MCBCS-408</strong> Multimedia Development</td>
<td><strong>MCBCS-406P</strong> Expression (Training), Creation (Project) and Self Evaluation based on MCBCS-403T [Comp. Lab. 4]</td>
<td><strong>MCBCS-408</strong> Multimedia Development</td>
<td></td>
</tr>
</tbody>
</table>
## Third Year B.Sc. (Computer Science)-NMDC

<table>
<thead>
<tr>
<th>Fifth Sem</th>
<th>Major Curriculum</th>
<th>Major Core</th>
<th>MCBCS-501T</th>
<th>Web Programming Techniques</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Major Supportive</td>
<td>MCBCS-502T</td>
<td>C# Programming</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Major Applied</td>
<td>MCBCS-503T</td>
<td>Software Engineering</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td></td>
<td>MCBCS-504P</td>
<td>MCBCS-502T &amp; MCBCS-501T [Comp. Lab.5]</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Life Skill Curriculum</td>
<td>MCBCS-505</td>
<td>Software Project Management</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Job Oriented Soft Skill</td>
<td>MCBCS-506</td>
<td>University recognized MOOC (NPTEL / SWAYAM / others) OR Intra / Inter Departmental courses OR System Analysis and Design (SAD)</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Value Oriented Courses</td>
<td>MCBCS-507</td>
<td>Advanced Java Programming</td>
<td>4</td>
<td></td>
</tr>
</tbody>
</table>

### Sixth Semester

<table>
<thead>
<tr>
<th>Major Curriculum</th>
<th>Major Core</th>
<th>MCBCS-601T</th>
<th>Essentials of Computer Security</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>MCBCS-602T</td>
<td>Digital Image Processing</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Major Supportive</td>
<td>MCBCS-603T</td>
<td>Web Development using PHP Programming</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>Major Applied</td>
<td>MCBCS-604P</td>
<td>Expression (Training), Creation (Project) and Self Evaluation based on MCBCS-603T [Comp. Lab.6]</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>MCBCS-605</td>
<td>Project Development activity and Seminar</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Life Skill Curriculum</td>
<td>MCBCS-606</td>
<td>University recognized MOOC (NPTEL / SWAYAM / others) OR Intra / Inter Departmental courses OR Introduction to Open Source Software</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>Value Oriented Courses</td>
<td>MCBCS-607</td>
<td>Software Quality Testing</td>
<td>4</td>
</tr>
</tbody>
</table>

---

The detailed syllabus is as below,
### Scheme of Evaluation (Marks Distribution)

#### For 04 credits course

<table>
<thead>
<tr>
<th>Internal : 50 Marks</th>
<th>University: 50 Marks</th>
<th>Total: 100 Marks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Credits: 4</td>
<td>Hours per Week: 5</td>
<td>Total Lectures: 60</td>
</tr>
</tbody>
</table>

A) **Internal : Total 50 Marks**

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Title</th>
<th>Marks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Class Test I</td>
<td>15</td>
</tr>
<tr>
<td>2</td>
<td>Class Test I</td>
<td>15</td>
</tr>
<tr>
<td>3</td>
<td>Assignment</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td><strong>Total</strong></td>
<td><strong>50 Marks</strong></td>
</tr>
</tbody>
</table>

#### For 05 credits course

<table>
<thead>
<tr>
<th>Internal : 75 Marks</th>
<th>University: 50 Marks</th>
<th>Total: 125 Marks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Credits: 5</td>
<td>Hours per Week: 5</td>
<td>Total Lectures: 60</td>
</tr>
</tbody>
</table>

A) **Internal : Total 75 Marks**

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Title</th>
<th>Marks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Class Test I</td>
<td>15</td>
</tr>
<tr>
<td>2</td>
<td>Class Test I</td>
<td>15</td>
</tr>
<tr>
<td>3</td>
<td>Assignment</td>
<td>20</td>
</tr>
<tr>
<td>4</td>
<td>Seminar</td>
<td>25</td>
</tr>
<tr>
<td></td>
<td><strong>Total</strong></td>
<td><strong>75 Marks</strong></td>
</tr>
</tbody>
</table>


B) University Assessment: Total 50 Marks

Note: 1) Q. No. 1 is compulsory and from Q. No. 2 to Q. No 8 solve any four.

2) All questions carry equal marks.

<table>
<thead>
<tr>
<th>Q. No.</th>
<th>Format</th>
<th>Marks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Write a short note on following:</td>
<td>$2 \times 5 = 10$</td>
</tr>
<tr>
<td></td>
<td>a)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>b)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>c)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>d)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>e)</td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td>Brief Question</td>
<td>10</td>
</tr>
<tr>
<td>3.</td>
<td>Brief Question</td>
<td>10</td>
</tr>
<tr>
<td>4.</td>
<td>Brief Question</td>
<td>10</td>
</tr>
<tr>
<td>5.</td>
<td>Write brief note on the following (Solve any two)</td>
<td>$5 \times 2 = 10$</td>
</tr>
<tr>
<td></td>
<td>a)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>b)</td>
<td></td>
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<td>8.</td>
<td>Brief Question</td>
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</table>
## Functional English

**Course Objectives:**
1. To encourage the students to speak English
2. To enable students to use English in day-to-day communication
3. To build up their confidence in the usage of English
4. To expose them to light prose and poetry
5. To develop their written communicative competence

**Course Outcome:** Confident students with readiness for competitive exams

### Unit – I

**Prose:**
1) The Bet – Anton Chekov
2) Socrates and the Schoolmaster – F. L. Brayne
4) The Gift of the Magi – O’ Henry
5) With the Photographer – Stephen Leacock

### Unit – II

**Spoken Communication:**
1) Meeting People, Exchanging Greetings and Taking Leave
2) Introducing Yourself
3) Introducing People to Others
4) Answering the Telephone and Asking for Someone
5) Dealing with a Wrong Number
6) Taking and Leaving Messages
7) Making Inquiries on the Phone
8) Calling for Help in an Emergency

### Unit – III

**Grammar and Vocabulary:**
Articles, prepositions, modal auxiliaries, antonyms, synonyms, one-word substitutes

### Unit – IV

**Written Communication:**
Summarizing

**Reference Books:**
1. ‘Prism: Spoken and Written Communication, Prose & Poetry’ published by Orient Longman
Paper No.: MCBCS-SL-102

Second Language (Marathi/Hindi/)

Internal: 50 University: 50 Total: 100 Marks

Credits: 4

Hours per Week: 4 Total Lectures: 60
Swami Ramanand Teerth Marathwada University’s
New Model Degree College, Hingoli

Syllabus for B.Sc. (CS) I Semester
Paper No.: MCBCS-103T Introduction to Information Communication Technology (ICT)
Internal: 75 University: 50 Total: 125 Marks
Hours per Week: 5 Total Lectures: 60

• Course Objectives: The objective of this course is to study the fundamentals of Computer System and to learn how computer systems work and underlying principles
• Course Outcome: Awareness of ICT

Unit – I
Basic Computer Organization: Block Diagram, Input Unit, Output Unit, Storage Unit, Arithmetic Unit, Control Unit, Central Processing Unit, the System Concept.
Number Systems: Non-Positional Number Systems, Positional Number Systems: Binary, Octal, Decimal, Hexadecimal. Conversion from one number system to another number system.
Computer Codes: BCD, EBCDIC, ASCII, UNICODE, Collecting Sequence.

Unit – II
Main Memory: Storage Evolution criteria, Main Memory Organisation, Main Memory Capacity, Types of Memory Chips, Cache Memory.
Secondary Memory: Sequential and Direct Access Devices, Magnetic Taps, Magnetic Chips, Optical Disks, Memory Storage Devices (Pen Drives, SD/MMC), Mass Storage Devices

Unit – III
Output Devices: Monitor, Printers, Plotter, Screen image projectors, Voice response systems.

Unit – IV
Computer Software: Software, Relationship between Hardware and Software, Types of Software.
Internet: Definition, History, Basic Services (E-mail, FTP, Telnet, Usenet News), WWW, Search Engine, Use of Internet.
Classification of Computers: Notebook, PCs, Workstation, Mainframe, Super, Client and Server, Hand held computers (Tablet, PDA, Smartphone).

Reference Books:
2. Foundation of Computer, P.K. Sinha
Syllabus for B.Sc. (CS) I Semester

Paper No.: MCBCS-104T  Programming in C
Internal: 75  University: 50  Total: 125 Marks  Credits: 5
Hours per Week: 5  Total Lectures: 60

Course Objectives:

- To be able to build own logic for a given problem and finally develop one’s own programs
- To understand the syntax and the semantics of C programming language.

Course Outcome: Competency in Programming Languages

Unit – I

Introduction: What is C, Getting Started with C, The C Character Set, Constants, Variables and Keywords, Types of C Constants, Rules for Constructing Integer Constants, Rules for Constructing Real Constants, Rules for Constructing Character Constants, Types of C Variables, Rules for Constructing Variable Names, C Keywords, The First C Program, Compilation and Execution, Receiving Input, C Instructions, Type Declaration Instruction, Arithmetic Instruction, Integer and Float Conversions, Type Conversion in Assignments, Hierarchy of Operations, Associativity of Operators, Control Instructions in C.

Unit – II


Unit – III

Functions & Pointers: What is a Function, Why Use Functions, Passing Values between Functions, Scope Rule of Functions, Calling Convention, One Dicey Issue, Advanced Features of Functions, Function Declaration and Prototypes, Call by Value and Call by Reference,

Pointers: An Introduction to Pointers, Pointer Notation, Back to Function Calls, Conclusions, Recursion, Recursion and Stack, Adding Functions to the Library.

Unit – IV

Arrays: What are Arrays, Array Initialization, Bounds Checking, Passing Array Elements to a Function, Pointers and Arrays, Passing an Entire Array to a Function, Two Dimensional Arrays, Initializing a 2-Dimensional Array, Memory Map of a 2-Dimensional Array, Pointers and 2-Dimensional Arrays, Pointer to an Array Passing 2-D array to a Function, Array of Pointers, Three Dimensional Array.

Reference Books:
1. Let Us C, Kanitkar
2. Ansi C, Balaguru Swami
3. Programming in C, Khanale
Syllabus for B.Sc. (CS) I Semester

Mathematical Foundation for Computer Science

Paper No.: MCBCS-105T

Internal: 50   University: 50   Total: 100 Marks

Credits: 4

Hours per Week: 4   Total Lectures: 60

Course Objectives:

- To get the knowledge about the Sets, matrices, relational functions etc..
- To study the basics of differential and integral calculus

Course Outcome: Development of Analytical Mind

Unit – I


Unit – II

Relation and Function: Introduction, Relations on Sets, Some operations on sets, Types of Relations in a set, Properties of Relations, Representation of Relations, Composition of Relations, Closure of Relations.

Function: Introduction, Classification of Functions, Types of Functions, Composition of Functions, Recursively defined function, Some Special Function.

Unit – III

Graph Theory: Introduction, Basic terminology, Simple graph, Multigraph, pseudo graph, Degree of vertex, Types of Graphs, Subgraphs and Isomorphic graphs, Operation of Graphs, Paths, Cycles and Connectivity, Eulerian and Hamiltonian graph, Shortest path problems, Representation of graph, Planar Graphs, Graph Coloring.

Unit – IV

Trees: Introduction, Trees and their properties, Spanning Tree, Binary Tree, Tree Traversal.


Reference Books:

1. A Textbook of Discrete Mathematics, Swapan Kumar Sarkar, S.Chand
3. Advanced Engineering Mathematics, Erwin Keryzig
6. Discrete Mathematical Structures, Kolman & Ross, PHI
Syllabus for B.Sc. (CS) I Semester

Paper No.: MCBCS-106P  
Expression (Training), Creation (Project) and Self Evaluation based on MCBCS-101T &  MCBCS-102T (Comp.Lab.1)

Internal: 50  University: 50 Total: 100 Marks  
Hours per Week: 4  Total Learning Hours: 120 (3 x 40) in Comp. Lab.  
Credits: 4

Unit – I  (Internal: 20 Marks)  
Assignment Expression: Training for installation of some popular operating systems, Experience of working with operating systems, Comparisons among various operating systems.

Unit – II  (Internal: 20 Marks)  
Creation: Project report preparation based

Unit – III  (Internal: 10 Marks)  
Self Evaluation: Based on checklist provided by instructor.
Scope for Communication Skills – 1
Credits: 2

Objectives of the Course:
1. To make a comprehensive use of English in day-to-day life.
2. To help Students develop the ability to learn and contribute critically.
3. To develop the writing skills of the students.
4. To help the students to understand the basic usages of English.

Course outcome:
By the end of this course students should be able to:
1. Understand and demonstrate Basic English usages for their different purposes.
2. Clear entrance examination and aptitude tests.
3. Write various letters, reports required for professional life.

Unit I
1. Basic English Grammar 15
   1.1 Noun
   1.2 Verb
   1.3 Adjective
   1.4 Adverb

Unit II
2. Transformation of Sentences: 10
   2.1 Simple to Complex
   2.2 Complex to Compound

Unit III
3. Writing Skills 15
   3.1 Essay Writing
   3.2 Email Writing
   3.3 Resume

Unit IV
4. Group Discussion 10
   4.1 Group Discussion:
   4.2 Seminar Conference
   4.3 Meeting
   4.4 Interview

References:-
2 Fundamental of Computer - V. Raja Raman, PHI Publication
Office Automation

Objectives
The main objective of Office Automation is to enhance and upgrade the existing system by increasing its efficiency and effectiveness. It will simplify the task and reduce the paper work means the software improves the working methods by replacing the existing manual system with the computer-based system.

Outcomes
After completion of this course student will be able to understand the computer software, hardware, made available to simplify and automate a variety of office operations such as data processing, data manipulating and data presentation with various application those are presents in Microsoft office tools packages.

Unit – I
Introduction to Ms-Word
- Uses of Ms- Word.
- Dialog Boxes: Command buttons, check boxes, Drop-down lists, tabs, radio Buttons, Increment buttons.
- Wizards and Templates.
- Basic Text Editing: Cut, Copy, Paste, Undo, Redo, Delete

Formatting:
- Character formatting by using Font dialog box, Paragraph Formatting by using Keeping text together, Adding borders and shading, page and section formatting, page setup, Numbering pages.

Unit – II

Working with Tables and Columns
- History of table, creating a table, entering text in a table using table tools.
- Changing column’s width with Auto fit, Gridlines.
- Merging Cells
- Table Formatting:-Sorting tables, copying tables, deleting tables.
- Mail merge

Unit – III

Introduction to Ms-Excel
- Spreadsheet overview, starting excel, creating spreadsheet, excel menu.
- Working with Formulas and Functions: Introduction using basic formulae, advance formulae, designing formulae
- Formatting: Types of formatting:
  1. Using borders, color and patterns
  2. Conditional formatting

Introduction to Power point
- Creating PowerPoint Presentation.
Introduction to MS-Access
• Creation Of files in Ms-Access.

Reference Books:
1. Microsoft Office 2000 By Complete (Bpb)
2. Mastering Word 2000 By Mansfield (Bpb)
3. Teach Yourself Ms-Excel 2000 In 24 Hours (Bpb)
Objectives of the Course:
5. To make a comprehensive use of English in day-to-day life.
6. To help Students develop the ability to learn and contribute critically.
7. To develop the writing skills of the students.
8. To help the students to understand the basic usages of English.

Course outcome:
By the end of this course students should be able to:
4. Understand and demonstrate Basic English usages for their different purposes.
5. Clear entrance examination and aptitude tests.
Write various letters, reports required for professional life

UNIT I
Poetry:
1) The Felling of the Banyan Tree – Dilip Chitre
2) Stay Calm – Grenville Kleiser
3) On Television – Roald Dahl
4) Say Not the Struggle Naught Availeth – Arthur Hugh Clough
5) Abou Ben Adhem – James Leigh Hunt

UNIT II
Spoken Communication:
1. Getting People’s Attention and Interrupting
2. Giving Instructions and Seeking Clarifications
3. Making Requests and Responding to Requests
4. Asking for Directions and Giving Directions
5. Thanking Someone and Responding to Thanks
6. Inviting and Accepting and Refusing an Invitation
7. Apologizing and Responding to an Apology
8. Asking for, Giving and Refusing Permission

UNIT III
Grammar and Vocabulary:
Articles, prepositions, modal auxiliaries, antonyms, synonyms, one-word substitutes

UNIT IV
Written Communication:
Note Making and Note Taking

Reference Book:
1. ‘Prism: Spoken and Written Communication, Prose & Poetry’ published by Orient Longman
Swami Ramanand Teerth Marathwada University’s
New Model Degree College, Hingoli
Syllabus for B.Sc. (CS) II Semester

Paper No.: MCBCS-SL-202
Second Language (Marathi/Hindi/)

Internal: 50  University: 50  Total: 100 Marks
Hours per Week: 4  Total Lectures: 60

Credits: 4
Syllabus for B.Sc. (CS) II Semester

Object Oriented Programming using C++

Paper No.: MCBCS-203T
Internal: 75  University: 50  Total: 125 Marks

Credits: 5

Course Objectives:
- An understanding of all the components of advance C++.
- An understanding of advanced practical issues, including memory management,
- The course will helps to student for complex declarations and expression evaluation.

Course Outcome : Competency in Object oriented programming

UNIT I

Introduction to OOPs
Object Oriented Programming, Basic concepts of OOPS, Benefits of OOPs.

Introduction to C ++
Tokens, Keywords, Identifiers, Constant, Data types, variables, Scope resolution Operator, I/O statements, Structure of C++ program, Control statements, Looping statements, Type casting, Arrays, Pointer, References, Structure and Unions

UNIT II

Function in C++
Call by reference, Return by reference, Function overloading and default arguments, Inline function, Static class members, Friend functions.

UNIT III

Class & Object:
Define Class, Members, Object, Visibility Modes, Static members, Defining Data Members and Member Functions, Nested Classes, Local Classes, Pointer to members & Pointer to Objects, Constructors & Destructors

UNIT IV

Operator overloading
Overloading Unary Operators, Overloading Binary Operators, Overloading using Friend Function, Rules for Overloading.

Inheritance & Polymorphism:
Types of Inheritance with Examples, Virtual Base Classes and Abstract Base Classes, Polymorphism, Constructor and Destructor in Derived Class, Virtual Functions and Pure Virtual Function

Reference Books:
1. Object Oriented Programming with C++ by Robert Lafore
2. Object Oriented Programming with C++ by E. Balagurusamy
3. Object Oriented Modeling and Design by James Rambough
4. The Complete Reference C++ by Herbert Shildth
5. Let us C++ by – Yashwant Kanitkar
Syllabus for B.Sc. (CS) II Semester

Paper No.: MCBCS-204T  
Digital Electronics and Microprocessor

Internal: 75  
University: 50  
Total: 125 Marks

Credits: 5

Hours per Week: 5  
Total Lectures: 60

Course Objectives:

- To learn about the design principles of different digital electronic circuits
- To study the applications of above circuits
- Student will understand the 8086 microprocessor.
- Using this course student will familiarize with the architecture of microprocessors.
- Make the student aware about the functional organization of physical components and architecture of a 8086 Microprocessor Kit.

Course outcome: Easy with Hardware terminology and digital circuits

Unit – I

Boolean Algebra and Logic Circuits: Fundamental of Boolean Algebra, Postulates of Boolean Algebra, Principle of Duality, Theorems of Boolean Algebra, Boolean Functions, Logic Gates, Logic Circuits, Flip-flop, Counters, Registers

Unit – II

Introduction to Microprocessor: Evolution, Microcontroller, Embedded Microprocessor, 16-Bit Intel Microprocessor Architecture, Pin Description of 8086, Operating modes, Minimum & Maximum modes, Register Organization, BIU & EU, Interrupts.

Unit – III

8086 Instruction Set: Instruction Groups, Addressing Mode Byte, Segment Register Selection, 8086 Instructions.

Unit – IV

Assembly Language Programs for 8086: To find largest/smallest number in a array, To find Largest 8-bit number, Ascending order, Descending order, Byte move, Word move, Byte/Word move using REP instruction, sum of 16-bits/32-bits number series, Multibyte addition and etc.

Standards for Bus Architecture and Ports: ISA, EISA, MCA, PCI, VESA, USB, IDE, EIDE, ATA, ATAPI and SCSI.

Reference Books:

2. Advance Microprocessor and Interfacing, B.Ram, Pearson
Course Objectives:
- To acquaint students with various statistical methods and their applications in different fields.
- To cultivate statistical thinking among students.
- To develop skills in handling complex problems in data analysis and research design.

Course Outcome: Establishment of quantitative components

Unit – I
Population, Sample and Data Condensation: Definition and scope of statistics, concept of population and sample with illustration, raw data, attributes and variables, classification, frequency distribution, cumulative frequency distribution.

Unit – II
Measures of Central Tendency: Concept of central tendency, requirements of a good measure of central tendency, arithmetic mean, median, mode, harmonic mean, geometric mean for grouped and ungrouped data.

Unit – III
Measures of Dispersion: Concept of dispersion, absolute and relative measure of dispersion, range, variance, standard deviation, coefficient of variation. Permutations and Combinations: Permutations of ‘n’ dissimilar objects taken ‘r’ at a time (with or without repetitions). nPr = n! / (n-r)! (without proof). Combinations of ‘r’ objects taken from ‘n’ objects. nCr = n! / (r! (n-r)!) (without proof). Simple examples, Applications.

Unit – IV
Sample space, events and Probability: Experiments and random experiments. Ideas of deterministic and nondeterministic experiments. Definition of - sample space, discrete sample space, events. Types of events, union and intersections of two or more events, mutually exclusive events, complementary event, exhaustive event. Simple examples. Classical definition of probability, Addition theorem of probability without proof (upto three events are expected), Definition of Conditional Probability Definition of independence of two events, simple numerical problems.

Reference Books:
6) Gupta S.P. – Statistical Methods, Pub – Sultan Chand and sons, New Delhi.
Syllabus for B.Sc. (CS) II Semester

Paper No.: BSCCS-206P  
Expression (Training), Creation (Project) and Self Evaluation based on MCBCS-203T(Comp.Lab.2)

Internal : 50  University: 50 Total: 100 Marks  
Credits: 4  
Hours per Week : 4  Total Learning Hours: 120 (3 x 40) in Comp. Lab.

Unit – I  (Internal: 20 Marks)  
Assignment Expression: Training for Assembly programming, Training for C Programming.

Unit –II  (Internal: 20 Marks)  
Creation: Individual Minor Project using C language.

Unit – III  (Internal: 10 Marks)  
Self Evaluation: Based on checklist provided by instructor.
Swami Ramanand Teerth Marathwada University’s New Model Degree College, Hingoli
Syllabus for B.Sc. (CS) II Semester

Paper No.: MCBCS-207

University recognized MOOC (NPTEL / SWAYAM / others) OR Intra / Inter Departmental courses OR Communication Skills – 2

Scope for Communication Skills – 2 Credits: 2

Objectives of the Course:
1. A comprehensive use of English in day-to-day life.
2. To help Students develop the ability to learn and contribute critically.
3. To develop the writing skills of the students.
4. To help the students to understand the basic usages of English.

Course outcome:
By the end of this course students should be able to:
1. Understand and demonstrate Basic English usages for their different purposes.
2. Clear entrance examination and aptitude tests.
3. Write various letters, reports required for professional life.

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<tr>
<th>Unit I</th>
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<tr>
<td>1. Practical usage of English:</td>
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<tr>
<td>1.1 Group Discussion</td>
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<td>1.2 Seminar and Conference</td>
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<td>1.3 Interview</td>
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<th>Unit II</th>
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<tr>
<td>2. Business Communication:</td>
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<td>2.1 E-mail and Cover letter writing</td>
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<td>2.2 Resume and CV</td>
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<td>2.3 Report writing</td>
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<th>Unit III</th>
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<td>3. Functional English</td>
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<td>3.1 Articles</td>
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<td>3.2 Prepositions</td>
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<td>3.3 Conjunctions</td>
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<td>4.4 Quantifiers</td>
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<th>Unit IV</th>
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<td>4. Basic Structures:</td>
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<td>4.1 Phrases</td>
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<td>4.2 Clauses</td>
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<tr>
<td>4.3 Sentence: Basic Structures</td>
</tr>
</tbody>
</table>

Reference Books -
1) Modern English Grammar - L. S. Deshpande (creative Publication)
2) A Practical English Grammar - A. J. Thomson. (Oxford University)
3) Developing Communication Skills.- Krishna Mohan & Meera Banerji (Macmillan India)
4) Macmillan Foundation English. - R. K. Dwivedi & a. Kumar (Mammalian India Ltd)
5) Writing English for You - G. Radhakrishna Pillai (Emerland Publication)
6) High School English Grammar & Composition - Wren & Martin (S. Chand)
Syllabus for B.Sc. (CS) II Semester

Paper No.: MCBCS-208    Computer System Architecture

Credits: 2

Objectives
Through this paper Student should learn basic principles of computer. The paper is designed to aim at importing basic level of Computer.

Outcome
To learn Basic Function of Devices like I/O, HDD etc. To Understand the Fundamental of Software and Hardware. Understand the Concept of Operating System and Network.

Unit I
Number system
Introduction to Number system, Binary, Octal, Hexadecimal, binary-complement representation, BCD-ASCII, conversion of numbers from one Number system to the other, binary arithmetic Signed numbers, 1’s and 2’s complement method,

Unit II
Logic Gates
Basic Logic Gates – Basic Theorems and Properties of Boolean Algebra – NAND, NOR implementation – Sum of Products – Product of Sums, Karnaugh ma, Tabulation Method, Don’t Care Conditions. Full Adder, Half Adder,

Unit III
Processor Organization
General Register Organization - ALU - Instruction codes - Instruction Formats - Stack Organization - Addressing modes

Unit IV
Control Unit
Register transfer and micro operations, Timing and Control, Control Memory, micro programming, Hard wired control

Suggested Readings: