Bachelor of Computer Applications (BCA)
Three year (Six Semester) Course

The course of study of Bachelor of Computer Applications (BCA) shall extend over a period of six semesters spread over three years. On satisfactory completion of the course and after passing the examinations, a candidate will be awarded the Bachelor of Computer Applications degree.

Every academic year shall be divided into two semesters. I semester starts from July and ends in December. II semester starts from January and ends in June and so on. There shall be an examination at the end of each semester. The examinations shall consist of theory papers, practical papers.

The examination of each semester will consist of four theory papers, and three practical papers.

Medium of instructions and examination will be English only.

Eligibility for admission:
Admission procedure for I semester starts in the month of June/July every year. The admission of the BCA course should be made irrespective of the stream (Arts/Science/Commerce) a candidate must have passed 10+2 level exam of any board with Physics / Mathematics / Bus. Maths / Computer Science / Information Tech. / Information Practices / Multimedia and Web.Tech. as one of the Optional subject with 50% or more (45% for SC/ST/OBC/SOBC category) in aggregate without any approximation.

Those students who are not having any of the above subjects will have to clear entrance exam which will be conducted before the admission procedure concludes. These students have to give this entrance exam conducted either by University of Rajasthan or by College department itself.

Examination Scheme:
Each theory paper shall be of 100 marks (70 marks for written examination of 3 hrs duration and 30 marks for internal assessment).
Each practical paper shall be of 100 marks (60 for practical exam and 40 for internal assessment).
The basis for internal evaluation in theory shall be home assignment, internal test and regularities in the attendance.
The basis for internal assessment in the laboratory courses shall be timely submission of the lab. records, performance in the lab., internal tests etc.

Each theory paper examination will be of three-hour duration and shall carry 70 marks. Theory paper shall contain three parts.

a) Part A, will contain 12 questions (student will attempt any 10) of very short questions each carrying 1 mark.
b) Part B, will contain 4 short descriptive types of questions (1from each unit) each carrying 5 marks, all are compulsory.
c) Part C, will contain 4 long descriptive types of questions (1from each unit) each carrying 10 marks, all questions are compulsory with internal choice.
Each practical examination (Maximum marks 100) will be of four-hour duration on one day and carry 60 marks for exercise(s) assigned in the examination and Viva, and 40 marks for the Internal Assessment.

<table>
<thead>
<tr>
<th>S.No.</th>
<th>Question Pattern</th>
<th>Max. Marks (Theory)</th>
<th>Max. Marks (Practical)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>ESE</td>
<td>CIA</td>
</tr>
<tr>
<td>1</td>
<td>Part A: 12 Very Short Questions (attempt any 10 questions)</td>
<td>10 X 1=10</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Part B: 4 Short Question from each Unit (Compulsory)</td>
<td>4 X 5 =20</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Part C: 4 Questions from each Unit with Internal Choice</td>
<td>4 X 10=40</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Sub Total</td>
<td>70</td>
<td>30</td>
</tr>
</tbody>
</table>

**Passing Criteria:** Rules and Regulations for promotion of students to higher classes and matters related to examinations

- Promotion from odd semesters to even semesters is automatic, provided the student has registered his/her name for the examination by paying the required examination fee.
- To gain eligibility for promotion to the next year (III / V Sem.), a student is required to pass in at least 60% of the subjects offered in the previous year’s semesters put together.
- A student is required to score a minimum of 40% in a subject (theory and internal assessment put together). However, he/she has to score a minimum of 40% in theory. In the case of subjects with practical it is mandatory for the student to score 40% in the practical examination to be declared to have passed in that subject. If the student fails in theory or practical he/she should reappear for theory or practical examination as the case may be. Examinations will be conducted for odd and even semesters at the end of each semester. There is no provision of Supplementary examinations in Semester Scheme courses.
- If student does not secure minimum marks in theory paper but clears the practical exam of that paper then practical marks will be carried forward.
- Students have to appear in both the internal exams of each semester. There will be no provision of repeat internal examinations under any circumstances.
- Candidate must complete the course within the double of the course duration time after appearing in the main exam. Candidate will be allowed to appear 3 times (1 Main + 2 extra attempts) in that particular paper.
- Candidate taking admission in Autonomous course will not be allowed to simultaneously pursue any other regular course from any other university and they will also not be allowed to do any full time job.
**Attendance:**
A candidate shall be required to put in a minimum of 75% attendance at the lectures and 75% attendance at the practical’s separately in each paper.

**Examination Scheme**

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Paper</th>
<th>ESE</th>
<th>CIA</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Theory</td>
<td>70%</td>
<td>30%</td>
<td>100</td>
</tr>
<tr>
<td>2</td>
<td>Practical</td>
<td>60%</td>
<td>40%</td>
<td>100</td>
</tr>
</tbody>
</table>

**Number of Units in Syllabus**

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Stream</th>
<th>No. of Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>BCA</td>
<td>4</td>
</tr>
</tbody>
</table>

**Maximum Marks for the Course and Number of Units of Each subject**

3 Years / 6 Semesters

<table>
<thead>
<tr>
<th>Sr. No</th>
<th>Stream</th>
<th>Semester</th>
<th>Number of Papers per semester</th>
<th>Total Marks of 1 Semester</th>
<th>Sub Total</th>
<th>Grand Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>I , II, III, IV and V Sem</td>
<td>4 X 100, 3 X 100</td>
<td>400 +300 = 700</td>
<td>700 X 5 = 3500</td>
<td>3500</td>
</tr>
<tr>
<td></td>
<td></td>
<td>VI Sem Project</td>
<td>4 X 100, 1 X 300</td>
<td>400+300 = 700</td>
<td>700 X 1 =700</td>
<td>700</td>
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<tr>
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<td></td>
<td></td>
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<td></td>
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<td>4200</td>
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**Award of Division and Grade:**
To award Division and Grade to students the total of two internal assessment & End term semester exam marks in all subjects will be considered. Over all merit / rank of student will be declared after compilation of marks / grade secured by the candidate in all the semesters of that course.
The distribution is as follows.

<table>
<thead>
<tr>
<th>% of Marks</th>
<th>Division</th>
<th>Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>90.01 % and above</td>
<td>I</td>
<td>Outstanding</td>
</tr>
<tr>
<td>80.01 – 90.0%</td>
<td>I</td>
<td>A++</td>
</tr>
<tr>
<td>70.01 – 80.0%</td>
<td>I</td>
<td>A+</td>
</tr>
<tr>
<td>60.0 – 70.0%</td>
<td>I</td>
<td>A</td>
</tr>
<tr>
<td>54.01 – 59.99%</td>
<td>II</td>
<td>B</td>
</tr>
<tr>
<td>48.01 – 54.0 %</td>
<td>II</td>
<td>C</td>
</tr>
<tr>
<td>40.01 – 48.0%</td>
<td>Pass</td>
<td>D</td>
</tr>
<tr>
<td>Less than 40.0%</td>
<td>Reappear/Fail</td>
<td>E</td>
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</table>
## Semester Structure (BCA)

### Semester – I

<table>
<thead>
<tr>
<th>Code</th>
<th>Theory Papers</th>
<th>Teaching per week Hours</th>
<th>End Semester Exam (ESE)</th>
<th>Continuous Internal Assessment (CIA)</th>
<th>Exam Hours</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>PBCA101</td>
<td>Fundamentals of Computer Science</td>
<td>4</td>
<td>70</td>
<td>30</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>PBCA102</td>
<td>PC Software (for Session 2013-14 only) Electrical Circuit and Semiconductor Physics</td>
<td>4</td>
<td>70</td>
<td>30</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>PBCA103</td>
<td>Programming in C</td>
<td>4</td>
<td>70</td>
<td>30</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>PBCA104</td>
<td>Basic Mathematics (for Session 2013-14 only) Discrete Mathematics</td>
<td>4</td>
<td>70</td>
<td>30</td>
<td>3</td>
<td>4</td>
</tr>
</tbody>
</table>

### Practical Papers

<table>
<thead>
<tr>
<th>Code</th>
<th>Theory Papers</th>
<th>Teaching per week Hours</th>
<th>End Semester Exam (ESE)</th>
<th>Continuous Internal Assessment (CIA)</th>
<th>Exam Hours</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>PBCA151</td>
<td>Programming in C Lab.</td>
<td>4</td>
<td>60</td>
<td>40</td>
<td>4</td>
<td>3</td>
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<tr>
<td>PBCA152</td>
<td>Office Management Lab.</td>
<td>4</td>
<td>60</td>
<td>40</td>
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<td>3</td>
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<tr>
<td>PBCA153</td>
<td>Communication Skills Lab.(for session 2013-14) ECSP Lab</td>
<td>4</td>
<td>60</td>
<td>40</td>
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</table>

**Total** 28 460 240 24 25

### Semester – II

<table>
<thead>
<tr>
<th>Code</th>
<th>Theory Papers</th>
<th>Teaching per week Hours</th>
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<th>Continuous Internal Assessment (CIA)</th>
<th>Exam Hours</th>
<th>Credits</th>
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<tbody>
<tr>
<td>PBCA201</td>
<td>Object Oriented Programming Concepts</td>
<td>4</td>
<td>70</td>
<td>30</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>PBCA202</td>
<td>Internet &amp; Web Technologies</td>
<td>4</td>
<td>70</td>
<td>30</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>PBCA203</td>
<td>Digital Electronics &amp; Circuit</td>
<td>4</td>
<td>70</td>
<td>30</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>PBCA204</td>
<td>Computer Architecture</td>
<td>4</td>
<td>70</td>
<td>30</td>
<td>3</td>
<td>4</td>
</tr>
</tbody>
</table>

### Practical Papers

<table>
<thead>
<tr>
<th>Code</th>
<th>Theory Papers</th>
<th>Teaching per week Hours</th>
<th>End Semester Exam (ESE)</th>
<th>Continuous Internal Assessment (CIA)</th>
<th>Exam Hours</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>PBCA251</td>
<td>C++ Lab.</td>
<td>4</td>
<td>60</td>
<td>40</td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td>PBCA252</td>
<td>Internet &amp; Web Lab</td>
<td>4</td>
<td>60</td>
<td>40</td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td>PBCA253</td>
<td>DEC Lab.</td>
<td>4</td>
<td>60</td>
<td>40</td>
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</table>

**Total** 28 460 240 24 25
### Semester – III

<table>
<thead>
<tr>
<th>Code</th>
<th>Theory Papers</th>
<th>Teaching per week Hours</th>
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<th>Continuous Internal Assessment (CIA)</th>
<th>Exam Hours</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>PB301</td>
<td>Data Base Management System</td>
<td>4</td>
<td>70</td>
<td>30</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>PB302</td>
<td>Advance Java Programming</td>
<td>4</td>
<td>70</td>
<td>30</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>PB303</td>
<td>Operating system Fundamentals</td>
<td>4</td>
<td>70</td>
<td>30</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>PB304</td>
<td>System Analysis &amp; Design</td>
<td>4</td>
<td>70</td>
<td>30</td>
<td>3</td>
<td>4</td>
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</tbody>
</table>

#### Practical Papers

<table>
<thead>
<tr>
<th>Code</th>
<th>Theory Papers</th>
<th>Teaching per week Hours</th>
<th>End Semester Exam (ESE)</th>
<th>Continuous Internal Assessment (CIA)</th>
<th>Exam Hours</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>PB351</td>
<td>DBMS Lab.</td>
<td>4</td>
<td>60</td>
<td>40</td>
<td>4</td>
<td>3</td>
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<tr>
<td>PB352</td>
<td>Java Lab.</td>
<td>4</td>
<td>60</td>
<td>40</td>
<td>4</td>
<td>3</td>
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<tr>
<td>PB353</td>
<td>Communication skill &amp; Group Discussion</td>
<td>4</td>
<td>60</td>
<td>40</td>
<td>4</td>
<td>3</td>
</tr>
</tbody>
</table>

**Total** 28 460 240 24 25

### Semester – IV

<table>
<thead>
<tr>
<th>Code</th>
<th>Theory Papers</th>
<th>Teaching per week Hours</th>
<th>End Semester Exam (ESE)</th>
<th>Continuous Internal Assessment (CIA)</th>
<th>Exam Hours</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>PB401</td>
<td>Data Structure &amp; Algorithms</td>
<td>4</td>
<td>70</td>
<td>30</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>PB402</td>
<td>PHP Programming</td>
<td>4</td>
<td>70</td>
<td>30</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>PB403</td>
<td>Advance Database Concepts</td>
<td>4</td>
<td>70</td>
<td>30</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>PB404</td>
<td>Data Communication and Networking</td>
<td>4</td>
<td>70</td>
<td>30</td>
<td>3</td>
<td>4</td>
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#### Practical Papers

<table>
<thead>
<tr>
<th>Code</th>
<th>Theory Papers</th>
<th>Teaching per week Hours</th>
<th>End Semester Exam (ESE)</th>
<th>Continuous Internal Assessment (CIA)</th>
<th>Exam Hours</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>PB451</td>
<td>Data Structure Lab.</td>
<td>4</td>
<td>60</td>
<td>40</td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td>PB452</td>
<td>PHP Lab.</td>
<td>4</td>
<td>60</td>
<td>40</td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td>PB453</td>
<td>PL/SQL Lab.</td>
<td>4</td>
<td>60</td>
<td>40</td>
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</tbody>
</table>

**Total** 28 460 240 24 25
### Semester – V

<table>
<thead>
<tr>
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<th>Theory Papers</th>
<th>Teaching per week Hours</th>
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<th>Continuous Internal Assessment (CIA)</th>
<th>Exam Hours</th>
<th>Credits</th>
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</thead>
<tbody>
<tr>
<td>PBCA501</td>
<td>Computer Graphics</td>
<td>4</td>
<td>70</td>
<td>30</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>PBCA502</td>
<td>DotNet Technologies</td>
<td>4</td>
<td>70</td>
<td>30</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>PBCA503</td>
<td>E-Commerce Application Development</td>
<td>4</td>
<td>70</td>
<td>30</td>
<td>3</td>
<td>4</td>
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<tr>
<td>PBCA504</td>
<td>Software Engineering</td>
<td>4</td>
<td>70</td>
<td>30</td>
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#### Practical Papers

<table>
<thead>
<tr>
<th>Code</th>
<th>Theory Papers</th>
<th>Teaching per week Hours</th>
<th>End Semester Exam (ESE)</th>
<th>Continuous Internal Assessment (CIA)</th>
<th>Exam Hours</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>PBCA551</td>
<td>Graphics Lab.</td>
<td>4</td>
<td>60</td>
<td>40</td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td>PBCA552</td>
<td>DotNet Lab</td>
<td>4</td>
<td>60</td>
<td>40</td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td>PBCA553</td>
<td>SRS Report Presentation</td>
<td>4</td>
<td>60</td>
<td>40</td>
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<td><strong>28</strong></td>
<td><strong>460</strong></td>
<td><strong>240</strong></td>
<td><strong>24</strong></td>
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### Semester – VI

<table>
<thead>
<tr>
<th>Code</th>
<th>Theory Papers</th>
<th>Teaching per week Hours</th>
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<th>Exam Hours</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>PBCA601</td>
<td>Management Information System</td>
<td>4</td>
<td>70</td>
<td>30</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>PBCA602</td>
<td>Network Security and cryptology</td>
<td>4</td>
<td>70</td>
<td>30</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>PBCA603</td>
<td>Data Warehousing and Data Mining</td>
<td>4</td>
<td>70</td>
<td>30</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>PBCA604</td>
<td>Elective Papers: Artificial Intelligence and Expert Systems</td>
<td>4</td>
<td>70</td>
<td>30</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>PBCA605</td>
<td>Animation and Multimedia</td>
<td></td>
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</table>

#### Practical Papers

<table>
<thead>
<tr>
<th>Code</th>
<th>Theory Papers</th>
<th>Teaching per week Hours</th>
<th>End Semester Exam (ESE)</th>
<th>Continuous Internal Assessment (CIA)</th>
<th>Exam Hours</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>PBCA651</td>
<td>Project</td>
<td>12</td>
<td>200</td>
<td>100</td>
<td>4</td>
<td>9</td>
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<tr>
<td><strong>Total</strong></td>
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<td><strong>480</strong></td>
<td><strong>220</strong></td>
<td><strong>16</strong></td>
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BCA –I Semester

PBCA101: Fundamentals of Computer Science

Max Marks: 100 (ESE: 70    CIA: 30)            Passing Marks:40

Question Paper pattern for End Semester Exam (ESE)

Max Marks: 70

Part-A will contain 12 (student will attempt any 10) very short questions of 1 mark each.
Part-B will contain 4 questions (1 from each unit) of 5 marks.
Part-C will contain 4 questions (1 from each unit with internal choice) of 10 marks.

UNIT- I

Introduction to Computers: Characteristics of computers, evolution of computers, generation of computers, classification of computers, applications of computers.


UNIT- II

Computer System: Central processing unit (CPU), memory, instruction format, instruction set.

Primary and Secondary Memory: Memory hierarchy, random access memory (RAM), types of RAM, read only memory (ROM), types of ROM. Classification of secondary storage devices, magnetic tape, magnetic disk, optical disk.

Number Systems: Number systems, conversion between number bases.

UNIT- III

Computer Program: Introduction, developing a program, algorithm, flowchart, pseudo code.

Computer Languages: Introduction, classification of programming languages, generations of programming languages, features of a good programming language.

Computer Software: Software definition, relationship between software and hardware, software categories, system software, application software.

UNIT-IV

Operating System: Introduction of operating system, types of operating system, functions of an operating system, modern operating systems.

Data Communication and Computer Network: Introduction, data communication, transmission media, multiplexing, switching, computer network, network topologies, communication protocols, network devices.

Internet Basics: Introduction, evolution of Internet, basic Internet terms, getting connected to Internet, Internet applications, electronic mail, searching the web (search engines), languages of Internet, viruses.

Reference Books:
1. Introduction to computer Science, ITL Education solution Limited, R&D Wing, PEARSON Education.
PB00A102: Electrical Circuit and Semiconductor Physics
(From session 2014-15 onwards)

Max Marks: 100 (ESE: 70 \ CIA: 30) \ Passing Marks: 40

Question Paper pattern for End Semester Exam (ESE)

Max Marks: 70

Part-A will contain 12 (student will attempt any 10) very short questions of 1 mark each.
Part-B will contain 4 questions (1 from each unit) of 5 marks.
Part-C will contain 4 questions (1 from each unit with internal choice) of 10 marks.

UNIT-I
Electric charge, conductors and insulators, Coulomb's Law, quantization and conservation of electric charge, the electric field, electric lines of force and Gauss' Law of electrostatics, electric potential energy, electric potential, energy and electrical power.
Capacitors, capacitance, capacitors in series and parallel, capacitors with dielectric. Electric current, resistance, resistivity and conductivity, Ohm's law, electromotive force, series and parallel combination of resistances, current in a single loop, Kirchoff's current law, Kirchoff's Voltage law.

UNIT-II
Magnetic field due to a bar magnet, Biot Savrt's law, magnetic field due to a current carrying coil, Force between two parallel currents, Magnetic field inside solenoid and toroid, magnetic flux, Faraday's law of electromagnetic induction, magnetic properties of matter, (diamagnetic, paramagnetic, ferromagnetic and ferromagnetic materials), inductance, energy stored in an inductor, LR circuits.

UNIT-III
Structure of matter (Molecule, Atom), Atomic Structure (Energy levels and electronic configuration), Intermolecular forces, Phases of matter, Types of solids, crystal structure of solids, atomic bonding (ionic, covalent and metallic bonding), Energy band theory of crystals, energy band structure of insulators, semiconductors and metals.
Mobility and conductivity, Electrons and holes in Intrinsic Semiconductor, Elementary properties of Germanium and Silicon, Donor and Acceptor Impurities, Extrinsic semi-conductors.

UNIT – IV
Energy band structure of open circuit p-n junction, depletion region, p-n junction as a rectifier, Half-wave and Full-wave rectifiers, ripple factor, efficiency, Bipolar Junction transistors, bipolar transistor action, basic principle of operation open circuited transistor. Zener Diode, voltage regulation.

Reference books

2. Fowler: Electricity, Tata Mc Graw Hill.
PBCA103: Programming in C

Max Marks: 100 (ESE: 70  CIA: 30) Passing Marks: 40

Question Paper pattern for End Semester Exam (ESE)

Part-A will contain 12 (student will attempt any 10) very short questions of 1 mark each.
Part-B will contain 4 questions (1 from each unit) of 5 marks.
Part-C will contain 4 questions (1 from each unit with internal choice) of 10 marks.

UNIT- I
Fundamentals of C: Programming Concepts, Pseudocode, Design of Algorithm & Flowchart, History and importance of C, sample programming, basic structure and execution of C programs, constants, variables, and data types and various type of declarations, different type operators and expressions, evaluation of expressions, operator precedence and associability. Managing input and output operations, decision making and branching decision making.

UNIT- II
Iteration: while, do…while, for loop, nested loops, break & continue, goto statements.
Arrays and Strings: One-dimensional arrays and their declaration and initialization, two-dimensional arrays and their initializations, character arrays (One and Two dimensional), reading and writing strings, string-handling functions.

UNIT-III
Functions: Need and elements for user-defined functions, definition of functions, return values and their types, function calls and declaration, recursion, parameter passing, passing arrays and strings to functions, the scope, visibility and life time of variables.
Understanding Pointers: Accessing the address of a variable, declaration and initialization of pointer variables, accessing a variable through its pointer, pointers and arrays, pointers and function arguments, functions returning pointers.

UNIT-IV
Structures and Unions: Defining structure, declaring structure variable and accessing structure members, initialization of structure, operation on individual members, array of structures, union, size of structure.
I/O in C: Formatted and Un-formatted I/O, File handling (Random, Binary and Sequential).

Reference Books:
PBPA104: Discrete Mathematics
(From session 2014-15 onwards)

Max Marks: 100 (ESE: 70  CIA: 30)  Passing Marks: 40

Question Paper pattern for End Semester Exam (ESE)
Max Marks: 70

Part-A will contain 12 (student will attempt any 10) very short questions of 1 mark each.
Part-B will contain 4 questions (1 from each unit) of 5 marks.
Part-C will contain 4 questions (1 from each unit with internal choice) of 10 marks.

UNIT- I

Introduction to number system, Codes (Natural BCD, Excess-3, Gray, Octal, Hexadecimal, Alphanumeric- EBCDIC and ASCII), Excess-3, Gray, Octal, Hexadecimal, Alphanumeric- EBCDIC AND ASCII), Error Codes, Sets Theory, Types of Sets, Multi Sets, Operations on Sets

UNIT -II

Relations and Properties of Relations, Combinatorics: Permutations and Combinations, Pigeon Hole Principle, Principle of Inclusion and Exclusion, Principle of mathematical induction,

UNIT- III

Proposition and Propositional Calculus: Proposition, Conjunction, Disjunction, Negation, Compound proposition, Conditional propositions and Logical equivalence, De Morgan's law, quantifiers, valid argument, deductive reasoning, modus ponens (rules of inference), universal instantiation, universal generalization, existential instantiation, universal generalization resolution.

UNIT -IV

Graph Theory- Types of Graphs, Path and Circuits, Eulerian Path and Circuits, Hamiltonian Path and Circuits, Shortest Path Algorithms, isomorphism of graphs, planar graphs, Trees, characterization of trees, spanning trees, breadth first search and depth first search method, minimal spanning trees.

References

PBCA151: Programming in C Lab.

Exercises to be framed so as to cover the topics and tools covered in theory paper.

PBCA152: Office Management Lab.

DOS Commands

**MS-Word** Creating and Saving documents, Entering, Editing, Moving, Copying and Formatting Text, Page formatting, Finding and replacing text, Spell checking and Grammar checking, enhancing documents, Indexing, Columns, Tables and feature there in, Inserting (Objects, picture, files etc.), Using Graphics, templates and wizard, using mail merge, using Word Art, customizing MS Word. Designing pages with MS Publisher, Inserting and Manipulating Objects. Editing Fills and recoloring pictures.

**MS Excel** Spreadsheet terminology, organization of the worksheet area, entering information, editing cells using commands and functions, moving copying, inserting and deleting rows and columns, formatting worksheet, printing worksheet, creating charts, modifying and enhancing charts, using date, time and addressing modes, naming range and using statistical, mathematical and financial functions, database in a worksheet, creating, sorting, querying and maintaining the database, multiple worksheets and Macros, working with objects.

**MS Power Point** Anatomy of a power Point Presentation, Creating and Viewing a presentation, Managing Slide Shows, Navigating through a presentation, Using hyperlinks, advanced navigation with action setting and action buttons, organizing formats with Master Slides, applying and modifying designs, adding graphics, multimedia and special effects, creating presentation for the web.

**MS Access:**
Planning a database (tables, queries, forms, reports), Creating and editing database, customizing tables, linking tables, designing and using forms, modifying database structure, maintaining database, Sorting and Indexing database, Querying a database and generating Reports, modifying a Report, exporting a Report to another format.

PBCA153: Communication Skills Lab. *(For session 2013-14 only)*

The development of effective communications skills for a business environment; the nature of communication; Written (reports, letters, electronic communications, etc.); oral (presentation skills) and interpersonal communications (Perceptions, listening; nonverbal communication, group dynamics conflict, negotiations etc.).


Exercises to be framed so as to cover the topics and tools covered in theory paper.
BCA –II Semester

PBCA201: Object Oriented Programming Concepts

Max Marks: 100 (ESE: 70   CIA: 30)   Passing Marks:40

Question Paper pattern for End Semester Exam (ESE)

Max Marks: 70

Part-A will contain 12 (student will attempt any 10) very short questions of 1 mark each.
Part-B will contain 4 questions (1 from each unit) of 5 marks.
Part-C will contain 4 questions (1 from each unit with internal choice) of 10 marks.

UNIT- I
Introduction to Object Oriented Concepts: Evolution of OOP, OOP Paradigm, advantages of OOP, comparison between functional programming and OOP approach, characteristics of object oriented language – objects, classes, inheritance, reusability, user defined data types, polymorphism, overloading.

Introduction to C++: C++ tokens, data types, C++ operators, type conversion, variable declaration, arrays, statements, expressions, conditional statements, Jumping statements, loops, functions, pointers, structures.

UNIT-II
Classes and Objects: Classes, objects, defining member functions, arrays of class objects, pointers and classes, passing objects, constructors, types of constructors, destructors, this pointer, access specifiers, friend functions.

UNIT-III
Inheritance: Introduction, types of inheritance, Importance of Inheritance, Constructor and Destructor in derived classes, types of base classes, multiple inheritance.

Polymorphism: Function overloading, operator overloading, virtual functions, pure virtual functions

Unit-IV
File Management: Handling Data files (sequential and random), Opening and closing of files, stream state member functions.
Tem plates, Exception Handling

Reference Books:
PBCA202: Internet and Web Technology

Max Marks: 100 (ESE: 70   CIA: 30)  Passing Marks:40

Question Paper pattern for End Semester Exam (ESE)

Max Marks: 70

- Part-A will contain 12 (student will attempt any 10) very short questions of 1 mark each.
- Part-B will contain 4 questions (1 from each unit) of 5 marks.
- Part-C will contain 4 questions (1 from each unit with internal choice) of 10 marks.

UNIT- I

Introduction to HTML: HTML, HTML tags, commonly used HTML commands, text formatting, text style, lists, adding graphics to HTML documents, tables, linking documents, frames, Forms, Image Maps.

UNIT-II
Introduction to DHTML: features of DHTML, CSS: Types of Style sheets, Different elements of Style sheets, Filter effects, IFrame, DIV and Layer Tags.

Understanding XML: SGML, XML, XML and HTML, modeling XML data.

UNIT- III
Java Script: Java script in web pages, advantages of java script, advantages of java script, data types and literals, type casting , java script array, operators and expression, conditional checking , function, user defined function.

UNIT- IV
DOM Hierarchy: Different objects of DOM (window, navigator, history, form, frames etc.), Form validation, Event handling in Javascript.

Reference Books:
**PBCA203: Digital Electronics and Circuits**

*Max Marks: 100 (ESE: 70  CIA: 30)  Passing Marks: 40*

**Question Paper pattern for End Semester Exam (ESE)**

*Max Marks: 70*

Part-A will contain 12 (student will attempt any 10) very short questions of 1 mark each.
Part-B will contain 4 questions (1 from each unit) of 5 marks.
Part-C will contain 4 questions (1 from each unit with internal choice) of 10 marks.

**Unit-I**
Positive and negative logic, Logic functions-NOT, AND, OR, NOR, EX-NOR, Truth tables, Boolean Algebra, de Morgan's theorems; Standard forms for logical expressions, Sum of Products, Product of Sums specification of logical functions in terms of Minterms and Maxterms, Karnaugh Maps, simplification of logical functions, introduction of "don't care" states, Synthesis using only NAND or only NOR gates.

**Unit-II**
**Digital Logic Families** : Characteristics of Digital ICs, Introduction to Bipolar Families (RTL, DCTL, DTL, ECL), Transistor as an amplifier, Characteristics of an amplifier. Feedback concepts, Elementary information about Field Effect transistors, Introduction to Unipolar Logic families (PMOS, NMOS, CMOS), TTL Circuits, 7400, 74H00, 74L00, 74S00, 74LS00, 74AS00 series, Positive and Negative Logic, ECL OR/NOR Gates, ECL characteristics.

**Unit-III**
Combinational Circuits, Multiplexer-IC 74150 and IC 44151, De multiplexer-IC 74154, Decoder- IC 74139, BCD to Seven segment De-coder IC 7446/7447 IC 7448/7449 Decimal to BCD Priority Encoder-IC 7447, parity Checker-IC 741 80, Magnitude Comparator IC 7485.

**Unit-IV**
**Sequential Circuits** : RS Flip Flop, Clocked RS Flip Flop, D Flip Flop, Edge Triggered D Flip Flop, master-Salve Technology and its advantage, Shift Register as Flip Flop system, IC 7496, UP/DOWN counters, 74 series asynchronous counters, 74 series synchronous counter.

**Reference Books :**
PBCA204: Computer Architecture

Max Marks: 100 (ESE: 70   CIA: 30)     Passing Marks:40

Question Paper pattern for End Semester Exam (ESE)

Max Marks: 70

Part-A will contain 12 (student will attempt any 10) very short questions of 1 mark each.
Part-B will contain 4 questions (1 from each unit) of 5 marks.
Part-C will contain 4 questions (1 from each unit with internal choice) of 10 marks.

Unit I
Introduction to Logical Operations, laws of Boolean algebra and De-Morgan’s Theorem, Principle of Duality
Digital Circuits:- Sum of Products (SOP) & Products of Sum (POS), Introduction to Combinational Circuits, Half-Adder, Half-Subtractor, Full Adder, Full Subtractor, Parallel Adder, Multiplexers, De- Multiplexers, Decoders, Encoders

Unit-II
Sequential Circuits:-Flip-Flops: RS, D using NAND and NOR gates, J-K Flip-Flop, T-Flip-Flop, J-K Master Slave Flip-Flop, edge triggered flip flops, Registers - SISO, SIPO, PISO, PIPO. Counters - Asynchronous and Synchronous, BCD counter, Decade Counter

Unit-III
CPU Design:-Timing and control, Instruction cycle, Memory Reference Instructions, Input-output and interrupt, complete computer description, design of basic computer, Instruction and addressing, instruction formats, addressing modes.

Unit-IV
Memory System Design: Main Memory Concepts, Cache Memory Organization, Associative Memory Concepts, Virtual Memory and Paging.
Input/output and Interfacing, DMA, I/O processors, Interrupts, RISC/CISC.

Suggested Readings
1. Mano Morris, Computer system architecture, PHI, New Delhi.

PBCA251: C++ Lab.
Exercises to be framed so as to cover the topics and tools covered in theory paper.

PBCA252: Internet & Web Lab.
Exercises to be framed so as to cover the topics and tools covered in theory paper.

PBCA252: DEC Lab.
In this lab the student must perform Ten experiments based on topics covered in the theory paper
BCA –III Semester

PBCA301: Database Management System

Max Marks: 100 (ESE: 70 CIA: 30) Passing Marks:40

Question Paper pattern for End Semester Exam (ESE)

Max Marks: 70

Part-A will contain 12 (student will attempt any 10) very short questions of 1 mark each.
Part-B will contain 4 questions (1 from each unit) of 5 marks.
Part-C will contain 4 questions (1 from each unit with internal choice) of 10 marks.

UNIT- I
Database System Concepts & Architecture: Overview of DBMS, Basic DBMS terminology, data base system v/s file system, data independence. Architecture of a DBMS, Schemas, Instances, Database Languages, Database Administrator, Data Models.

UNIT- II
Data Modeling: Data modeling using the Entity Relationship Model: ER model concepts, notation for ER diagram, mapping constraints, keys, Concepts of Super Key, candidate key, primary key, Generalization, aggregation.
Relational Algebra: Fundamental operations of relational algebra & their implementation, interdependence of operations.

UNIT -III
Database Design: Functional dependencies, loss less decomposition, 1st, 2nd & 3rd normal forms, dependency preservation, boyce codd NF. Introduction to Transactions, transaction states.

UNIT- IV
Introduction to SQL: Characteristics of SQL, Advantages of SQL, SQL data types and literals, Types of SQL commands, SQL operators and their procedure, Tables, views and indexes, Queries and sub queries, Aggregate functions, insert, update and delete operations, Joins, Unions, Intersection, Minus in SQL.

Reference Books:
1. Fundamental of Database Systems by R. Elmasri; S. Navate; Benjamin Cummings.
2. Introduction to database systems by C. J .Date.
PBCA302: Advance Java Programming

Max Marks: 100 (ESE: 70 CIA: 30) Passing Marks:40

Question Paper pattern for End Semester Exam (ESE)

Max Marks: 70

Part-A will contain 12 (student will attempt any 10) very short questions of 1 mark each.
Part-B will contain 4 questions (1 from each unit) of 5 marks.
Part-C will contain 4 questions (1 from each unit with internal choice) of 10 marks.

Unit-I
Introduction: Overview of Object Oriented Concepts in Java. Java features like security, portability, byte code, java virtual machine, object oriented, robust, multithreading, architectural neutral, distributed and dynamic.
Fundamentals of Java: Data types and control structures, operators, array.
Classes and Objects: Object References, Function Overloading, Constructor Overloading, Inheritance.

Unit-II
Packages and Interfaces: Access specifiers, Package creation, use of packages, Basics of Interfaces, Use of Interfaces, final, transient, static, volatile keywords.
Exception handling in Java: Exception raising & handling, Exception classes, Throwing exceptions, User defined Exceptions.
String handling: String and string buffer class and various string functions.
Threading in Java: Fundamentals of Multi-threading Java coding with Thread classes, thread Management in Java, Using Runnable interface.

Unit-III
Applets: Applet life cycle, Graphics facility, Color and Font, Passing parameters to applets.

Unit-IV
JDBC: JDBC Drivers, Two Tier and Three Tier client server model, Setting up a connection to database, Creating and executing SQL statements, Resultset and Resultset MetaData Object.
Java utilities: java.lang, java.util, java.io packages.

Reference Books :

2. Deitel and Deitel, Java, How to Program, Pearson Education Asia.
5. Herbert Schiildt, Java 2, Tata Mc Graw Hill.
PBCA303: Operating System Fundamentals

Max Marks: 100 (ESE: 70  CIA: 30)  Passing Marks: 40

Question Paper pattern for End Semester Exam (ESE)

Max Marks: 70

Part-A will contain 12 (student will attempt any 10) very short questions of 1 mark each.
Part-B will contain 4 questions (1 from each unit) of 5 marks.
Part-C will contain 4 questions (1 from each unit with internal choice) of 10 marks.

UNIT- I
Introduction to Operating System: Evolution of operating system, characteristics, types of operating system, function of operating system, concepts of process and files, systems calls.

UNIT- II
Memory management: Logical and Physical address space, swapping, Contiguous allocating, multiple partitions, fragmentation compaction, paging, segmentation, Virtual memory management, demand paging, page replacement algorithms.

UNIT-III
Deadlock: The deadlock problem, characterization prevention, avoidance detection and recovery from deadlock, process concurrency concept, precedence graph. Critical section problem, semaphores and interprocess communication.

UNIT- IV
Mass-Storage Structure: Disk structure, disk scheduling, disk management, swap-space management.
Security and Protection: Goals of protection, domain of protection, access matrix, implementation of access matrix; revocation of access rights.

Reference Books:
2. Andrew S. Tenenbaum: Modern Operating Systems; Prentice Hall, India.
PBCA304: System Analysis & Design

Max Marks: 100 (ESE: 70  CIA: 30)  Passing Marks: 40

Question Paper pattern for End Semester Exam (ESE)

Max Marks: 70

Part-A will contain 12 (student will attempt any 10) very short questions of 1 mark each.
Part-B will contain 4 questions (1 from each unit) of 5 marks.
Part-C will contain 4 questions (1 from each unit with internal choice) of 10 marks.

Unit-I
System Development Life Cycle: Steps of SDLC

Unit-II
Feasibility Study: Types of feasibility, Steps in Feasibility Analysis

Unit-III
Information Gathering: need, Information about the firms, Information gathering tools, Interviewing, Arranging the Interview, Types of Interviews and Questionnaires, The Structured and Unstructured Alternatives.

Unit-IV
Testing and Implementation: System and Unit testing, Test cases: White box & Black box testing strategies: verification & validation, integration testing. Implementation Planning and Conversion techniques.

Reference Books:
4. Mark Lejk, and David Deeks, an Introduction to System Analysis Techniques Prentice Hall.
PBCA351: DBMS Lab.

1. Creating database tables and using data types.
   • Create table, • Modify table, • Drop table
2. Practical Based on Data Manipulation.
   • Adding data with Insert, • Modify data with Update,
   • Deleting records with Delete
3. Practical Based on Implementing the Constraints.
   • NULL and NOT NULL, • Primary Key and Foreign Key Constraint
   • Unique, Check and Default Constraint
4. Practical for Retrieving Data Using following clauses.
   • Simple select clause, • Accessing specific data with Where, Ordered By,
   Distinct and Group By
5. Practical Based on Aggregate Functions.
   • AVG, • COUNT, • MAX, • MIN, • SUM, • CUBE
6. Practical Based on implementing all String functions.
7. Practical Based on implementing Date and Time Functions.
8. Practical Based on implementing use of union, intersection, set difference.
9. Implement Nested Queries & JOIN operation.
10. Practical Based on performing different operations on a view.

PBCA352: Java Lab.

Exercises to be framed so as to cover the topics and tools covered in theory paper.

PBCA353: Communication & Group Discussion
BCA –IV Semester

PBCA401: Data Structure and Algorithms

Max Marks: 100 (ESE: 70  CIA: 30)  Passing Marks:40

Question Paper pattern for End Semester Exam (ESE)

Max Marks: 70
Part-A will contain 12 (student will attempt any 10) very short questions of 1 mark each.
Part-B will contain 4 questions (1 from each unit) of 5 marks.
Part-C will contain 4 questions (1 from each unit with internal choice) of 10 marks.

Unit-I
Algorithms, pseudocode, characteristics of algorithms, analyzing algorithms and problems, complexity measures, basic time analysis of an algorithm, space complexity. Data abstraction and basic data structures, data types, abstract data types.
String processing (storing strings, string operations, pattern matching algorithms).
Arrays and their representation in memory, insertion, deletion, merging, searching and sorting, multidimensional arrays, pointers, pointer arrays.

Unit-II
Linked lists: representation of linked list in memory, insertion, deletion and searching of linked list, two way, circular and header lists.
Stacks: array and linked list representation of stacks, arithmetic expressions, Polish notations, Recursion

Unit-III
Queues: Array and linked list representation of queues, deques, priority and circular queues.
Applications of Stacks and Queues.
Trees: Binary and N-ary trees, representation of binary trees in memory, traversing binary trees, traversal algorithms using stacks, binary search trees.

Unit-IV
Graphs and their representations, sequential representation, Warshall’s algorithm, linked representation of graphs, operations on graphs, traversing a graph.
Sorting and Searching: Internal and external sorting techniques, Sequential, Binary and Hash searching, Bubble sort, Insertion sort, Selection sort, Merge sort, Radix sort and quick sort, heapsort, algorithm comparisons.

Reference Books:

3. A. Michael Berman: Data Structures via C++, Oxford University Press.
5. Jean-Paul Tremblay and Paul G. Sorenson, An Introduction to Data structures with applications, TMH Publishing Co.Ltd.
PBCA402: PHP Programming

Max Marks: 100 (ESE: 70 CIA: 30) Passing Marks: 40

Question Paper pattern for End Semester Exam (ESE)

Max Marks: 70

Part-A will contain 12 (student will attempt any 10) very short questions of 1 mark each.
Part-B will contain 4 questions (1 from each unit) of 5 marks.
Part-C will contain 4 questions (1 from each unit with internal choice) of 10 marks.

UNIT-I
Introduction to PHP: Server side Scripting Vs Client Side Scripting, Evaluation of Php, Features of Php, Basic Syntax, Variable and constant, Data types, Operators and Expressions
Decision Making: If, Multiple Ifs, Nested Ifs, Loops (while, do…while, for loop, foreach), Nested Loops, Jumping Statement.
Arrays: Numeric, Associative and Multidimensional Arrays

UNIT-II
Strings: Creating and accessing String, Searching & Replacing String, Formatting String, String Related Library function, Pattern matching, Replacing text, Splitting a string with a Regular Expression
Functions: Defining a Function, Calling a Function, Parameter passing, Returning value from function

UNIT-III
Form Data Handling: $_GET, $_POST, $_REQUEST Variables, Cookies handling, Session Management
Exception Handling: Understanding Exception and error, Try, catch, throw

UNIT-IV
File Handling: Opening and closing a file, Coping, renaming and deleting a file
Database Handling: Connection with MySql Database or ODBC, Performing basic database, operation (Insert, Delete, Update, Select), Setting query parameter.

References
1. PHP, The CompleteReference, Steven Holzner, TMH
2. Beginning PHP 5.3, Matt Doyle, John Wiley & Sons
**PBCA403: Advance Database Concepts**

*Max Marks: 100 (ESE: 70  CIA: 30) Passing Marks: 40*

**Question Paper pattern for End Semester Exam (ESE)**

*Max Marks: 70*

Part-A will contain 12 (student will attempt any 10) very short questions of 1 mark each.
Part-B will contain 4 questions (1 from each unit) of 5 marks.
Part-C will contain 4 questions (1 from each unit with internal choice) of 10 marks.

**Unit-I**

**Transaction management:** Basic concepts, Transaction states, Implementation of Atomocity and Durability, Concurrent Executions, Serializability, Recoverability, Implementation of Isolation, Testing for serializability.
Concurrency Control: Lock-based Protocols, Time stamp based protocols, Validation based protocols, Multiple Granularity, Deadlock handling.

**Unit –II**

Database System Architectures: Centralized and client-server architecture, server system architecture, Parallel Systems, Distributed Systems.

Object-based Databases: Complex Data Types, Structure Types and Inheritance in SQL, Table Inheritance, Persistent Programming Languages.

**Unit-III**

Distributed Databases: Distributed Data Storage, Distributed Transactions, Commit protocol, Concurrency Control in Distributed Databases.


**Unit-IV**

PL/SQL basics, blocks, architecture, variables an constants, attributes, character set, PL/SQL sentence structure, data types, conditional and sequential control statements, control structures, conditional control, sequential control, cursors, exception Handling, triggers, procedures and packages.

**References**

1. Fundamental of Database Systems by R. Elmasri; S. Navate; Benjamin Cummings.
2. Introduction to database systems by C. J. Date.
5. PL/SQL by Ivan Bayross.
PBCA404: Data Communication and Networking

Max Marks: 100 (ESE: 70   CIA: 30)  Passing Marks:40

Question Paper pattern for End Semester Exam (ESE)

Part-A will contain 12 (student will attempt any 10) very short questions of 1 mark each.
Part-B will contain 4 questions (1 from each unit) of 5 marks.
Part-C will contain 4 questions (1 from each unit with internal choice) of 10 marks.

Unit-I
Overview, evolution of computer networks, Network architecture, configuring network, network strategies, networks types, LAN, MAN and WAN, Line configuration, topology, transmission mode, identify key components of network, categories of network, differentiating between LAN, MAN, WANS and Internet.

Unit-II
The OSI model, The physical layer (bandwidth limited signals, transmission media, wireless transmission), Multiplexing, Modulation, the data link layer, error detection and correction, data link protocols, the medium access sublayer, the channel allocation problem.

Unit-III
IEEE standard 802 for LANs and MANs, Switches, Bridges, Routers, The network layer routing algorithm, congestion control algorithm, the transport layer, the presentation layer, the session layer, the application layer.

Unit-IV
Introduction to TCP/IP Model, compare TCP/IP to (OSI) reference model, TCP/IP applications such as FTP, Telnet, DNS, DHCP, SMTP, POP3 etc. Basic Mobile communication network Model, Wi-Fi network, Bluetooth, Broadband & Based Line Connection.

Reference Books

1. Andrew S. Tanenbaum, Computer Networks, Prentice Hall

PBCA451: Data Structure Lab.
Exercises to be framed so as to cover the topics and tools covered in theory paper.

PBCA452: PHP Lab.
Exercises to be framed so as to cover the topics and tools covered in theory paper.

PBCA453: PL/SQL Lab.
Exercises to be framed so as to cover the topics and tools covered in theory paper.
BCA –V Semester

PBCA501: Computer Graphics

Max Marks: 100 (ESE: 70) CIA: 30) Passing Marks: 40

Question Paper pattern for End Semester Exam (ESE)

Max Marks: 70

Part-A will contain 12 (student will attempt any 10) very short questions of 1 mark each.
Part-B will contain 4 questions (1 from each unit) of 5 marks.
Part-C will contain 4 questions (1 from each unit with internal choice) of 10 marks.

Unit-I
Introduction to Computer Graphics: Definition, Application areas of Computer graphics, Graphical user interface, Cathode ray tubes, Random scan displays, Raster scan displays, Color CRT monitors, Flat panel displays (Plasma Panels, Liquid crystal displays, Electroluminescent displays, etc.), Graphics software (GKS, PHIGS), Color Models (RGB, CMYK, HSV, Lookup tables, color map table, etc.)

Unit-II
Raster Graphics Algorithms: Line drawing algorithms (DDA, Bresenham's algorithm), Circle and Ellipse drawing algorithms, Filling (Scan-converting Polygon filling, Inside outside tests boundary fill, flood fill and area fill algorithm).
Transformations: 2-D transformations (Translation, Rotation, Reflection, shearing, scaling), Homogeneous coordinate representation, 3-D transformations.

Unit-III
Two dimensional Clipping and visible surface detection methods: Viewing pipeline, window and viewport, Sutherland-Cohen sub-division algorithm, Cyrus-beck algorithm, classification of visible surface detection algorithm, Backface algorithm, Depth sorting method, Area subdivision method etc.

Unit-IV
Introduction to Digital Image Processing: Definition, application areas. File forms, Basic digital Image processing techniques like antialiasing, Convolutions, Thresholding etc, Image enhancement.

Reference Books:

PBCA502: DotNET Technologies

Max Marks: 100 (ESE: 70  CIA: 30)  Passing Marks:40

Question Paper pattern for End Semester Exam (ESE)

Max Marks: 70

Part-A will contain 12 (student will attempt any 10) very short questions of 1 mark each.
Part-B will contain 4 questions (1 from each unit) of 5 marks.
Part-C will contain 4 questions (1 from each unit with internal choice) of 10 marks.

UNIT I

UNIT II
Introduction to C# Programming with respect to ASP.NET. Basics of ASP. NET, Creating and deploying ASP .NET applications, Web forms, Web controls, working with events.

UNIT III
Rich web controls, Custom web controls, Validation controls, Debugging, Deploying projects with Business objects.

UNIT IV
Basics of ADO .NET, ADO Objects, (Data Table – Data Views – Data Set, Data Adapter ), OLEDB and SQL Managed Providers.

Reference books:

2. ASP.NET 4 Unleashed by Stephen Walther, Kevin Scott Hoffman, Sams Publishing
3. Bill Evjen, Professional ASP.NET 3.5 in C# and VB, Wrox Publication
PBCA503: E-Commerce Application Development

Max Marks: 100 (ESE: 70  CIA: 30)  Passing Marks:40

Question Paper pattern for End Semester Exam (ESE)

Max Marks: 70
Part-A will contain 12 (student will attempt any 10) very short questions of 1 mark each.
Part-B will contain 4 questions (1 from each unit) of 5 marks.
Part-C will contain 4 questions (1 from each unit with internal choice) of 10 marks.

Unit-I
Introduction to E-Commerce: Definition of e-Commerce, objectives, advantages, disadvantages, scope of e-commerce, Traditional Commerce V/s E-Commerce.

Unit-II

E-Payment System: Types of Electronic Payment Systems, E-Cash, E- Cheque, Smart Cards, Credit Card, Debit Card, E-Purse, Payment Gateways.

Unit-III

Unit-IV

Reference Books:
1. Ecommerce : Devid Withlay TMH
2. Developing E-Commerce Systems by Jim A. Carter PHI.
PBCA504: Software Engineering

Max Marks: 100 (ESE: 70   CIA: 30)  
Passing Marks:40

Question Paper pattern for End Semester Exam (ESE)

Max Marks: 70

Part-A will contain 12 (student will attempt any 10) very short questions of 1 mark each.
Part-B will contain 4 questions (1 from each unit) of 5 marks.
Part-C will contain 4 questions (1 from each unit with internal choice) of 10 marks.

Unit-I

Unit-II

Unit-III
S/W Design: Objectives, Principles, Concepts, Design methodologies Data design, Architectural design, procedural design, Object oriented concepts.

Unit-IV
Testing fundamentals: Objectives, principles, testability, Test cases: White box & Black box testing strategies: verification & validation, unit test, integration testing, validation, testing, system testing

Reference Books:

PBCA551: Graphics Lab.
Exercises to be framed so as to cover the topics and tools covered in theory paper.

PBCA552: DotNet Lab.
Exercises to be framed so as to cover the topics and tools covered in theory paper.

PBCA553: SRS Report Presentation
BCA – VI Semester

PBCA601: Management Information System

Max Marks: 100 (ESE: 70  CIA: 30)  Passing Marks: 40

Question Paper pattern for End Semester Exam (ESE)

Max Marks: 70

Part-A will contain 12 (student will attempt any 10) very short questions of 1 mark each.
Part-B will contain 4 questions (1 from each unit) of 5 marks.
Part-C will contain 4 questions (1 from each unit with internal choice) of 10 marks.

Unit-I

Unit-II

Unit-III

Unit-IV
Functional MIS: A Study of Marketing, Personnel, Financial and production MIS.

Reference Books:

PBCA602: Network Security and Cryptology

Max Marks: 100 (ESE: 70  CIA: 30)  Passing Marks: 40

Question Paper pattern for End Semester Exam (ESE)

Max Marks: 70

Part-A will contain 12 (student will attempt any 10) very short questions of 1 mark each.
Part-B will contain 4 questions (1 from each unit) of 5 marks.
Part-C will contain 4 questions (1 from each unit with internal choice) of 10 marks.

UNIT I

UNIT II
Data Encryption Standard (DES) Key recovery attacks on block ciphers, Iterated DES and DESX, Advanced encryption Standard (AES), Pseudorandom Functions, The birthday attack, Number-Theoretic Primitives, Fermat’s and Euler’s Theorem, RSA algorithm.

UNIT III

UNIT IV

Reference Books:
PBCA603: Data Warehousing and Data Mining

Max Marks: 100 (ESE: 70   CIA: 30)  Passing Marks:40

Question Paper pattern for End Semester Exam (ESE)

Max Marks: 70

Part-A will contain 12 (student will attempt any 10) very short questions of 1 mark each.
Part-B will contain 4 questions (1 from each unit) of 5 marks.
Part-C will contain 4 questions (1 from each unit with internal choice) of 10 marks.

Unit-I
Introduction to Data Warehouse, Data warehouse uses, Data Warehouse Planning stages and Designing approaches. Data Warehouse Delivery Methods.

Unit-II

Unit-III
Aggregations and summary table Data Marts, Designing Data Marts. Metadata-Data transformation Hardware architecture-Process, Server, Network and Client hardware Contents of data warehouse database, Database structures and layout and file systems.

Unit-IV
Data Mining: Data mining concepts, business, technical and social context for data mining, data mining interface, data mining approaches, data mining methodologies, data preprocessing: data cleaning, data reduction, data transformation, technologies used for data mining.

Reference Books:

1. Sam Anahory, Dennis Murray, "Data Warehousing", Pearson Education pub.
4. Data mining concepts & techniques : jia wei han, micheline kamber, jian pei
PBCA604 (Elective Paper): Artificial Intelligence and Expert Systems

Max Marks: 100 (ESE: 70 CIA: 30) Passing marks: 40

Question Paper pattern for End Semester Exam (ESE) Max Marks: 70

Part-A will contain 12 (student will attempt any 10) very short questions of 1 mark each.
Part-B will contain 4 questions (1 from each unit) of 5 marks.
Part-C will contain 4 questions (1 from each unit with internal choice) of 10 marks.

Unit – I
Concept of intelligence, Artificial intelligence, definition turning test, areas of application. Search techniques, state space, Production rules, problem characteristics. Production system characteristic, depth first, breadth first search methods.

Unit – II
Heuristic search method, generate and test, hill climbing, best first method, graph search, AND OR search methods, constraint satisfaction, backtracking. Introduction to list and string processing, concept of knowledge, Logic, prepositional and predicate calculus, resolution.

Unit – III
Semiotics nets, frames, conceptual dependency, scripts, Monotonic reasoning, logical reasoning induction, default reasoning, minimalist reasoning, statistical reasoning, Baye’s theorem, certainty factors, dempster shafer theory, Fuzzy logic.

Unit – IV
Concept of learning, Knowledge acquisition, rote learning, discovery, analogy. Concept of expert system, need for an expert system, Component and categories of an expert system, Stages in the development of an expert system.

Recommended Books

1. Elaine rich & Kevin Knight: Artificial Intelligence and Expert System, PHI.
PBCA605 (Elective Paper): Animation and Multimedia

Max Marks: 100 (ESE: 70  CIA: 30)  Passing Marks: 40

Question Paper pattern for End Semester Exam (ESE)

Part-A will contain 12 (student will attempt any 10) very short questions of 1 mark each.
Part-B will contain 4 questions (1 from each unit) of 5 marks.
Part-C will contain 4 questions (1 from each unit with internal choice) of 10 marks.

Unit-1

Unit-2
Computer Animation: Introduction, Early Animation Techniques, Types of Animation, Software for Animation, Difference Between Traditional Animation and Computer Animation

Unit-3
Shapes: Basic shapes, Creating rectangles, ovals, and circles, polystar, Creating freeform shapes, Selecting and editing shapes, Using the Selection and Lasso tools, Transforming shapes, Copying, moving, and deleting a shape, Grouping and aligning objects, Color, Applying color, Using the Paint Bucket and Ink Bottle tools, Using the Eyedropper and Brush tools, Fill Transform Tool, Custom colors and gradients, Creating a custom color swatch, Applying gradients, Creating a custom gradient Layers: Layer basics, Merging and rearranging layers, Deleting a layer, Modifying layers, Renaming a layer, Layers folders, Locking and hiding layers, Masking a layer, Guide layers, Creating a guide layer, Controlling the speed of a motion tween, Arranging and extending frames, Scenes and Frame Labels: Creating a Scenes, Organizing Scenes, Creating Frame Labels, Symbols and Instances, Creating and editing a button symbol, Controlling tints, brightness and transparency of instances

Unit-4
Animation concept: Creating basic animation frame by frame, Creating animation using onion skin, Shape animation, Understanding and creating symbols for animation, Motion tween animation, Using rotate, alpha effects in animation, Motion guide animation.
Working with colors pallete, Adding sound to animation, Adding sound to buttons, Importing images from other software’s, Creating effective web banners.

Reference Books:
2. The Complete reference: TMH.
PBCA651: Project

Two typed and duly bound copies of project report shall be submitted at least 3 weeks before commencement of the Theory/Practical examination which ever commences earlier.

Guidelines:
- It is a team work – team consisting of preferably two (in no case more than three) students. In special cases, a single student team is acceptable.
- Each team will be allotted a faculty member who will be their mentor.
- The topic will be allotted by the mentor at the beginning of the course.
- There will be three monthly presentations of 20 min. each and one ESE presentation of 40 minutes.
- It is advisable that the finalization of topic and major milestones is completed within 20 days from the date of start of the semester.
- The mentors will assess the progress of the students allocated to them on ongoing basis.