

**Syllabus outline for Computer Science & Engineering (Hons.) with Specialization in Big Data Analytics**

**DEPT. of COmputer Science & Engineering**

# PREAMBLE

Education plays enormously significant role in building of a nation. There are quite a large number of educational institutions, engaged in imparting education in our country. Majority of them have entered recently into semester system to match with international educational pattern. However, our present education system is churning out youth who have to compete locally, regionally, nationally as well as globally. The present alarming situation necessitates transformation and/or redesigning of system, not only by introducing innovations but developing “learner-centric approach.

Majority of Indian higher education institutions have been following the system, which obstructs the flexibility for the students to study the subjects/courses of their choice and their mobility to different institutions. There is need to allow the flexibility in education system, so that students depending upon their interests can choose inter-disciplinary, intra-disciplinary and skill-based courses. This can only be possible when choice based credit system (CBCS), an internationally acknowledged system, is adopted. The choice based credit system not only offers opportunities and avenues to learn core subjects but also explore additional avenues of learning beyond the core subjects for holistic development of an individual. The CBCS will undoubtedly facilitate benchmarking of our courses with best international academic practices.

Advantages of the choice based credit system:

• Shift in focus from the teacher-centric to student-centric education.

• Student may undertake as many credits as they can cope with (without repeating all courses in a given semester if they fail in one/more courses).

• CBCS allows students to choose inter-disciplinary, intra-disciplinary courses, skill oriented papers (even from other disciplines according to their learning needs, interests and aptitude) and more flexibility for students.

• CBCS makes education broad-based and at par with global standards. One can take credits by combining unique combinations.

• CBCS offers flexibility for students to study at different times and at different institutions to complete one course (ease mobility of students). Credits earned at one institution can be transferred to another institution.

# CHOICE BASED CREDIT SYSTEM

The Indian Higher Education Institutions have been moving from the conventional annual system to semester system. Currently many of the institutions have already introduced the Choice Based Credit System. The semester system accelerates the teaching-learning process and enables vertical and horizontal mobility in learning. The credit based semester system provides flexibility in designing curriculum and assigning credits based on the course content and hours of teaching. The Choice Based Credit System provides a ‘cafeteria’ type approach in which the students can take courses of their choice, learn at their own pace, undergo additional courses to acquire more than the required credits and adopt an interdisciplinary approach to learning.

## Programme Educational Objectives

This scheme and courses are related to four-year Computer Science & Engineering programme with following Programme Educational Objectives (PEO).

1. Graduates of the program will have successful technical and professional careers in industry, academia, govt. and entrepreneurship.

2. Graduates of the program will hold strong professional ethics with good team skills and communication

3. Graduates of the program will engage in lifelong learning to acquire new knowledge in an evolving technological landscape.

## Types of Courses

1. Courses are the subjects that comprise the Computer Engineering Programme.
2. A course may be designed to comprise lectures, tutorials, laboratory work, fieldwork, outreach activities, project work, vocational training, viva, seminars, term papers, assignments, presentations, self-study etc. or a combination of some of these components.
3. The learning outcomes of each course will be defined before the start of a semester.
4. Following are the course types:

i. **Core Course (CC):** This is a course, which is to be compulsorily studied by a student as a core requirement to complete the requirement of B.Tech in Computer Science &Engineering.

ii. **Elective Course:** An elective course is a course, which can be chosen from a pool of courses. It is intended to support the discipline of study by providing an expanded scope, enabling exposure to another discipline/domain and nurturing a student’s proficiency and skill. An elective may be of following types:

a) **Discipline Specific Elective (DE):** It is an elective course that adds proficiency to the students in the discipline.

b) **Generic Elective (GE):** It is an elective course taken from other engineering disciplines and enhances the generic proficiency and interdisciplinary perspective of students.

iii. **Obligatory Courses:**

1. **Mandatory Courses (MC)**: It can be taken from among a pool of foundation courses, which aim at value-based education. They may provide hands-on training to improve competencies and skills or provide education on human, societal, environmental and national values.
2. **Dissertation/Project/Training/Internship (PTI):**Course designed to acquire special/advanced knowledge, such as supplement study/support study to a project work, and a candidate studies such a course on his own with an advisory support by a teacher/faculty member is called dissertation/project
3. **Humanities, Social Sciences & Management (HSM):** It is an elective course taken from non-engineering disciplines (humanities, social sciences and management) that broadens the perspective of an engineering student.
4. **Basic Science Courses (BSC):** It is based upon content that leads to fundamental knowledge enhancement in sciences, and basic engineering principles.
5. **NPTEL (NPT):** Online MOOC courses are based on the respective year’s offered courses.
6. **General Studies Courses (GSC):** Course designed to encourage and enrich the students for the technical and professional exams
7. Each credit course contributes certain credits to the programme. A course can be offered either as a full course (4 credits) or as a half course (2 credits). A full course is conducted with 3 hours of lectures and either 1 hour of tutorial or 2 hours of practical work per week. A half course is conducted with 2 hours of lectures. There are also some exceptional electives with 3 credits and 1 credit.

Definition of Credit: -

|  |  |
| --- | --- |
| 1 Hr. Lecture (L) per week | 1 Credit |
| 1 Hr. Tutorial (T) per week | 1 Credit |
| 1 Hr. Practical (P) per week  Or  2 Hr. Practical (Lab)/week | 0.5 Credits  Or  1 Credit |

1. A project work/dissertation is considered as a special course involving application of the knowledge gained during the course of study in exploring, analyzing and solving complex problems in real life applications. A candidate completes such a course with an advisory support by a faculty member.
2. **Mandatory Courses** may be offered. They do not carry credits but aim at expanding knowledge or bridging deficiency in knowledge or skill.
3. A course may have pre-requisite course(s) that are given in the Semester-wise Course Allocation scheme.
4. A student can opt for a course only if he/she has successfully passed its pre- requisite(s).
5. A student has to register for all courses before the start of a semester.
6. **Program codes:** The codes for various undergraduate programmes are as follows:

i. Civil Engineering: CE

ii. Computer Science &Engineering: CS

iii. Electronics and Communication Engineering: EC

iv. Electrical Engineering: EE

v. Mechanical Engineering: ME

1. **Departmental Course Codes:** The codes for departmental core courses and discipline-specific electives are specific to each discipline. The first two characters are derived from departmental codes listed above. The third character is ‘C’ for core courses and ‘D’ for discipline-specific courses and ‘PT’ forDissertation/Project/Training/Internship. This is followed by a digit sequence number:

i. CSCyyy: Core Course

ii. CSDyyy: Discipline-Specific Elective Course

iii. CSPTyyy: Dissertation/Project/Training/Internship

1. **Common Elective Course Codes:** All disciplines will follow a common code as shown below. The 3-digit sequence number ‘yyy’ is taken from the respective tables of different types of courses.

i. HSMyyy: Humanities, Social Sciences& Management Course

ii. BSCyyy: Basic Science Course

iii. MCyyy: Mandatory Course

iv. GSCyyy: General Studies Courses

1. **General Electives:** A student may take a course under the category of General Elective (GE) offered by any other Department of the Institute under the categories of Core Course (CC) and Discipline Specific Electives (DE). However, such options shall be offered to a student as per prescribed guidelines of the Institute.
2. **General Electives:** A student may take a course under the category of General Elective (GE) offered by any other Department of the Institute under the categories of Core Course (CC) and Discipline Specific Electives (DE). However, such options shall be offered to a student as per prescribed guidelines of the Institute.
3. The opting of a course by the student will depend upon the requisites for that course and with the consent of the course advisor.

# PROGRAM OUTCOMES

1. At the completion of the B.Tech. Computer Science &Engineering Program, a student will achieve the following outcomes:
2. Gain an ability to apply the knowledge of mathematics, science, Engineering fundamentals and computer engineering in solving complex engineering problems.
3. Acquire the ability to survey the literature, conduct experiments, interpret data and analyze complex engineering problems.
4. Acquire the ability to design a system, its components and processes to meet requirements with due regard to social, economic and environmental considerations.
5. Acquire the ability to apply research based knowledge and methods to investigate complex engineering problems with focus on computer engineering.
6. Acquire the ability to select existing tools, techniques and resources and create new ones to model complex engineering problems and activities.
7. Understand the responsibilities of an engineering profession towards society, economy, health, safety and legal issues.
8. Understand a computer engineer’s role in enhancing sustainable development.
9. Demonstrate professional ethics and responsibilities with utmost integrity at all times
10. Acquire the ability to contribute effectively as members or leaders of diverse and multidisciplinary teams.
11. Communicate effectively among professional and with society through reports, presentations, documentations and instructions.
12. Engage in lifelong learning in ever evolving landscape of computer science and engineering.

# SCHEME – SEMESTER WISE COURSE ALLOCATION

**First Semester Syllabus**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Sl No. | Type | Subject Code | Topic | L | T | P | Credit Points |
| 1 | BSC | BSC--- | Physics | 3 | 1 | 3 | 5.5 |
| 2 | BSC | BSC--- | Mathematics-1 | 3 | 1 | 0 | 4 |
| 3 | GE | EEC101 | Basic Electrical Engineering | 3 | 0 | 2 | 4 |
| 4 | GE | MEC101 | Engineering Graphics & Design | 1 | 0 | 4 | 3 |
| 5 | GE | ECC101 | Basic Electronics Engineering | 2 | 0 | 0 | 2 |
| 6 | GSC | GSC101 | ESP & SDP-I | 0 | 1 | 0 | 1 |
|  |  |  | Total |  |  |  | 19.5 |

## Students will undergo a mandatory induction program

**Suggestive Choice Based Subjects**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Sl No. | Type | Subject Code | Topic | L | T | P | Credit Points |
| 1 | **BSC** | **BSC001** | **Physics - Semiconductor physics** | **3** | **1** | **3** | **5.5** |
| 2 | BSC | BSC002 | Physics - Introduction to Electromagnetic Theory | 3 | 1 | 3 | 5.5 |
| 3 | BSC | BSC003 | Physics - Introduction to Mechanics | 3 | 1 | 3 | 5.5 |
| 4 | BSC | BSC004 | Physics - Quantum Mechanics for Engineers | 3 | 1 | 3 | 5.5 |
| 5 | BSC | BSC005 | Physics - Oscillation, Waves and Optics | 3 | 1 | 3 | 5.5 |
| 6 | BSC | BSC006 | Chemistry | 3 | 1 | 3 | 5.5 |
| 7 | **BSC** | **BSC007** | **Mathematics - Calculus and Vector Calculus** | **3** | **1** | **0** | **4** |
| 8 | BSC | BSC008 | Mathematics –Calculus & Differential Equation | 3 | 1 | 0 | 4 |
| 9 | BSC | BSC009 | Mathematics – Statistics and Probability Theory | 3 | 0 | 0 | 3 |
| 10 | BSC | BSC010 | Mathematics - Discrete Mathematics | 3 | 0 | 0 | 3 |
| 11 | BSC | BSC011 | Mathematics - Numerical Methods & Probability Theory | 3 | 1 | 0 | 4 |
| 12 | BSC | BSC012 | Mathematics –Transform Calculus, Numerical Methods & Complex Analysis | 3 | 1 | 0 | 4 |
| 13 | BSC | BSC013 | Mathematics - Probability, Statistics & Stochastic Process | 3 | 1 | 0 | 4 |

**Second Semester Syllabus**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Sl No. | Type | Subject Code | Topic | L | T | P | Credit Points |
| 1 | BSC | BSC--- | Chemistry | 3 | 1 | 3 | 5.5 |
| 2 | BSC | BSC--- | Mathematics-2 | 3 | 1 | 0 | 4 |
| 3 | CC | CSC201 | Programming for Problem Solving | 3 | 0 | 2 | 4 |
| 4 | GE | MEC202 | Workshop/Manufacturing Practices | 1 | 0 | 4 | 3 |
| 5 | HSM | HSM001 | English | 2 | 0 | 2 | 3 |
| 6 | GSC | GSC202 | ESP & SDP - II | 0 | 2 | 0 | 2 |
| 7 | PTI | INT201 | Inter/Intra Institutional Activity | 0 | 0 | 6 | 3 |
| 8 | NPT | NPT## | (NPTEL) | - | - | - | 1 |
|  |  |  | Total |  |  |  | 25.5 |

## (NPT201)NPTEL courses are based on the respective year’s offered courses

**Suggestive Choice Based Subjects**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Sl No. | Type | Subject Code | Topic | L | T | P | Credit Points |
| 1 | BSC | BSC001 | Physics - Semiconductor Physics | 3 | 1 | 3 | 5.5 |
| 2 | BSC | BSC002 | Physics - Introduction to Electromagnetic Theory | 3 | 1 | 3 | 5.5 |
| 3 | BSC | BSC003 | Physics - Introduction to Mechanics | 3 | 1 | 3 | 5.5 |
| 4 | BSC | BSC004 | Physics - Quantum Mechanics for Engineers | 3 | 1 | 3 | 5.5 |
| 5 | BSC | BSC005 | Physics - Oscillation, Waves and Optics | 3 | 1 | 3 | 5.5 |
| 6 | BSC | BSC006 | Chemistry | **3** | **1** | **3** | **5.5** |
| 7 | BSC | BSC007 | Mathematics - Calculus and Vector Calculus | 3 | **1** | **0** | **4** |
| 8 | **BSC** | **BSC008** | **Mathematics – Advanced Calculus & Differential Equation** | 3 | 1 | 0 | 4 |
| 9 | BSC | BSC009 | Mathematics – Statistics and Probability Theory | 3 | 0 | 0 | 3 |
| 11 | BSC | BSC012 | Mathematics –Transform Calculus, Numerical Methods & Complex Analysis | 3 | 1 | 0 | 4 |
| 12 | BSC | BSC013 | Mathematics - Probability, Statistics & Stochastic Process | 3 | 1 | 0 | 4 |

**Third Semester Syllabus**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Sl No. | Type | Subject Code | Topic | L | T | P | Credit Points |
| 1 | BSC | BSC--- | Mathematics-3 | 3 | 0 | 0 | 3 |
| 2 | CC | CSC302 | Object Oriented Programming using C++ | 3 | 0 | 2 | 4 |
| 3 | CC | CSC303 | Data Structure & Algorithms | 3 | 0 | 2 | 4 |
| 4 | DE | --- | Discipline Specific Elective | 1 | 0 | 3 | 2.5 |
| 5 | GE | ------ | Generic Elective | - | - | - | 4 |
| 6 | NPT | NPT## | (NPTEL) | - | - | - | 1 |
| 7 | GSC | GSC303 | ESP & SDP - III | 0 | 2 | 0 | 2 |
| 8 | HSM | HSM--- | Humanities | 3 | 0 | 0 | 3 |
|  |  |  | Total |  | | | 23.5 |

##(NPT301) NPTEL courses are based on the respective year’s offered courses

**Suggestive Choice Based Subjects**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Sl No | Type | Subject Code | Topic | L | T | P | Credit Points |
| 3 | **BSC** | **BSC009** | **Mathematics –Applied Statistics and Probability Theory** | 3 | 0 | 0 | 3 |
| 4 | BSC | BSC010 | Mathematics - Discrete Mathematics | 3 | 0 | 0 | 3 |
| 5 | BSC | BSC011 | Mathematics - Numerical Methods & Probability Theory | 3 | 1 | 0 | 4 |
| 6 | BSC | BSC012 | Mathematics –Transform Calculus, Numerical Methods & Complex Analysis | 3 | 1 | 0 | 4 |
| 7 | BSC | BSC013 | Mathematics - Probability, Statistics & Stochastic Process | 3 | 1 | 0 | 4 |
| 8 | GE | ECC407 | Analog Circuits | 3 | 0 | 2 | 4 |
| 9 | GE | ECC306 | Digital System Design& Computer Organization | 3 | 0 | 2 | 4 |
| 10 | HSM | HSM004 | Industrial Psychology | 3 | 0 | 0 | 3 |
| 11 | HSM | HSM013 | Values and Ethics in Profession | 3 | 0 | 0 | 3 |
| 12 | HSM | HSM014 | E Commerce | 3 | 0 | 0 | 3 |
| 13 | DE | CSD301 | Introduction to Python Programming | 1 | 0 | 2 | 2 |
| 14 | DE | CSD302 | Introduction to Android Programming | 1 | 0 | 2 | 2 |

**Fourth Semester Syllabus**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Sl No. | Type | Subject Code | Topic | L | T | P | Credit Points |
| 1 | BSC | BSC--- | Mathematics-4 | 3 | 0 | 0 | 3 |
| 2 | CC | CSC404 | Formal Language & Automata Theory | 3 | 0 | 0 | 3 |
| 3 | CC | CSC405 | Object Oriented Methodology using Java | 3 | 0 | 2 | 4 |
| 4 | CC | CSC406 | Design & Analysis of Algorithms | 3 | 0 | 2 | 4 |
| 5 | CC | CSC407 | Software Engineering | 3 | 0 | 2 | 4 |
| 6 | HSM | HSM--- | Humanities | 3 | 0 | 0 | 3 |
| 7 | GSC | GSC404 | ESP & SDP – IV | 0 | 2 | 0 | 2 |
| 8 | NPT | NPT## | (NPTEL) | - | - | - | 1 |
| 9 | PTI | INT502 | Internship Industrial Training | 0 | 0 | 6 | 3 |
|  |  |  | Total |  | | | 27 |

## (NPT401)NPTEL courses are based on the respective year’s offered course

**Suggestive Choice Based Subjects**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Sl No. | Type | Subject Code | Topic | L | T | P | Credit Points |
| 1 | **BSC** | **BSC016** | **Mathematics - Numerical Methods & Operation Research** | 3 | 0 | 0 | 3 |
| 2 | BSC | BSC016 | Operation Research | 3 | 0 | 0 | 3 |
| 3 | BSC | BSC018 | Statistics for Data Analysis | 3 | 0 | 0 | 3 |
| 4 | **BSC** | **BSC019** | **Graph Theory** | 3 | 0 | 0 | 3 |
| 5 | BSC | BSC020 | Statistical Inference | 3 | 0 | 0 | 3 |
| 6 | **HSM** | **HSM006** | **Economics for Engineers** | 3 | 0 | 0 | 3 |
| 7 | HSM | HSM008 | Principle of Management | 3 | 0 | 0 | 3 |
| 8 | HSM | HSM009 | Total Quality Management | 3 | 0 | 0 | 3 |

**Fifth Semester Syllabus**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Sl No. | Type | Subject Code | Topic | L | T | P | Credit Points |
| 1 | CC | CSC508 | Data Base Management System | 3 | 0 | 2 | 4 |
| 2 | CC | BDA502 | Introduction to Big Data Analytics | 3 | 0 | 0 | 3 |
| 3 | CC | CSC510 | Operating System | 3 | 0 | 2 | 4 |
| 4 | GE | --- | Generic Elective | - | - | - | 4 |
| 5 | DE\* | --- | Discipline Specific Elective | - | - | - | 3 |
| 6 | GSC | GSC505 | ESP & SDP – V | 0 | 2 | 0 | 2 |
| 7 | NPT | NPT## | (NPTEL) | - | - | - | 1 |
| 8 | BSC | BSC | Mathematics-5 | 3 | 0 | 0 | 3 |
| 9 | MC | MC001 | Environmental Science | 0 | 0 | 0 | 0 |
|  |  |  | Total |  | | | 24 |

##(NPT501) NPTEL courses are based on the respective year’s offered course

**Suggestive Choice Based Subjects**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Sl No. | Type | Subject Code | Topic | L | T | P | Credit Points |
| 1 | DE\* | CSD503 | Programming with Ruby on Rails | 2 | 0 | 2 | 3 |
| 2 | **DE\*** | **CSC407** | **Software Engineering** | 2 | 0 | 2 | 3 |
| 3 | DE\* | CSD504 | Advanced Programming with Python | 2 | 0 | 2 | 3 |
| 4 | GE | ECC510 | Digital Signal Processing | 3 | 0 | 2 | 4 |
| 5 | GE | ECC406 | Analog &Digital Communication | 3 | 0 | 2 | 4 |
| 5 | **BSC** | **BSC010** | **Mathematics - Discrete Mathematics** | 3 | 0 | 0 | 3 |
| 6 | BSC | BSC017 | Operations Research | 3 | 0 | 0 | 3 |
| 7 | BSC | BSC018 | Statistics for Data Analysis | 3 | 0 | 0 | 3 |

**Sixth Semester Syllabus**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Sl No. | Type | Subject Code | Topic | L | T | P | Credit Points |
| 1 | CC | **BDA602** | Big Data Modeling & Management | 3 | 0 | 0 | 3 |
| 2 | CC | BDA603 | Big Data Integration & Modeling | 3 | 0 | 2 | 4 |
| 3 | DE | … | Discipline Specific Elective | 3 | 0 | 2 | 4 |
| 4 | GE/DE | ----- | Discipline Specific Elective/Generic Elective | 3 | 0 | 2 | 4 |
| 5 | DE | ----- | Discipline Specific Elective | - | - | - | 3 |
| 6 | GE/DE | ------ | Discipline Specific Elective/Generic Elective | - | - | - | 3 |
| 7 | GSC | GSC606 | ESP & SDP – VI | 0 | 1 | 0 | 1 |
| 8 | NPT | NPT## | (NPTEL) | - | - | - | 1 |
| 9 | MC | MC002 | Disaster Management | 0 | 0 | 0 | 0 |
|  |  |  | Total |  | | | 23 |

##(NPT601)NPTEL courses are based on the respective year’s offered course

#Students will undergo project/training/internship in the industry / research organization / reputed Institute during the vacation

**Suggestive Choice Based Subjects**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Sl No. | Type | Subject Code | Topic | L | T | P | Credit Points |
| 1 | DE\* | CSC612 | Data Communication & Networking | 3 | 0 | 2 | 4 |
| 2 | DE\* | CSD606 | Big Data & Data Analytics | 3 | 0 | 2 | 4 |
| 3. | DE\* | CSD607 | Web Technology | 3 | 0 | 2 | 4 |
| 5. | DE\*\* | CSD713 | Internet of Things using Raspberry Pi | 1 | 0 | 4 | 3 |
| 6. | DE\*\* | CSD503 | Programming with Ruby on Rails | 1 | 0 | 4 | 3 |
| 7. | GE | ECC408 | Microprocessor & Microcontrollers | 2 | 0 | 2 | 3 |
| 8. | CSD | CSC509 | Computer Organization & Architecture | 2 | 0 | 2 | 3 |

**Seventh Semester Syllabus**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Sl No. | Type | Subject Code | Topic | L | T | P | Credit Points |
| 1 | HSM | HSM | Humanities | - | - | - | 3 |
| 2 | DE\* | …… | Discipline Specific Elective | 3 | 0 | 2 | 4 |
| 3 | DE\*\* | …… | Discipline Specific Elective | 3 | 0 | 0 | 3 |
| 4 | DE/BSC |  |  | - | - | - | 3 |
| 5 | GSC | GSC707 | ESP & SDP – VII | 0 | 1 | 0 | 1 |
| 7 | PTI | INT502 | Internship Industrial Training | 0 | 0 | 6 | 3 |
|  |  |  | Total |  | | | 17 |

## NPTEL courses are based on the respective year’s offered course

#Students will undergo project/training/internship in the industry / research organization / reputed Institute during the vacation

**Suggestive Choice Based Subjects**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Sl No. | Type | Subject Code | Topic | L | T | P | Credit Points |
| 1. | DE\* | CC705 | Introduction to Cloud Security | 3 | 0 | 0 | 3 |
| 2. | DE\* | BDA604 | Machine Learning With Big Data | 3 | 0 | 0 | 3 |
| 3. | DE\*\* | CSD711 | E-Commerce | 3 | 0 | 0 | 3 |
| 4. | DE\*\* | CSD609 | Artificial Intelligence | 3 | 0 | 2 | 4 |
| 6. | DE\*\* | BDA605 | Graph Analytics for Big Data | 3 | 0 | 2 | 4 |
| 7. | BSC | BSC013 | Mathematics - Graph Theory | 3 | 0 | 0 | 3 |
| 8. | HSM | HSM010 | Professional Practice, Law & Ethics | 3 | 0 | 0 | 3 |  |
| 9. | HSM | HSM011 | Human Resource Development and Organizational Behavior | 3 | 0 | 0 | 3 |  |
| 10. | HSM | HSM003 | Organizational Behavior | 3 | 0 | 0 | 3 |
| 11. | HSM | HSM006 | Economics for Engineers | 3 | 0 | 0 | 3 |

**Eighth Semester Syllabus**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Sl No. | Type | Subject Code | Topic | L | T | P | Credit Points |
| 1 | DE | … | Discipline Specific Elective | 3 | 0 | 0 | 3 |
| 2 | DE | … | Discipline Specific Elective | 3 | 0 | 0 | 3 |
| 3 | DE/GE | … | Generic Elective | 3 | 0 | 0 | 4 |
| 4 | GSC | GSC808 | ESP & SDP – VIII | 0 | 1 | 0 | 1 |
| 5 | PTI | INT801 | Internship Industrial Training/Project | 0 | 0 | 8 | 4 |
|  |  |  | Total |  | | | 14 |

**Suggestive Choice Based Subjects**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Sl No. | Type | Subject Code | Topic | L | T | P | Credit Points |
| 1 | DE\* | BDA606 | Managing Big Data with SQL | 3 | 0 | 0 | 3 |
| 2. | DE\* | CSD815 | Natural Language Processing | 3 | 0 | 0 | 3 |
| 3. | DE\* | CC807 | Cloud Architecture & Development Model | 3 | 0 | 0 | 3 |
| 5. | DE\*\* | CSD818 | Neural Network and Application | 3 | 0 | 0 | 3 |
| 6 | DE\*\* | CC808 | Introduction to Microsoft Azure and Its Services | 3 | 0 | 0 | 3 |
| 9. | GE | ECC510 | Digital Signal Processing | 3 | 0 | 0 | 3 |
| 10. | GE | ECD019 | Speech & Audio Processing | 3 | 0 | 0 | 3 |

**Detailed Syllabus of Specialization Course**

**CLOUD COMPUTING**