

# **B. Tech. Honors/ Research Degree in Electronics and Computer Science Engineering**

## **B. Tech in Electronics and Computer Science Engineering Program Educational Objectives (PEOs):**

The B. Tech program in Electronics and Computer Science Engineering aims to prepare the graduates with the following objectives:

1. Lead a successful career in industries or undertake entrepreneurial endeavors and provide solutions in the areas of system design, analysis of algorithms & data, computer networking, and allied areas of Electronics and Computer Science Engineering or pursue advanced studies.
2. Utilize their knowledge, skills and resources to design, invent and find creative and innovative solutions to engineering problems in a multidisciplinary work environment following appropriate ethical practices.
3. Develop attitude in lifelong learning, apply and adapt new ideas as the technology evolves.

## **Program Outcomes (POs):**

The program outcomes are:

- a) **Engineering knowledge:** Ability to apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
- b) **Problem analysis:** Ability to identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
- c) **Design/Development of solutions:** Ability to design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
- d) **Conduct investigations on complex problems:** Ability to use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
- e) **Modern tool usage:** Ability to create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
- f) **The engineer and society:** Ability to apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
- g) **Environment and sustainability:** Ability to understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
- h) **Ethics:** Ability to apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
- i) **Individual and team:** Ability to function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

- j) **Communication:** Ability to communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
- k) **Project management and finance:** Ability to demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
- l) **Life-long learning:** Ability to recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

### **Program Specific Outcomes (PSOs)**

The program specific outcomes are:

- a) Ability to design and develop systems using suitable hardware and software tools for industrial data management and information communication requirements.
- b) Ability to conduct research in networking, software engineering, embedded system, and related technologies.
- c) Ability to design and develop complex products using suitable tools for societal and engineering needs with skills to communicate effectively in groups.

### **CURRICULUM**

The total minimum credits required for completing the B. Tech. programme in Electronics and Computer Science Engineering is 165.

### **PROFESSIONAL ELECTIVE**

Professional elective-I, II, III are offered during semester five and six. Professional elective IV and V are offered during semester seven and eight. List of electives to be offered during an academic year is announced at the beginning of respective semesters. An elective will be offered only if ten or more students are interested in it. Not that all the electives will be offered in every academic year. Some electives may have seat limitations and will be offered in first cum first serve basis. In order to accommodate more aspiring students, electives having high demand may be offered twice, that is during autumn as elective-I or II and again as elective-III during spring semester.

Students can select electives based on their interest in a domain. Areas of specialization or domain are optional, however electives can be grouped to provide learning around a functional area. Students may qualify for a maximum of one area of Specialization. Completion of the specialization will not be reflecting on transcripts or degree certificate.

## Electronics and Computer Science Engineering SEMESTER III

| Theory   |             |                                  |   |   |   |           |           |
|--|-------------|----------------------------------|---|---|---|-----------|-----------|
| Sl. No   | Course Code | Course Title                     | L | T | P | Total     | Credit    |
| 1.   | MA21001     | Probability and Statistics       | 3 | 1 | 0 | 4         | 4         |
| 2.   | EC20001     | Signals and Systems              | 3 | 0 | 0 | 3         | 3         |
| 3.   | EC21001     | Electronic Circuits              | 3 | 1 | 0 | 4         | 4         |
| 4.   | CS21001     | Data Structures                  | 3 | 1 | 0 | 4         | 4         |
| 5.   | CS20005     | Computer System and Architecture | 3 | 0 | 0 | 3         | 3         |
| 6.   | EX20003     | Scientific and Technical Writing | 2 | 0 | 0 | 2         | 2         |
| <b>Total Credit (Theory Subjects)</b>                  |             |                                  |   |   |   | <b>20</b> | <b>20</b> |
| Practical  |             |                                  |   |   |   |           |           |
| 1.   | EC29003     | Signal Processing Lab            | 0 | 0 | 2 | 2         | 1         |
| 2.   | CS29001     | Data Structures Lab              | 0 | 0 | 2 | 2         | 1         |
| Sessional  |             |                                  |   |   |   |           |           |
| 1.   |             | Vocational Electives             | 0 | 0 | 2 | 2         | 1         |
| <b>Total Credit (Practical and Sessional Subjects)</b> |             |                                  |   |   |   | <b>6</b>  | <b>3</b>  |
| <b>Total Credit (Semester)</b>                         |             |                                  |   |   |   | <b>26</b> | <b>23</b> |

## SEMESTER IV

| Theory                                   |             |                                  |   |   |   |           |           |
|--|-------------|----------------------------------|---|---|---|-----------|-----------|
| Sl. No                                   | Course Code | Course Title                     | L | T | P | Total     | Credit    |
| 1.                                       | MA21002     | Discrete Mathematics             | 3 | 1 | 0 | 4         | 4         |
| 2.                                       | CS20002     | Operating Systems                | 3 | 0 | 0 | 3         | 3         |
| 3.                                       | EC20008     | Communication Engineering        | 3 | 0 | 0 | 3         | 3         |
| 4.                                       | CS20006     | Database Management Systems      | 3 | 0 | 0 | 3         | 3         |
| 5.                                       | EX20001     | Industry 4.0 Technologies        | 2 | 0 | 0 | 2         | 2         |
| 6.                                       |             | HASS Elective II                 | 3 | 0 | 0 | 3         | 3         |
| <b>Total Credit (Theory Subjects)</b>    |             |                                  |   |   |   | <b>18</b> | <b>18</b> |
| Practical                                |             |                                  |   |   |   |           |           |
| 1.                                       | EC29001     | Electronic Circuits Lab          | 0 | 0 | 4 | 4         | 2         |
| 2.                                       | CS29006     | Database Management Systems Lab  | 0 | 0 | 2 | 2         | 1         |
| 3.                                       | CS29008     | Programming With Python and Java | 0 | 0 | 4 | 4         | 2         |
| <b>Total Credit (Practical Subjects)</b> |             |                                  |   |   |   | <b>10</b> | <b>5</b>  |
| <b>Total Credit (Semester)</b>           |             |                                  |   |   |   | <b>28</b> | <b>23</b> |

### SEMESTER V

| Theory                                   |             |  |   |   |   |           |           |
|--|-------------|--|---|---|---|-----------|-----------|
| Sl. No                                   | Course Code | Course Title                             | L | T | P | Total     | Credit    |
| 1.                                       | CS30001     | Design and Analysis of Algorithms        | 3 | 0 | 0 | 3         | 3         |
| 2.                                       | EC20002     | Microprocessors and Embedded Systems     | 3 | 0 | 0 | 3         | 3         |
| 3.                                       | HS30401     | Universal Human Values                   | 3 | 0 | 0 | 3         | 3         |
| 4.                                       |             | HASS Elective III                        | 3 | 0 | 0 | 3         | 3         |
| 5.                                       |             | Professional Elective-I                  | 3 | 0 | 0 | 3         | 3         |
| 6.                                       |             | Professional Elective-II                 | 3 | 0 | 0 | 3         | 3         |
| <b>Total Credit (Theory Subjects)</b>    |             |  |   |   |   | <b>18</b> | <b>18</b> |
| Practical                                |             |  |   |   |   |           |           |
| 1.                                       | CS39001     | Algorithms Lab                           | 0 | 0 | 2 | 2         | 1         |
| 2.                                       | EC29002     | Communication Engineering Lab            | 0 | 0 | 2 | 2         | 1         |
| 3.                                       | EC29006     | Microprocessors and Embedded Systems Lab | 0 | 0 | 2 | 2         | 1         |
| Sessional                                |             |  |   |   |   |           |           |
| 1.                                       | EC38001     | Electronics Product Development          | 0 | 0 | 2 | 2         | 1         |
| 2.                                       | SAxxxx      | K-Explore Open Elective-I                | 0 | 0 | 2 | 2         | 1         |
| <b>Total Credit (Practical Subjects)</b> |             |  |   |   |   | <b>10</b> | <b>5</b>  |
| <b>Total Credit (Semester)</b>           |             |  |   |   |   | <b>28</b> | <b>23</b> |

### SEMESTER VI

| Theory                                   |             |                              |   |   |   |           |           |
|--|-------------|------------------------------|---|---|---|-----------|-----------|
| Sl. No                                   | Course Code | Course Title                 | L | T | P | Total     | Credit    |
| 1.                                       | CS31001     | Software Engineering         | 3 | 1 | 0 | 4         | 4         |
| 2.                                       | EC30005     | VLSI Circuits and Systems    | 3 | 0 | 0 | 3         | 3         |
| 3.                                       | CS30003     | Computer Networks            | 3 | 0 | 0 | 3         | 3         |
| 4.                                       | HS30101     | Engineering Economics        | 3 | 0 | 0 | 3         | 3         |
| 5.                                       |             | Professional Elective III    | 3 | 0 | 0 | 3         | 3         |
| 6.                                       |             | Open Elective-II/(MI – I)    | 3 | 0 | 0 | 3         | 3         |
| <b>Total Credit (Theory Subjects)</b>    |             |                              |   |   |   | <b>19</b> | <b>19</b> |
| Practical                                |             |                              |   |   |   |           |           |
| 1.                                       | CS33002     | Applications Development Lab | 0 | 0 | 4 | 4         | 2         |
| 2.                                       | EC39001     | VLSI Design Lab              | 0 | 0 | 2 | 2         | 1         |
| 3.                                       | CS39003     | Computer Networks Lab        | 0 | 0 | 2 | 2         | 1         |
| Sessional                                |             |                              |   |   |   |           |           |
| 1  | EM37002     | Minor Project                | - | - | - | -         | 2         |
| <b>Total Credit (Practical Subjects)</b> |             |                              |   |   |   |           | <b>6</b>  |
| <b>Total Credit (Semester)</b>           |             |                              |   |   |   | <b>27</b> | <b>25</b> |

**SEMESTER VII (for B. Tech. (Hons.))**

| <b>Theory</b>                            |                    |                                   |          |          |          |              |               |
|--|--------------------|-----------------------------------|----------|----------|----------|--------------|---------------|
| <b>Sl. No</b>                            | <b>Course Code</b> | <b>Course Title</b>               | <b>L</b> | <b>T</b> | <b>P</b> | <b>Total</b> | <b>Credit</b> |
| 1  | EX40003            | Engineering Professional Practice | 2        | 0        | 0        | 2            | 2             |
| 2.                                       |                    | Professional Elective-IV          | 3        | 0        | 0        | 3            | 3             |
| 3.                                       |                    | Open Elective – III (MI – II)     | 3        | 0        | 0        | 3            | 3             |
| 4.                                       |                    | MI – III (Optional)               | 3        | 0        | 0        | 3            | 3             |
| 5.                                       |                    | MI – IV (Optional)                | 3        | 0        | 0        | 3            | 3             |
| <b>Total Credit (Theory Subjects)</b>    |                    |                                   |          |          |          | <b>8</b>     | <b>8</b>      |
| <b>Practical</b>                         |                    |                                   |          |          |          |              |               |
| 1.                                       | EM47001            | Project – I/ Internship           | -        | -        | -        | -            | 5             |
| 2.                                       | EM48001            | Practical Training                | -        | -        | -        | -            | 2             |
| 3.                                       |                    | MI- Lab/ MI project               | -        | -        | -        | -            | 2             |
| <b>Total Credit (Sessional Subjects)</b> |                    |                                   |          |          |          |              | <b>7</b>      |
| <b>Total</b>                             |                    |                                   |          |          |          | <b>8</b>     | <b>15</b>     |

**SEMESTER VIII (B. Tech. (Hons.))**

| <b>Theory</b>                            |                    |                         |          |          |          |              |               |
|--|--------------------|-------------------------|----------|----------|----------|--------------|---------------|
| <b>Sl. No</b>                            | <b>Course Code</b> | <b>Course Title</b>     | <b>L</b> | <b>T</b> | <b>P</b> | <b>Total</b> | <b>Credit</b> |
| 1.                                       |                    | Professional Elective-V | 3        | 0        | 0        | 3            | 3             |
| 2.                                       |                    | Open Elective-IV (MI V) | 3        | 0        | 0        | 3            | 3             |
| 3.                                       |                    | MI - VI (Optional)      | 3        | 0        | 0        | 3            | 3             |
| <b>Total Credit (Theory Subjects)</b>    |                    |                         |          |          |          | <b>6</b>     | <b>6</b>      |
| <b>Sessional</b>                         |                    |                         |          |          |          |              |               |
| 1.                                       | EM47002            | Project- II             | -        | -        | -        | -            | 9             |
| <b>Total Credit (Sessional Subjects)</b> |                    |                         |          |          |          |              | <b>9</b>      |
| <b>Total</b>                             |                    |                         |          |          |          | <b>6</b>     | <b>15</b>     |

**SEMESTER VII (B.Tech (Research))**

| <b>Theory</b>                            |                    |                                   |          |          |          |              |               |
|--|--------------------|-----------------------------------|----------|----------|----------|--------------|---------------|
| <b>Sl. No</b>                            | <b>Course Code</b> | <b>Course Title</b>               | <b>L</b> | <b>T</b> | <b>P</b> | <b>Total</b> | <b>Credit</b> |
| 1.                                       | EX40001            | Research Methods and Ethics       | 3        | 0        | 0        | 3            | 3             |
| 2.                                       | EX40003            | Engineering Professional Practice | 2        | 0        | 0        | 2            | 2             |
| 3.                                       |                    | Research Elective-I               | 3        | 0        | 0        | 3            | 3             |
| 4.                                       |                    | MI-II (Optional)                  | 3        | 0        | 0        | 3            | 3             |
| 5.                                       |                    | MI-III (Optional)                 | 3        | 0        | 0        | 3            | 3             |
| 6.                                       |                    | MI-IV (Optional)                  | 3        | 0        | 0        | 3            | 3             |
| <b>Total of Theory</b>                   |                    |                                   |          |          |          | <b>8</b>     | <b>8</b>      |
| <b>Sessional</b>                         |                    |                                   |          |          |          |              |               |
| 1.                                       | EM47001            | Project – I/ Internship           | -        | -        | -        | -            | 5             |
| 2.                                       | EM48001            | Practical Training                | -        | -        | -        | -            | 2             |
| 3.                                       |                    | MI-Lab/ MI-Project (Optional)     | -        | -        | -        | -            | 2             |
| <b>Total Credit (Sessional Subjects)</b> |                    |                                   |          |          |          | -            | 7             |
| <b>Total</b>                             |                    |                                   |          |          |          | <b>8</b>     | <b>15</b>     |

**SEMESTER VIII (B.Tech (Research))**

| <b>Theory</b>                            |                    |                      |          |          |          |              |               |
|--|--------------------|----------------------|----------|----------|----------|--------------|---------------|
| <b>Sl. No</b>                            | <b>Course Code</b> | <b>Course Title</b>  | <b>L</b> | <b>T</b> | <b>P</b> | <b>Total</b> | <b>Credit</b> |
| 1.                                       |                    | Research Elective-II | 3        | 0        | 0        | 3            | 3             |
| 2.                                       |                    | MI-V (Optional)      | 3        | 0        | 0        | 3            | 3             |
|  |                    | MI-VI(Optional)      | 3        | 0        | 0        | 3            | 3             |
| <b>Total of Theory</b>                   |                    |                      |          |          |          | <b>3</b>     | <b>3</b>      |
| <b>Sessional</b>                         |                    |                      |          |          |          |              |               |
| 1.                                       | EM47004            | Project- II          | -        | -        | -        | -            | 12            |
| <b>Total Credit (Sessional Subjects)</b> |                    |                      |          |          |          |              | 12            |
| <b>Total</b>                             |                    |                      |          |          |          | <b>3</b>     | <b>15</b>     |

**PROFESSIONAL ELECTIVE I/II/III**

| Sl. No | CourseCode | Course Title                                       | L | T | P | Total | Credits |
|--------|------------|--|---|---|---|-------|---------|
| 1.     | CS30005    | High Performance Computing                         | 3 | 0 | 0 | 3     | 3       |
| 2.     | CS30009    | Distributed Operating System                       | 3 | 0 | 0 | 3     | 3       |
| 3.     | CS30010    | Cloud Computing                                    | 3 | 0 | 0 | 3     | 3       |
| 4.     | CS30011    | Computational Intelligence                         | 3 | 0 | 0 | 3     | 3       |
| 5.     | CS30019    | Web Technology and Applications                    | 3 | 0 | 0 | 3     | 3       |
| 6.     | CS30023    | Software Defined Networking                        | 3 | 0 | 0 | 3     | 3       |
| 7.     | CS30029    | Computer Vision and Pattern Recognition            | 3 | 0 | 0 | 3     | 3       |
| 8.     | EC30006    | Hardware Description Language for Digital Design   | 3 | 0 | 0 | 3     | 3       |
| 9.     | EC30007    | ARM and Advanced Processors                        | 3 | 0 | 0 | 3     | 3       |
| 10.    | EC30008    | Wireless Sensor Networks                           | 3 | 0 | 0 | 3     | 3       |
| 11.    | EC30009    | Compound Semiconductor Basics                      | 3 | 0 | 0 | 3     | 3       |
| 12.    | EC30010    | Mobile Ad Hoc Network                              | 3 | 0 | 0 | 3     | 3       |
| 13.    | EC30011    | Digital System Design with Verilog                 | 3 | 0 | 0 | 3     | 3       |
| 14.    | EC30012    | Nanoelectronics                                    | 3 | 0 | 0 | 3     | 3       |
| 15.    | EC30013    | Optical and Satellite Communication                | 3 | 0 | 0 | 3     | 3       |
| 16.    | EC30015    | Hardware and Software Co-Design of Embedded System | 3 | 0 | 0 | 3     | 3       |
| 17.    | EC30017    | Audio & Speech Processing                          | 3 | 0 | 0 | 3     | 3       |
| 18.    | EC30019    | Information Theory and Coding                      | 3 | 0 | 0 | 3     | 3       |
| 19.    | EC30021    | Industrial IoT                                     | 3 | 0 | 0 | 3     | 3       |
| 20.    | EL30001    | Industrial Automation                              | 3 | 0 | 0 | 3     | 3       |
| 21.    | EM30007    | Machine Learning based Signal Processing           | 3 | 0 | 0 | 3     | 3       |
| 22.    | EM30008    | Deep Learning: Algorithms and Implementation       | 3 | 0 | 0 | 3     | 3       |
| 23.    | EM30009    | Data Analytics                                     | 3 | 0 | 0 | 3     | 3       |
| 24.    | EM30011    | Data Mining  | 3 | 0 | 0 | 3     | 3       |

**PROFESSIONAL ELECTIVE –IV/ V**

| Sl. No | CourseCode | Course Title                                  | L | T | P | Total | Credit |
|--------|------------|---|---|---|---|-------|--------|
| 1.     | CS40003    | Software Testing and Automation               | 3 | 0 | 0 | 3     | 3      |
| 2.     | CS40005    | Human Computer Interaction                    | 3 | 0 | 0 | 3     | 3      |
| 3.     | CS40007    | Computer Graphics and Multimedia Systems      | 3 | 0 | 0 | 3     | 3      |
| 4.     | CS40010    | Augmented and Virtual Reality                 | 3 | 0 | 0 | 3     | 3      |
| 5.     | CS40012    | Blockchain                                    | 3 | 0 | 0 | 3     | 3      |
| 6.     | CS40015    | Cryptography and Network Security             | 3 | 0 | 0 | 3     | 3      |
| 7.     | EC40001    | Optimization Techniques in Engineering        | 3 | 0 | 0 | 3     | 3      |
| 8.     | EC40002    | Millimetre Waves and Terahertz Technology     | 3 | 0 | 0 | 3     | 3      |
| 9.     | EC40003    | Cognitive Radio and Cooperative Communication | 3 | 0 | 0 | 3     | 3      |
| 10.    | EC40004    | Quantum Communication                         | 3 | 0 | 0 | 3     | 3      |
| 11.    | EC40005    | Analog and Mixed Signal IC Design             | 3 | 0 | 0 | 3     | 3      |
| 12.    | EC40006    | Advanced VLSI and SoC                         | 3 | 0 | 0 | 3     | 3      |
| 13.    | EC40007    | Low Power VLSI Design                         | 3 | 0 | 0 | 3     | 3      |
| 14.    | EC40008    | Advanced Computer Architecture and RISC-V     | 3 | 0 | 0 | 3     | 3      |
| 15.    | EC40009    | Biomedical Signal Processing                  | 3 | 0 | 0 | 3     | 3      |
| 16.    | EM40001    | ML for Language Processing                    | 3 | 0 | 0 | 3     | 3      |
| 17.    | EM40006    | Cybersecurity                                 | 3 | 0 | 0 | 3     | 3      |
| 18.    | EM40008    | Bioinformatics                                | 3 | 0 | 0 | 3     | 3      |
| 19.    | EM40010    | Optimization Methods in Machine Learning      | 3 | 0 | 0 | 3     | 3      |

## Suggested Bucket of Professional Electives

| PE I                              | PE II                             | PE III                               | PE IV   | PE V   | Specialization                |
|-----------------------------------|-----------------------------------|--------------------------------------|---|--|-------------------------------|
| CS30005 /<br>CS30009 /<br>CS30029 | CS30019 /<br>EM30009 /<br>EM30011 | CS30010<br>(PR-CS20002) /<br>CS30023 | CS40003 /<br>CS40015 /<br>CS40007                   | EM40006 /<br>CS40010<br>(PR-CS30029)/<br>CS40012 | Computer Science              |
| EC30017                           | CS30011 /<br>EM30007              | EM30008 /<br>EM30009 /<br>EM30011    | CS40005 /<br>EC40009 /<br>EM40001 /<br>(PR-EM30007) | EM40008 /<br>EM40010                             | ML and Applications           |
| EC30019                           | EC30013                           | EC30008 /<br>EC30010                 | EC40003 /<br>CS40015                                | EC40004 /<br>EC40002                             | Communication &<br>Networking |
| EC30009 /<br>EC30015              | EC30011 /<br>EC30006              | EC30007                              | EC40005 /<br>EC40007                                | EC40006 /<br>EC40008                             | VLSI &<br>Embedded Design     |

## LIST OF HASS ELECTIVES

### HASS Elective-II

| Sl. No | Course Code | Subjects                           | L | T | P | Total | Credit |
|--------|-------------|------------------------------------|---|---|---|-------|--------|
| 1.     | HS20120     | Economics of Development           | 3 | 0 | 0 | 3     | 3      |
| 2.     | HS20122     | International Economic Cooperation | 3 | 0 | 0 | 3     | 3      |
| 3.     | HS20220     | Organizational Behaviour           | 3 | 0 | 0 | 3     | 3      |
| 4.     | HS20222     | Human Resource Management          | 3 | 0 | 0 | 3     | 3      |

### HASS Elective-III

| Sl. No | Course Code | Subjects                                 | L | T | P | Total | Credit |
|--------|-------------|--|---|---|---|-------|--------|
| 1.     | HS30125     | Market Structure and Pricing Policies    | 3 | 0 | 0 | 3     | 3      |
| 2.     | HS30127     | Pragmatic Inquiry                        | 3 | 0 | 0 | 3     | 3      |
| 3.     | HS30129     | Economic Analysis of Decision Rules      | 3 | 0 | 0 | 3     | 3      |
| 4.     | HS30131     | Economics of Health and Education        | 3 | 0 | 0 | 3     | 3      |
| 5.     | HS30223     | Business Ethics and Corporate Governance | 3 | 0 | 0 | 3     | 3      |
| 6.     | HS30225     | Leadership and Team Effectiveness        | 3 | 0 | 0 | 3     | 3      |
| 7.     | HS30421     | Gender Studies                           | 3 | 0 | 0 | 3     | 3      |
| 8.     | HS30423     | Tribal Resource Management               | 3 | 0 | 0 | 3     | 3      |
| 9.     | HS30425     | Indian Knowledge System                  | 3 | 0 | 0 | 3     | 3      |

### RESEARCH ELECTIVE - I (OFFERED BY SCHOOL OF ELECTRONICS ENGINEERING)

| Sl. No. | Course Code | Subjects                                  | L | T | P | Total | Credit |
|---------|-------------|---|---|---|---|-------|--------|
| 1.      | EC30009     | Compound Semiconductor Basics             | 3 | 0 | 0 | 3     | 3      |
| 2.      | EC40007     | Low Power VLSI Design                     | 3 | 0 | 0 | 3     | 3      |
| 3.      | CS30023     | Software Defined Networking               | 3 | 0 | 0 | 3     | 3      |
| 4.      | EC40015     | 5G Supportive Technologies                | 3 | 0 | 0 | 3     | 3      |
| 5.      | EC40017     | Planner Antenna                           | 3 | 0 | 0 | 3     | 3      |
| 6.      | EC40019     | Solar Cell Device and Material Technology | 3 | 0 | 0 | 3     | 3      |

**RESEARCH ELECTIVE – II (OFFERED BY SCHOOL OF ELECTRONICS ENGINEERING)**

| Sl. No. | Course Code | Subjects                                      | L | T | P | Total | Credit |
|---------|-------------|---|---|---|---|-------|--------|
| 1.      | EC40003     | Cognitive Radio and Cooperative Communication | 3 | 0 | 0 | 3     | 3      |
| 2.      | EC40006     | Advanced VLSI and SoC                         | 3 | 0 | 0 | 3     | 3      |
| 3.      | EC40010     | Massive MIMO Technology                       | 3 | 0 | 0 | 3     | 3      |
| 4.      | EC40014     | RF CMOS VLSI                                  | 3 | 0 | 0 | 3     | 3      |
| 5.      | EC40016     | VLSI Signal Processing                        | 3 | 0 | 0 | 3     | 3      |
| 6.      | EC40018     | Smart Antennas                                | 3 | 0 | 0 | 3     | 3      |

**VOCATIONAL ELECTIVES****Vocational courses offered by School of Civil Engineering**

| Sl. No. | Course Code | Subjects   | L | T | P | Total | Credit |
|---------|-------------|--|---|---|---|-------|--------|
| 1.      | CE28001     | Building Drawing, Estimation & Costing<br>(for Civil Engineering Students) | 0 | 0 | 2 | 1     | 1      |
| 2.      | CE28003     | GIS & GPS Applications<br>(For other branch students)                      | 0 | 0 | 2 | 1     | 1      |

**Vocational courses offered by School of Computer Science Engineering**

| Sl. No. | Course Code | Subjects   | L | T | P | Total | Credit |
|---------|-------------|------------|---|---|---|-------|--------|
| 1.      | CS28001     | Web Design | 0 | 0 | 2 | 1     | 1      |

**Vocational courses offered by School of Electrical Engineering**

| Sl. No. | Course Code | Subjects  | L | T | P | Total | Credit |
|---------|-------------|---|---|---|---|-------|--------|
| 1.      | EE28011     | Industrial wiring and control panel design                    | 0 | 0 | 2 | 1     | 1      |
| 2.      | EE28013     | Installation, operation and maintenance of solar power system | 0 | 0 | 2 | 1     | 1      |
| 3.      | EE28015     | Domestic wiring and home automation                           | 0 | 0 | 2 | 1     | 1      |
| 4.      | EE28017     | Cyber physics application in industrial IOT                   | 0 | 0 | 2 | 1     | 1      |
| 5.      | EE28019     | Industrial Control and Remote Monitoring                      | 0 | 0 | 2 | 1     | 1      |

**Vocational courses offered by School of Electronics Engineering**

| Sl. No. | Course Code | Subjects                  | L | T | P | Total | Credit |
|---------|-------------|---------------------------|---|---|---|-------|--------|
| 1.      | EC28001     | Computational Photography | 0 | 0 | 2 | 1     | 1      |
| 2.      | EC28003     | Sound Engineering         | 0 | 0 | 2 | 1     | 1      |
| 3.      | EC28005     | Sensors for Automation    | 0 | 0 | 2 | 1     | 1      |
| 4.      | EC28007     | PCB Design                | 0 | 0 | 2 | 1     | 1      |

### Vocational courses offered by School of Mechanical Engineering

| Sl. No. | Course Code | Subjects                                  | L | T | P | Total | Credit |
|---------|-------------|---|---|---|---|-------|--------|
| 1       | ME28011     | Additive Manufacturing(3-D Printing)      | 0 | 0 | 2 | 1     | 1      |
| 2       | ME28013     | Die development by CNC milling            | 0 | 0 | 2 | 1     | 1      |
| 3       | ME28015     | Concept Car Manufacturing                 | 0 | 0 | 2 | 1     | 1      |
| 4       | ME28017     | Development of Autonomous Wheeled Robots  | 0 | 0 | 2 | 1     | 1      |
| 5       | ME28019     | Modelling of Micro-Wind turbine by 3D CAD | 0 | 0 | 2 | 1     | 1      |

### K-EXPLORE OPEN ELECTIVE - I

| Sl. No. | Course Code | Subjects                                 | L | T | P | Total | Credit |
|---------|-------------|--|---|---|---|-------|--------|
| 1.      | SA38001     | Robotics                                 | 0 | 0 | 2 | 2     | 1      |
| 2.      | SA38003     | Web Designing                            | 0 | 0 | 2 | 2     | 1      |
| 3.      | SA38005     | Civil-Tech                               | 0 | 0 | 2 | 2     | 1      |
| 4.      | SA38007     | Circuit Design & Control                 | 0 | 0 | 2 | 2     | 1      |
| 5.      | SA38009     | Indian Classical, Folk & Bollywood Dance | 0 | 0 | 2 | 2     | 1      |
| 6.      | SA38011     | Indian Classical & Western Music         | 0 | 0 | 2 | 2     | 1      |
| 7.      | SA38013     | Graphic Designing & Editing              | 0 | 0 | 2 | 2     | 1      |
| 8.      | SA38015     | Art & Craft                              | 0 | 0 | 2 | 2     | 1      |
| 9.      | SA38017     | Theatre & Street Play                    | 0 | 0 | 2 | 2     | 1      |
| 10.     | SA38019     | Film Making                              | 0 | 0 | 2 | 2     | 1      |
| 11.     | SA38021     | Debating,Public Speaking& Anchoring      | 0 | 0 | 2 | 2     | 1      |
| 12.     | SA38023     | Creative Writing                         | 0 | 0 | 2 | 2     | 1      |
| 13.     | SA38025     | Photography & Videography                | 0 | 0 | 2 | 2     | 1      |
| 14.     | SA 38027    | Fashion Styling                          | 0 | 0 | 2 | 2     | 1      |
| 15.     | SA 38029    | Culinary Arts                            | 0 | 0 | 2 | 2     | 1      |
| 16.     | SA 38031    | Quiz Activity                            | 0 | 0 | 2 | 2     | 1      |
| 17.     | SA 38033    | Social Outreach                          | 0 | 0 | 2 | 2     | 1      |
| 18.     | SA 38035    | Health & Emergency Care                  | 0 | 0 | 2 | 2     | 1      |