



**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA**  
**KAKINADA – 533 003, Andhra Pradesh, India**

**DEPARTMENT OF ELECTRONICS AND INSTRUMENTATION ENGINEERING**

## **COURSE STRUCTURE AND SYLLABUS**

**For UG – R20**

**B. TECH – ELECTRONICS AND INSTRUMENTATION ENGINEERING**

*(Applicable for batches admitted from 2020-2021)*



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**KAKINADA - 533 003, Andhra Pradesh, India**



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KAKINADA – 533 003, Andhra Pradesh, India

## DEPARTMENT OF ELECTRONICS AND INSTRUMENTATION ENGINEERING

### COURSE STRUCTURE

#### I Year – I SEMESTER

| S. No                | Course Code | Course Name                                 | L | T | P | Credits     |
|----------------------|-------------|---------------------------------------------|---|---|---|-------------|
| 1                    |             | Mathematics – I                             | 3 | 0 | 0 | 3           |
| 2                    |             | Applied Chemistry                           | 3 | 0 | 0 | 3           |
| 3                    |             | Communicative English                       | 3 | 0 | 0 | 3           |
| 4                    |             | Programming for Problem Solving Using C     | 3 | 0 | 0 | 3           |
| 5                    |             | Engineering Drawing                         | 2 | 0 | 2 | 3           |
| 6                    |             | English Communication Skills Laboratory     | 0 | 0 | 3 | 1.5         |
| 7                    |             | Applied Chemistry Lab                       | 0 | 0 | 3 | 1.5         |
| 8                    |             | Programming for Problem Solving Using C Lab | 0 | 0 | 3 | 1.5         |
| <b>Total Credits</b> |             |                                             |   |   |   | <b>19.5</b> |

#### I Year – II SEMESTER

| S. No                | Course Code | Subjects                                               | L | T | P | Credits     |
|----------------------|-------------|--------------------------------------------------------|---|---|---|-------------|
| 1                    |             | Mathematics – II                                       | 3 | 0 | 0 | 3           |
| 2                    |             | Applied Physics                                        | 3 | 0 | 0 | 3           |
| 3                    |             | Object Oriented Programming through Java               | 2 | 0 | 2 | 3           |
| 4                    |             | Network Analysis                                       | 3 | 0 | 0 | 3           |
| 5                    |             | Basic Electrical Engineering                           | 3 | 0 | 0 | 3           |
| 6                    |             | Electronic components & Measuring Instruments Workshop | 0 | 0 | 3 | 1.5         |
| 7                    |             | Basic Electrical Engineering Lab                       | 0 | 0 | 3 | 1.5         |
| 8                    |             | Applied Physics Lab                                    | 0 | 0 | 3 | 1.5         |
| 9                    |             | Environmental Science                                  | 3 | 0 | 0 | 0           |
| <b>Total Credits</b> |             |                                                        |   |   |   | <b>19.5</b> |



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**II B.Tech - I Semester**

| S. No. | Category | Subjects                                                                    | L | T | P | Credits     |
|--------|----------|-----------------------------------------------------------------------------|---|---|---|-------------|
| 1      | PC       | Electronic Devices and Circuits                                             | 3 | 1 | 0 | 3           |
| 2      | PC       | Signals and Systems                                                         | 3 | 1 | 0 | 3           |
| 3      | PC       | Switching Theory and Logic Design                                           | 3 | 1 | 0 | 3           |
| 4      | PC       | Electronic Measurements and Instrumentation                                 | 3 | 1 | 0 | 3           |
| 5      | BS       | Mathematics-III                                                             | 3 | 1 | 0 | 3           |
| 6      | LC       | Electronic Devices and Circuits Lab                                         | 0 | 0 | 3 | 1.5         |
| 7      | LC       | Electronic Measurements and Instrumentation Lab                             | 0 | 0 | 3 | 1.5         |
| 8      | LC       | Digital System Design Lab                                                   | 0 | 0 | 3 | 1.5         |
| 9      |          | Skill oriented course *(Computational Techniques using MATLAB and Lab VIEW) | 1 | 0 | 2 | 2           |
|        |          | <b>Total Credits</b>                                                        |   |   |   | <b>21.5</b> |

**II B.Tech - II Semester**

| S. No. | Category | Subjects                                    | L | T | P | Credits     |
|--------|----------|---------------------------------------------|---|---|---|-------------|
| 1      | PC       | Electronic Circuits Analysis                | 3 | 1 | 0 | 3           |
| 2      | ES       | Linear Control Systems                      | 3 | 1 | 0 | 3           |
| 3      | PC       | Microprocessor and Micro controllers        | 3 | 1 | 0 | 3           |
| 4      | PC       | Integrated Circuits and applications        | 3 | 1 | 0 | 3           |
| 5      | HS       | Managerial Economics and Financial Analysis | 3 | 0 | 0 | 3           |
| 6      | LC       | Electronic Circuit Analysis LAB             | 0 | 0 | 3 | 1.5         |
| 7      | LC       | Microprocessor and Micro controllers Lab    | 0 | 0 | 3 | 1.5         |
| 8      | LC       | Integrated Circuits and applications Lab    | 0 | 0 | 3 | 1.5         |
| 9      |          | Skill Course (Python Programming)           | 1 | 0 | 2 | 2           |
|        |          | <b>Total Credits</b>                        |   |   |   | <b>21.5</b> |



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**III B.Tech I Semester**

| S. No. | Category | Subjects                                                                                           | L | T | P | Credits     |
|--------|----------|----------------------------------------------------------------------------------------------------|---|---|---|-------------|
| 1      |          | Digital Signal Processing                                                                          | 3 | 0 | 0 | 3           |
| 2      |          | Transducers and Sensors                                                                            | 3 | 0 | 0 | 3           |
| 3      |          | Industrial Instrumentation                                                                         | 3 | 0 | 0 | 3           |
| 4      |          | Professional Elective courses (PE1)                                                                | 3 | 0 | 0 | 3           |
| 5      |          | Open Elective (OE1)                                                                                | 3 | 0 | 0 | 3           |
| 6      |          | Transducers and Sensors Lab                                                                        | 0 | 0 | 3 | 1.5         |
| 7      |          | Digital Signal Processing Lab                                                                      | 0 | 0 | 3 | 1.5         |
| 8      |          | SCILAB                                                                                             | 1 | 0 | 2 | 2           |
| 9      |          | Indian Traditional Knowledge                                                                       | 2 | 0 | 0 | 0           |
| 10     |          | Summer Internship 2 Months<br>(Mandatory) after second year<br>(to be evaluated during V semester) | 0 | 0 | 0 | 1.5         |
|        |          | <b>Total Credits</b>                                                                               |   |   |   | <b>21.5</b> |
| 11     |          | <b>Honors/Minor courses (The hours distribution can be 3-0-2 or 3-1-0 also)</b>                    | 4 | 0 | 0 | 4           |

|                                                                                                                                 |                                                                                                                                      |                                                                                                                                                                   |
|---------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b><u>PE1:</u></b><br>1. Principles of Communication Engineering<br>2. PLCs and SCADA<br>3. IOT Sensor Technology<br>4. EMI/EMC | <b><u>HONOR COURSES</u></b><br>1. Computer Networks<br>2. Artificial Intelligence<br>3. CMOS Analog IC Design<br>4. Advanced Sensors | <b><u>MINOR COURSES</u></b><br>1. Signals and Systems<br>2. Analog and Digital Communications<br>3. Principles of Electronics<br>4. Principles of Instrumentation |
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**III B. Tech II Semester**

| S. No.                                                                            | Category | Subjects                                                                        | L | T | P | Credits     |
|-----------------------------------------------------------------------------------|----------|---------------------------------------------------------------------------------|---|---|---|-------------|
| 1                                                                                 | PC       | Process Control Instrumentation                                                 | 3 | 0 | 0 | 3           |
| 2                                                                                 | PC       | VLSI Design                                                                     | 3 | 0 | 0 | 3           |
| 3                                                                                 | PC       | Analytical Instrumentation                                                      | 3 | 0 | 0 | 3           |
| 4                                                                                 | PE       | Professional Elective courses(PE2)                                              | 3 | 0 | 0 | 3           |
| 5                                                                                 | OE       | Open Elective (OE2)                                                             | 3 | 0 | 0 | 3           |
| 6                                                                                 | LC       | Process Control Lab                                                             | 0 | 0 | 3 | 1.5         |
| 7                                                                                 | LC       | VLSI Design Lab                                                                 | 0 | 0 | 3 | 1.5         |
| 8                                                                                 | LC       | Advanced Instrumentation Lab                                                    | 1 | 0 | 2 | 2           |
| 9                                                                                 |          | Machine learning using Scikit                                                   | 2 | 0 | 0 | 0           |
| 10                                                                                | MC       | Research Methodology                                                            | 0 | 0 | 0 | 1.5         |
|                                                                                   |          | <b>Total Credits</b>                                                            |   |   |   | <b>21.5</b> |
| 11                                                                                |          | <b>Honors/Minor courses (The hours distribution can be 3-0-2 or 3-1-0 also)</b> | 4 | 0 | 0 | 4           |
| <b>Industrial/Research Internship (Mandatory) 2 Months during summer vacation</b> |          |                                                                                 |   |   |   |             |

**PE2:**

- 1.Robotics and Automation
- 2.Computer Architecture and Organization
- 3.Soft computing techniques
- 4.MEMS and Micro Systems

**HONOR COURSES**

- 1.Machine Learning for Image Processing
- 2.Digital Control Systems
- 3.Data Converters
- 4.Biomedical Instrumentation

**MINOR COURSES**

- 1.Principles of Nano Sensors
- 2.Biomedical Engineering
- 3.Digital logic and Microcontrollers
- 4.Telemetry and Telemedicine



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**IV B.Tech I Semester**

| S. No. | Category | Subjects                                                                                                        | L | T | P | Credits   |
|--------|----------|-----------------------------------------------------------------------------------------------------------------|---|---|---|-----------|
| 1      | PE       | Professional Elective courses(PE3)                                                                              | 3 | 0 | 0 | 3         |
| 2      | PE       | Professional Elective courses(PE4)                                                                              | 3 | 0 | 0 | 3         |
| 3      | PE       | Professional Elective courses(PE5)                                                                              | 3 | 0 | 0 | 3         |
| 4      | OE       | Open Elective (OE3)                                                                                             | 3 | 0 | 0 | 3         |
| 5      | OE       | Open Elective (OE4)                                                                                             | 3 | 0 | 0 | 3         |
| 6      | MC       | Universal Human Values 2:<br>Understanding Harmony                                                              | 3 | 0 | 0 | 3         |
| 7      |          | Introduction to Data Analytics<br>/2.Interfacing with Arduino                                                   | 1 | 0 | 2 | 2         |
| 8      |          | Industrial/Research Internship 2 Months<br>(Mandatory) after third year (to be<br>evaluated during VII semester | 0 | 0 | 0 | 3         |
|        |          | <b>Total Credits</b>                                                                                            |   |   |   | <b>23</b> |
| 9      |          | <b>Honors/Minor courses (The hours<br/>distribution can be 3-0-2 or 3-1-0 also)</b>                             | 4 | 0 | 0 | <b>4</b>  |

**\*There is a provision for the Universities/Institutions to implement AICTE mandatory course “Universal Human Values 2: Understanding Harmony” under Humanities and social science Elective in seventh semester for 3 credits.**

|                                                                                                                                                                  |                                                                                                                                                       |                                                                                                                                        |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------|
| <u>PE3:</u><br>1. Embedded Systems<br>2. Bio Signal Processing<br>3. Virtual Instrumentation<br>4. Nano Science                                                  | <u>HONOR COURSES</u><br>1. Computer Control of Processes<br>2. Power Plant Instrumentation<br>3. Optimal Control Systems<br>4. CMOS Digital IC Design | <u>Minor Courses</u><br>1. Digital Signal Processing<br>2. Machine learning<br>3. Fundamentals of Embedded Systems<br>4. Filter Design |
| <u>PE4:</u><br>1. Non-Linear and Robust Control<br>2. Artificial Intelligence<br>3. Automotive Sensors<br>4. Artificial Neural Networks and Fuzzy Logic          |                                                                                                                                                       |                                                                                                                                        |
| <u>PE5:</u><br>1. DSP processors & Architectures<br>2. Instrumentation in Petro Chemical Industries<br>3. Digital Control Systems<br>4. Adaptive Control Systems |                                                                                                                                                       |                                                                                                                                        |

## IV B.Tech II Semester

| S.No.                | Category                     | Code | Course Title                                     | Hours per week |   |   | Credits   |
|----------------------|------------------------------|------|--------------------------------------------------|----------------|---|---|-----------|
| 1                    | Major Project                | PROJ | Project work, seminar and internship in industry | -              | - | - | 12        |
|                      | <b>INTERNSHIP (6 MONTHS)</b> |      |                                                  |                |   |   |           |
| <b>Total credits</b> |                              |      |                                                  |                |   |   | <b>12</b> |