



**Shri Vaishnav Vidyapeeth Vishwavidyalaya, Indore**  
**Shri Vaishnav Institute of Technology and Science**  
**Choice Based Credit System (CBCS) in the Light of NEP-2020**  
**B.Tech. EEE All Branches w.e.f. 2023**

| COURSE CODE | CATE GORY | COURSE NAME                | TEACHING & EVALUATION SCHEME |               |                      |                         |                      |   |   |   |         |
|-------------|-----------|----------------------------|------------------------------|---------------|----------------------|-------------------------|----------------------|---|---|---|---------|
|             |           |                            | THEORY                       |               |                      | PRACTICAL               |                      | L | T | P | CREDITS |
|             |           |                            | END SEM University Exam      | Two Term Exam | Teachers Assessment* | END SEM University Exam | Teachers Assessment* |   |   |   |         |
| BTEE503     |           | Control System Engineering | 60                           | 20            | 20                   | 30                      | 20                   | 3 | 1 | 2 | 5       |

**Legends:** L - Lecture; T - Tutorial/Teacher Guided Student Activity; P - Practical; C - Credit.

\***Teacher Assessment** shall be based on the following components: Quiz/Assignment/Project/Participation in Class, given that no component shall exceed more than 10 marks.

**Course Educational Objectives (CEOs):**

The course will provide understanding of control system and mathematical modeling of the system.

**Course Outcomes (COs):**

After the successful completion of this course students will be able to

1. Demonstrate the understanding of basic elements and modeling of the control system.
2. Analyze the stability in time domain and frequency domain
3. Design the controller and compensators for the system

**Syllabus**

**UNIT I**

**8 Hrs.**

**Introduction:** Basic Elements of Control System, Open loop and Closed loop systems, Differential equation, Transfer function, Modeling of Electric systems, Translational and rotational mechanical systems, Block diagram reduction Techniques, Signal flow graph, Constructional and working concept of AC servomotor.

**UNIT II**

**8 Hrs.**

**Time Domain Analysis:** Time domain analysis of closed loop systems: Test signals, time response of first and second order systems, Time domain performance specifications, Steady state error & error constants Feedback control actions: Proportional, derivative and integral control.

**UNIT III**

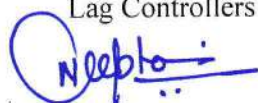
**8 Hrs.**

**Stability Analysis and Root locus:** The concept of stability, Routh's stability criterion, qualitative stability and conditional stability, limitations of Routh's stability. Characteristics equation of closed loop system root loci, construction of loci, Effect of adding, poles and Zeros on the loci, Stability by root loci.

**UNIT IV**

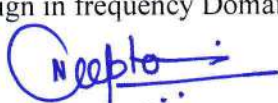
**8 Hrs.**

**Frequency domain Analysis:** Frequency, Domain analysis, Bode plots, Determination of frequency domain specifications, Phase margin and Gain margin, Stability analysis from Bode plots, Polar plots, Nyquist plots, Stability analysis, Compensation techniques: Lag, Lead, Lead-Lag Controllers design in frequency Domain.




**Chairperson**


Board of Studies  
Shri Vaishnav Vidyapeeth  
Vishwavidyalaya, Indore



**Chairperson**

Faculty of Studies  
Shri Vaishnav Vidyapeeth  
Vishwavidyalaya, Indore

  
**Controller of Examinations**  
Shri Vaishnav Vidyapeeth  
Vishwavidyalaya, Indore

  
**Registrar**  
Shri Vaishnav Vidyapeeth  
Vishwavidyalaya, Indore

**Shri Vaishnav Vidyapeeth Vishwavidyalaya, Indore**  
**Shri Vaishnav Institute of Technology and Science**  
**Choice Based Credit System (CBCS) in the Light of NEP-2020**  
**B.Tech. EEE All Branches w.e.f. 2023**

| B.Tech. EEE All Branches W.E.R. 2025 |           |                            |                              |               |                      |                         |                      |   |   |   |         |
|--------------------------------------|-----------|----------------------------|------------------------------|---------------|----------------------|-------------------------|----------------------|---|---|---|---------|
| COURSE CODE                          | CATE GORY | COURSE NAME                | TEACHING & EVALUATION SCHEME |               |                      |                         |                      |   |   |   |         |
|                                      |           |                            | THEORY                       |               |                      | PRACTICAL               |                      | L | T | P | CREDITS |
|                                      |           |                            | END SEM University Exam      | Two Term Exam | Teachers Assessment* | END SEM University Exam | Teachers Assessment* |   |   |   |         |
| BTEE503                              |           | Control System Engineering | 60                           | 20            | 20                   | 30                      | 20                   | 3 | 1 | 2 | 5       |

**Legends:** L - Lecture; T - Tutorial/Teacher Guided Student Activity; P – Practical; C – Credit.

\*Teacher Assessment shall be based on the following components: Quiz/Assignment/Project/Participation in Class, given that no component shall exceed more than 10 marks.

### UNIT V

**8 Hrs.**

**State Space Analysis of Continuous Systems:** Concepts of state, state variables and state model, derivation of state models from block diagrams, Solution of state equation: Eigen values & eigenvectors digitalization state transitive matrix, Concepts of Controllability and Observability.

### Text Books:

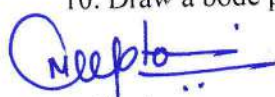
1. Richard C Dorf; Robert H Bishop, "Modern control system", Pearson Education, 14th Edition, 2022
2. I. J. Nagrath and M. Gopal, "Control System Engineering", New Age International Publishers, 7th Edition, 2021.

### References:

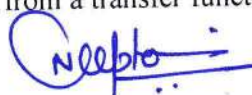
1. M. F. Golnaraghi and Benjamin C Kuo, "Automatic control systems", New York McGraw-Hill Education, 9th Edition, 2017.
2. M. Gopal, "Digital Control and State Variable Methods", Tata McGraw- Hill 4th Edition, 2014.
3. Joseph J. DiStefano, Allen R Stubberud and Ivan J Williams, Schaum's Outline Series, "Feedback and Control Systems", Tata McGraw- Hill, 2nd Edition 2014.
4. John J. D'azzo & Constantine H. Houpis, "Linear control system analysis and design", Tata McGraw-Hill., 5th Edition 2003.

### List of Experiments:

1. To study the torque speed characteristics and determine the transfer function of a DC motor.
2. To study the characteristics of a small AC servomotor and determine its transfer function.
3. To study the performance of various types of controllers used to control the temperature of an oven.
4. To study the performance characteristics of an analogues PID controller using simulated systems.
5. Perform impulse response of a transfer function.
6. Perform ramp response of a transfer function.
7. Perform the transient and frequency response of a second order network.
8. Draw Nyquist plot from a transfer function.
9. Draw root locus from a transfer function.
10. Draw a bode plot from a transfer function.



**Chairperson**  
Board of Studies  
Shri Vaishnav Vidyapeeth  
Vishwavidyalaya, Indore



**Chairperson**  
Faculty of Studies  
Shri Vaishnav Vidyapeeth  
Vishwavidyalaya, Indore



**Controller of Examinations**  
Shri Vaishnav Vidyapeeth  
Vishwavidyalaya, Indore



**Registrar**  
Shri Vaishnav Vidyapeeth  
Vishwavidyalaya, Indore

**Shri Vaishnav Vidyapeeth Vishwavidyalaya, Indore**  
**Shri Vaishnav Institute of Technology and Science**  
**Choice Based Credit System (CBCS) Scheme in light of NEP-2020**  
**B. Tech in AU/ME/CE/EE/EEE/EC/EC-IOT/EI/R&A/MT**  
**(2021-2025)**

| COURSE CODE | CATE<br>GORY | COURSE NAME                    | TEACHING & EVALUATION SCHEME  |                  |                         |                               |                         |   |   |   |         |
|-------------|--------------|--------------------------------|-------------------------------|------------------|-------------------------|-------------------------------|-------------------------|---|---|---|---------|
|             |              |                                | THEORY                        |                  |                         | PRACTICAL                     |                         | L | T | P | CREDITS |
|             |              |                                | END SEM<br>University<br>Exam | Two Term<br>Exam | Teachers<br>Assessment* | END SEM<br>University<br>Exam | Teachers<br>Assessment* |   |   |   |         |
| BTME510     | AESE         | DESIGN THINKING AND INNOVATION | 60                            | 20               | 20                      | 0                             | 0                       | 2 | 0 | 0 | 2       |

**Legends:** L - Lecture; T - Tutorial/Teacher Guided Student Activity; P – Practical; C - Credit;

\***Teacher Assessment** shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

**Course Educational Objectives (CEOs):**

The objective of this course is to provide (A) the new ways of creative thinking and learn the innovation cycle of design thinking process, (B) understand product design and prototyping and (C) develop innovative product.

**Course Outcomes (COs):**

After completion of this course student will able to

1. Compare and classify the various learning styles and memory techniques and apply them in their engineering education
2. Analyze emotional experience and inspect emotional expressions to better understand users while designing innovative products
3. Develop new ways of creative thinking and learn the innovation cycle of design thinking process for developing innovative products
4. Propose real-time innovative engineering product designs and choose appropriate frameworks, strategies, techniques during prototype development
5. Perceive individual differences and its impact on everyday decisions and further Create a better customer experience

**Syllabus**

**Unit I**

**(6 Hrs)**

Learning: understanding the learning process, Kolb's learning styles, assessing and interpreting.

Memory: understanding the memory process, problems in retention, memory enhancement techniques.


Emotions: understanding emotions, experience & expression, assessing empathy, application with peers.

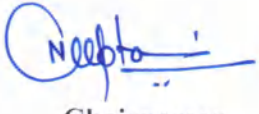
**Unit II**

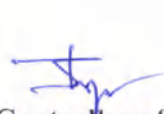
**(6 Hrs)**

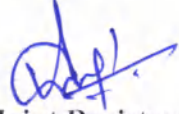
Design Thinking: definition, need, objective, concepts & brainstorming, stages of design thinking process (explain with examples) – **empathize, define, ideate, prototype, test.**

Creative Thinking: understanding creative thinking process, understanding problem solving, creative problem solving test.

  
**Chairperson**  
 Board of Studies  
 Shri Vaishnav Vidyapeeth  
 Vishwavidyalaya, Indore

  
**Chairperson**  
 Faculty of Studies  
 Shri Vaishnav Vidyapeeth  
 Vishwavidyalaya, Indore

  
**Controller of Examinations**  
 Shri Vaishnav Vidyapeeth  
 Vishwavidyalaya, Indore

  
**Joint Registrar**  
 Shri Vaishnav Vidyapeeth  
 Vishwavidyalaya, Indore



**Shri Vaishnav Vidyapeeth Vishwavidyalaya, Indore**  
**Shri Vaishnav Institute of Technology and Science**  
**Choice Based Credit System (CBCS) Scheme in light of NEP-2020**  
**B. Tech in AU/ME/CE/EE/EEE/EC/EC-IOT/EI/R&A/MT**  
**(2021-2025)**

| COURSE CODE | CATEG<br>ORY | COURSE NAME                       | TEACHING &EVALUATION SCHEME   |                  |                         |                               |                         |   |   |   |         |
|-------------|--------------|-----------------------------------|-------------------------------|------------------|-------------------------|-------------------------------|-------------------------|---|---|---|---------|
|             |              |                                   | THEORY                        |                  |                         | PRACTICAL                     |                         | L | T | P | CREDITS |
|             |              |                                   | END SEM<br>University<br>Exam | Two Term<br>Exam | Teachers<br>Assessment* | END SEM<br>University<br>Exam | Teachers<br>Assessment* |   |   |   |         |
| BTME510     | AESE         | DESIGN THINKING AND<br>INNOVATION | 60                            | 20               | 20                      | 0                             | 0                       | 2 | 0 | 0 | 2       |

**Legends:** L - Lecture; T - Tutorial/Teacher Guided Student Activity; P – Practical; C - Credit;

**\*Teacher Assessment** shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

**Unit III**

**(6 Hrs)**

Product Design: process of engineering product design, design thinking approach, stages of product design, examples of best product designs and functions, assignment – engineering product design.  
 Prototyping: What is prototype? Why prototype? Rapid prototype development process, testing, sample example, test group marketing

**Unit IV**

**(6 Hrs)**

Celebrating the Difference: understanding individual differences & uniqueness, group discussion and activities to encourage the understanding, acceptance and appreciation of individual differences  
 Customer Centricity: practical examples of customer challenges, use of design thinking to enhance customer experience, parameters of product experience, alignment of customer expectations with product design.

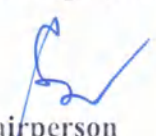
**Unit V**

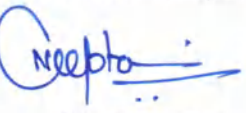
**(6 Hrs)**

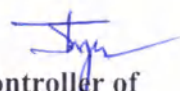
Feedback, Re-design & Re-create: feedback loop, focus on user experience, address “ergonomic challenges, user focused design, rapid prototyping & testing, final product, final presentation – “solving practical engineering problem through innovative product design & creative solution”.

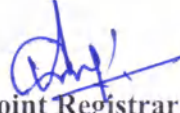
**Text and Reference Books:**

1. E. Balaguruswamy “Developing Thinking Skills (The way to Success)” Khanna Book Publishing Company, 2022.
2. Gavin Ambrose and Paul Harris “Basics Design 08: Design Thinking” Bloomsbury Publishing India Pvt. Ltd. 2009.
3. Vijay Kumar “101 Design Methods: A Structured Approach for Driving Innovation in Your Organization” Wiley Pub. 2012.
4. Idris Mootee, "Design Thinking for Strategic Innovation: What They Can't Teach You at Business or Design School", John Wiley & Sons 2013.
5. Hasso Plattner, Christoph Meinel and Larry Leifer (eds), "Design Thinking: Understand – Improve – Apply", Springer, 2011
6. Roger Martin, "The Design of Business: Why Design Thinking is the Next Competitive Advantage", Harvard Business Press, 2009.

  
**Chairperson**  
 Board of Studies  
 Shri Vaishnav Vidyapeeth  
 Vishwavidyalaya, Indore

  
**Chairperson**  
 Faculty of Studies  
 Shri Vaishnav Vidyapeeth  
 Vishwavidyalaya, Indore

  
**Controller of  
Examinations**  
 Shri Vaishnav Vidyapeeth  
 Vishwavidyalaya, Indore

  
**Joint Registrar**  
 Shri Vaishnav Vidyapeeth  
 Vishwavidyalaya, Indore



**Shri Vaishnav Vidyapeeth Vishwavidyalaya, Indore**  
**Shri Vaishnav Institute of Technology and Science**  
**Choice Based Credit System (CBCS) in the Light of NEP-2020**  
**B.Tech. in Electrical Engineering**  
**(Common to EE\EX)**  
**(2022-2026)**

| (2022-2020) |           |                        |                             |               |                      |                         |                      |   |   |   |         |
|-------------|-----------|------------------------|-----------------------------|---------------|----------------------|-------------------------|----------------------|---|---|---|---------|
| COURSE CODE | CATEG ORY | COURSE NAME            | TEACHING &EVALUATION SCHEME |               |                      |                         |                      |   |   |   |         |
|             |           |                        | THEORY                      |               |                      | PRACTICAL               |                      | L | T | P | CREDITS |
|             |           |                        | END SEM University Exam     | Two Term Exam | Teachers Assessment* | END SEM University Exam | Teachers Assessment* |   |   |   |         |
| BTEE 501N   |           | Electrical Machines-II | 60                          | 20            | 20                   | 0                       | 0                    | 3 | 1 | 2 | 5       |

**Legends:** L - Lecture; T - Tutorial/Teacher Guided Student Activity; P - Practical; C - Credit;

\*Teacher Assessment shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

**Course Educational Objectives (CEOs):**

To prepare the students to have a basic and practical knowledge of DC machine. To prepare the students to have a basic knowledge of 3 phase Synchronous machine.

**Course Outcomes (COs):**

Upon completion of this course students will be able to:

1. Demonstrate various parts of an electrical machine.
2. Conduct Different test on DC machine.
3. Understand and analyze synchronous generator.
4. Demonstrate constructional details, principle of operation of Special Machines.

**Syllabus**

**UNIT I**

[8 Hrs]

**DC Generators:** Introduction, construction, types, emf equation, lap and wave windings, armature reaction, commutation, methods of improving commutation, equalizer rings, demagnetizing and cross magnetizing ampere turns, various characteristics of shunt, series and compound generators, voltage build up, losses and efficiency, condition for maximum efficiency.

**UNIT II**

[8 Hrs]

**DC Motors:** Introduction, principals, back-emf, torque of motor, types, characteristics of shunt, series and compound motors, speed control (field and armature control methods), basic idea of solid state devices in controlling of DC motors, Starting of DC motors, three point and four point starters, losses and efficiency, testing (brake test, swimburnes, hopkinson test), Applications.



Chairperson  
Board of Studies  
Shri Vaishnav Vidyapeeth  
Vishwavidyalaya, Indore



Chairperson  
Faculty of Studies  
Shri Vaishnav Vidyapeeth  
Vishwavidyalaya, Indore



Controller of Examinations  
Shri Vaishnav Vidyapeeth  
Vishwavidyalaya, Indore



Registrar  
Shri Vaishnav Vidyapeeth  
Vishwavidyalaya, Indore



**Shri Vaishnav Vidyapeeth Vishwavidyalaya, Indore**  
**Shri Vaishnav Institute of Technology and Science**  
**Choice Based Credit System (CBCS) in the Light of NEP-2020**  
**B.Tech. in Electrical Engineering**  
**(Common to EE\EX)**  
**(2022-2026)**

| (2022-2023) |           |                        |                              |               |                      |                         |                      |   |   |   |         |
|-------------|-----------|------------------------|------------------------------|---------------|----------------------|-------------------------|----------------------|---|---|---|---------|
| COURSE CODE | CATE GORY | COURSE NAME            | TEACHING & EVALUATION SCHEME |               |                      |                         |                      |   |   |   |         |
|             |           |                        | THEORY                       |               |                      | PRACTICAL               |                      | L | T | P | CREDITS |
|             |           |                        | END SEM University Exam      | Two Term Exam | Teachers Assessment* | END SEM University Exam | Teachers Assessment* |   |   |   |         |
| BTEE 501N   |           | Electrical Machines-II | 60                           | 20            | 20                   | 0                       | 0                    | 3 | 1 | 2 | 5       |

**UNIT III**

[9 Hrs]

**Synchronous Generators (Alternators):** Introduction, Construction, advantages of rotating field, types of rotors, emf equation, excitation systems, equivalent circuit and their phasor diagrams, voltage regulation, synchronous impedance method, mmf method, Zero power factor method, two reaction theory of salient pole rotor, phasor diagram, power developed and power angle characteristics of salient pole machine, determination of  $X_d$  and  $X_q$ , synchronization, synchronizing power and torque, parallel operation application.

**UNIT IV**

[8 Hrs]

**Synchronous Motors:** Introduction, construction, principal of operation, starting of synchronous motor, equivalent circuit and phasor diagrams, power and torque, performance calculation, speed torque characteristics, power factor control-effect of change of excitation.

**UNIT V**

[7 Hrs]

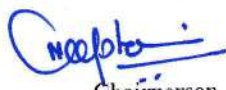
**Synchronous Motors:** V curve and inverted V curve, synchronous condenser and reactors, synchronous phase modifiers, hunting-causes and remedies, applications, synchronous induction motor application.


**Textbooks:**


1. A. E. Fitzgerald, C. Kingsley Jr and Umans, Electric Machinery, 6th Edition McGraw Hill, International Student Edition.
2. I.J. Nagrath & D.P. Kothari, Electric Machines, 3/e, Tata McGraw Hill, New Delhi.

**References:**

1. M.G. Say, Performance & design of AC machines, CBS publishers & distributors, Delhi, 3rd edition
2. A.E. Clayton & N.N. Nancock, The Performance & design of DC machines CBS publications & distributors, Delhi, 3rd edition
3. P.S. Bhimbra, Generalized theory of Electrical Machines, Khanna publishers, Delhi,
4. Ashfaq Husain, Electric Machines, Dhanpat Rai, New Delhi.
5. Syed A. Nasar, Electric Machines & Power Systems, Volume I, Tata McGraw Hill, New Delhi
6. E. Fitzgerald, C. Kingsley & S.D. Umans, Electric Machinery Tata McGraw Hill, New Delhi, 5 edition.
7. Stephen J Chapman, Electric Machinery Fundamentals, McGraw-Hill

  
Chairperson  
Board of Studies  
Shri Vaishnav Vidyapeeth  
Vishwavidyalaya, Indore

  
Chairperson  
Faculty of Studies  
Shri Vaishnav Vidyapeeth  
Vishwavidyalaya, Indore

  
Controller of Examinations  
Shri Vaishnav Vidyapeeth  
Vishwavidyalaya, Indore

  
Registrar  
Shri Vaishnav Vidyapeeth  
Vishwavidyalaya, Indore



**Shri Vaishnav Vidyapeeth Vishwavidyalaya, Indore**  
**Shri Vaishnav Institute of Technology and Science**  
**Choice Based Credit System (CBCS) in the Light of NEP-2020**  
**B.Tech. in Electrical Engineering**  
**(Common to EE\EX)**  
**(2022-2026)**

| COURSE CODE | CATEG ORY | COURSE NAME            | TEACHING & EVALUATION SCHEME |               |                      |                         |                      |   |   |   |         |
|-------------|-----------|------------------------|------------------------------|---------------|----------------------|-------------------------|----------------------|---|---|---|---------|
|             |           |                        | THEORY                       |               |                      | PRACTICAL               |                      | L | T | P | CREDITS |
|             |           |                        | END SEM University Exam      | Two Term Exam | Teachers Assessment* | END SEM University Exam | Teachers Assessment* |   |   |   |         |
| BTEE 501N   |           | Electrical Machines-II | 60                           | 20            | 20                   | 0                       | 0                    | 3 | 1 | 2 | 5       |

**List of Experiments:** Experiments can cover any of the above topics, following is a suggestive list:

1. To obtain open circuit characteristics of self excited DC shunt generator and to find its critical resistance.
2. Speed control of D.C. shunt motor by Field current control method & plot the curve for speed verses field current.
3. Speed control of D.C. shunt motor by Armature voltage control method & plot the curve for speed verses armature voltage.
4. To perform Swinburne's test on a DC shunt machine and to calculate efficiency at full load.
5. To perform Hopkinson's test on a DC shunt machine and to calculate full load efficiency (a) when running as motor and (b) when running as generator.
6. Draw & verify open circuit characteristics of 3- $\phi$  synchronous generator.
7. Draw & verify short circuit characteristics of 3- $\phi$  synchronous generator.
8. Draw & verify external load characteristics of 3- $\phi$  synchronous generator.
9. Calculate  $X_d$  &  $X_q$  parameter of synchronous machine by slip test.
10. Synchronization of a three-phase alternator with the infinite bus and control load sharing.
11. Draw & verify 'V' curve of 3- $\phi$  synchronous motor.

*Shyali*

*Neeloto*  
Chairperson  
Board of Studies  
Shri Vaishnav Vidyapeeth  
Vishwavidyalaya, Indore

*Neeloto*  
Chairperson  
Faculty of Studies  
Shri Vaishnav Vidyapeeth  
Vishwavidyalaya, Indore

*Shyam*  
Controller of Examinations  
Shri Vaishnav Vidyapeeth  
Vishwavidyalaya, Indore

*Adar*  
Registrar  
Shri Vaishnav Vidyapeeth  
Vishwavidyalaya, Indore



**Shri Vaishnav Vidyapeeth Vishwavidyalaya, Indore**  
**Shri Vaishnav Institute of Technology and Science**  
**Choice Based Credit System (CBCS) in the Light of NEP-2020**  
**B.Tech. in Electrical and Electronics Engineering**  
**(2021-2025)**

| COURSE CODE | CATEGORY | COURSE NAME                                   | TEACHING & EVALUATION SCHEME |               |                      |                         |                      |   |   |   |         |
|-------------|----------|---|------------------------------|---------------|----------------------|-------------------------|----------------------|---|---|---|---------|
|             |          |   | THEORY                       |               |                      | PRACTICAL               |                      | L | T | P | CREDITS |
|             |          |   | END SEM University Exam      | Two Term Exam | Teachers Assessment* | END SEM University Exam | Teachers Assessment* |   |   |   |         |
| BTEE514     | DE       | Introduction of IoT in Electrical Engineering | 60                           | 20            | 20                   | 0                       | 0                    | 3 | 0 | 0 | 3       |

**Legends:** L - Lecture; T - Tutorial/Teacher Guided Student Activity; P - Practical; C - Credit.

\*Teacher Assessment shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

**Course Educational Objectives (CEOs):** The objective of study of IoT in Electrical Engineering is to:

1. Study IoT characteristics and definition
2. Study various IoT Sensors and communication technology
3. Study physical devices and endpoints
4. Study applications of IoT in electrical Engineering

**Course Outcomes (COs):**

After the successful completion of this course students will be able to

1. Attain knowledge of IoT in Electrical Engineering
2. Attain knowledge on IoT sensors and devices
3. Attain knowledge on internet connectivity of IoT
4. Learn application of IoT in various domain.

### Syllabus

#### UNIT I

7Hrs.

##### Introduction to IoT

Introduction: Definition and characteristics of IoT, Physical design of IoT, Logical Design of IoT, IoT enabling technologies, IoT levels and deployment templates.

#### UNIT II

8 Hrs.

##### IoT/M2M and Internet Connectivity

M2M, difference between IoT and M2M, Introduction to internet connectivity, Internet connectivity principles, Internet based communication, IP addressing in the IoT, Media access control, Application layer Protocols: HTTP, HTTPS, FTP, Telnet, and others.

**Chairperson**  
Board of Studies  
Shri Vaishnav Vidyapeeth  
Vishwavidyalaya, Indore

**Chairperson**  
Faculty of Studies  
Shri Vaishnav Vidyapeeth  
Vishwavidyalaya, Indore

**Controller of Examinations**  
Shri Vaishnav Vidyapeeth  
Vishwavidyalaya, Indore

**Joint Registrar**  
Shri Vaishnav Vidyapeeth  
Vishwavidyalaya, Indore



**Shri Vaishnav Vidyapeeth Vishwavidyalaya, Indore**  
**Shri Vaishnav Institute of Technology and Science**  
**Choice Based Credit System (CBCS) in the Light of NEP-2020**  
**B.Tech. in Electrical and Electronics Engineering**  
**(2021-2025)**

| COURSE CODE | CATEGORY | COURSE NAME                                   | TEACHING & EVALUATION SCHEME |               |                      |                         |                      |   |   |   |         |
|-------------|----------|---|------------------------------|---------------|----------------------|-------------------------|----------------------|---|---|---|---------|
|             |          |   | THEORY                       |               |                      | PRACTICAL               |                      | L | T | P | CREDITS |
|             |          |   | END SEM University Exam      | Two Term Exam | Teachers Assessment* | END SEM University Exam | Teachers Assessment* |   |   |   |         |
| BTEE514     | DE       | Introduction of IoT in Electrical Engineering | 60                           | 20            | 20                   | 0                       | 0                    | 3 | 0 | 0 | 3       |

**Legends:** L - Lecture; T - Tutorial/Teacher Guided Student Activity; P – Practical; C - Credit.

\*Teacher Assessment shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

**UNIT III**

**8 Hrs.**

**IoT physical devices and End points**

Basic building blocks of an IoT devices, raspberry pi, Raspberry pi interfaces, other IOT interfaces.

**UNIT IV**

**8 Hrs.**

**Sensors**

Introduction, sensor Technology, participatory sensing, Industrial IoT and Automotive IoT, Actuator, sensor data communication Protocols, Radio frequency identification Technology, wireless sensor Network technology

**UNIT V**

**8 Hrs.**

**Application of IoT in Smart Grid And Other Domains**

Generation, Transmission, Distribution and Metering, Energy Storage, Smart Monitoring and Diagnostics System at Major Power Plants, Real-Time Monitoring and Control of Processes, SCADA, Proprietary Communication, Home automation, Building automation, IoT application in environment, cities, agriculture, industry

**Textbooks:**

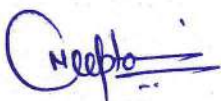
- George Mastorakis, (2016), Internet of Things (IoT) in 5G Mobile Technologies, 1st ed. Edition, Publisher SPRINGER.
- ArshdeepBahga, Vijay Madiseti (2016) Internet of Things-A hands on approach, 1<sup>st</sup> Edition, Universities Press
- Raj Kamal (2017), Internet of Things-Architecture and design principles, 1st Edition, Mc Graw Hill Education

**References:**


- Enterprise IoT: Strategies and Best Practices for Connected Products and Services, Dirk Slama, Frank Puhlmann, Jim Morrish, Rishi M Bhatnagar, Publisher O'REILLY



**Chairperson**  
Board of Studies  
Shri Vaishnav Vidyapeeth  
Vishwavidyalaya, Indore



**Chairperson**  
Faculty of Studies  
Shri Vaishnav Vidyapeeth  
Vishwavidyalaya, Indore



**Controller of Examinations**  
Shri Vaishnav Vidyapeeth  
Vishwavidyalaya, Indore



**Joint Registrar**  
Shri Vaishnav Vidyapeeth  
Vishwavidyalaya, Indore



**Shri Vaishnav Vidyapeeth Vishwavidyalaya, Indore**  
**Shri Vaishnav Institute of Technology and Science**  
**Choice Based Credit System (CBCS) in the Light of NEP-2020**  
**B.Tech. EC/EE/EX/ECIOT w.e.f. 2023**

| Course Code | Category | Course Name                       | TEACHING & EVALUATION SCHEME |               |                      |                         |                      |   |   |   |         |
|-------------|----------|-----------------------------------|------------------------------|---------------|----------------------|-------------------------|----------------------|---|---|---|---------|
|             |          |                                   | THEORY                       |               |                      | PRACTICAL               |                      | L | T | P | CREDITS |
|             |          |                                   | END SEM University Exam      | Two Term Exam | Teachers Assessment* | END SEM University Exam | Teachers Assessment* |   |   |   |         |
| BTEC502     | EC       | Cellular and Mobile Communication | 60                           | 20            | 20                   | 0                       | 0                    | 3 | 0 | 0 | 3       |

**Legends:** L - Lecture; T - Tutorial/Teacher Guided Student Activity; P – Practical; C – Credit.

\***Teacher Assessment** shall be based on the following components: Quiz/Assignment/Project/Participation in Class, given that no component shall exceed more than 10 marks.

**Course Educational Objectives (CEOs):**

The subject aims to provide the student with:

1. To impart fundamental concepts in cellular technology, models of mobile radio channels, communication technologies adapted and wireless networks.
2. Be acquainted with different interference factors influencing cellular and mobile communications.
3. To efficiently use the background behind developing different path loss and/or radio coverage in cellular environment.

**Course Outcomes (COs):**

1. Students will get familiar with cellular terminology as mobile station, base station and mobile telephone switching office.
2. Develop the capability to analyze and design propagation models for mobile radio channel.
3. Learn how to reduce co-channel and non co-channel interference.
4. Know about implementation of digital cellular system.

**Syllabus**

**UNIT I**

**6 Hrs.**

**Introduction to Cellular Mobile Systems:** Limitations of Conventional Mobile Telephone System, Basic Cellular Systems, Performance Criteria, Free-Space propagation model for mobile communication, Radio Propagation mechanism: reflection, diffraction, scattering and interference.

**UNIT II**

**7 Hrs.**

**Cellular Concept:** Operations of Cellular system, Concept of Frequency Reuse, Co-channel Interference Reduction Factor, Desired C/I in an Omni-directional Antenna System, Sectoring and Cell Splitting, System Capacity, Trunking and Grade of Service (GOS), Concept of Handoff, Types of Handoff, Queuing of Handoff.

**Chairperson**

Board of Studies  
Shri Vaishnav Vidyapeeth  
Vishwavidyalaya, Indore

**Chairperson**

Faculty of Studies  
Shri Vaishnav Vidyapeeth  
Vishwavidyalaya, Indore

**Controller of Examinations**

Shri Vaishnav Vidyapeeth  
Vishwavidyalaya, Indore

**Registrar**

Shri Vaishnav Vidyapeeth  
Vishwavidyalaya, Indore



**Shri Vaishnav Vidyapeeth Vishwavidyalaya, Indore**  
**Shri Vaishnav Institute of Technology and Science**  
**Choice Based Credit System (CBCS) in the Light of NEP-2020**  
**B.Tech. EC/EE/EX/ECIOT w.e.f. 2023**

**UNIT III**

**6 Hrs.**

**Cell Coverage for Signal and Traffic:** Signal Reflections in Flat and Hilly Terrain, Effect of Human Made Structures, Phase Difference between Direct and Reflected Paths, Straight Line Path Loss Slope, General Formula for Mobile Propagation between Two Fixed Station over Water and Flat Open Area, Near and Long-Distance Propagation, Point to Point model.

**UNIT IV**

**7 Hrs.**

**Interference in Cellular Mobile System:** Co-channel Interference: Interference in co-channel cell, comparison  $N=4$  and  $N=7$  cellular system. Non Co-channel Interference: Adjacent Channel Interference, Next Channel Interference and Neighboring Channel Interference, Near-End Far-End Interference.

**Frequency Management, Channel Assignment:** Numbering the radio channels, Set-up Channels, Channel Assignment Schemes: Fixed and Dynamic Channel Assignment Schemes, Sharing and Borrowing concept.

**UNIT V**

**6 Hrs.**

**Digital Cellular System:** Multiple Access Techniques: FDMA, TDMA and CDMA, GSM System Architecture, GSM Radio Subsystem, GSM Channel Types, Frame Structure for GSM, Signal Processing in GSM.

**Text Books:**

1. William C. Y. Lee, "Mobile Cellular Telecommunications: Analog and Digital Systems", 2<sup>nd</sup> Edition, Tata McGraw Hill Publication, 2017.
2. Theodore S. Rappaport, "Wireless Communications: Principles and Practice", 2<sup>nd</sup> Edition, Pearson / PHI Publication, 2010.
3. Andreas F. Molisch, "Wireless Communications: From Fundamentals to Beyond 5G", 3<sup>rd</sup> ed., Wiley-IEEE Press, 2022.

**References:**

1. Iti Saha Misra, "Wireless Communications and Networks: 3G and Beyond", 2<sup>nd</sup> Edition, Tata McGraw Hill Publication, 2013.
2. Gordon L. Stuber, "Principles of Mobile Communications", Springer International 3<sup>rd</sup> Edition, 2017.
3. William Stallings, "Wireless Communications and Networks", 2<sup>nd</sup> Edition, Pearson Education, 2005.
4. Siegmund M. Redl, Mathias K. Weber, Malcolm W. Oliphant, "An Introduction to GSM", Artech House Publishers, 1998.

**Chairperson**

Board of Studies  
Shri Vaishnav Vidyapeeth  
Vishwavidyalaya, Indore

**Chairperson**

Faculty of Studies  
Shri Vaishnav Vidyapeeth  
Vishwavidyalaya, Indore

**Controller of Examinations**

Shri Vaishnav Vidyapeeth  
Vishwavidyalaya, Indore

**Registrar**

Shri Vaishnav Vidyapeeth  
Vishwavidyalaya, Indore



**Shri Vaishnav Vidyapeeth Vishwavidyalaya, Indore**  
**Shri Vaishnav Institute of Technology and Science**  
**Choice Based Credit System (CBCS) in the Light of NEP-2020**  
**B.Tech.(EC/ EC-IOT/RA/EE/EX/EI/MTX)**  
**(2021-2025)**

(2021-2025)

| COURSE CODE | CATEGORY | COURSE NAME           | TEACHING & EVALUATION SCHEME |               |                      |                         |                      |   |   |   |         |
|-------------|----------|-----------------------|------------------------------|---------------|----------------------|-------------------------|----------------------|---|---|---|---------|
|             |          |                       | THEORY                       |               |                      | PRACTICAL               |                      | L | T | P | CREDITS |
|             |          |                       | END SEM University Exam      | Two Term Exam | Teachers Assessment* | END SEM University Exam | Teachers Assessment* |   |   |   |         |
| BTEC 507    | DCC      | Programming in Python | 0                            | 0             | 0                    | 30                      | 20                   | 0 | 0 | 2 | 1       |

**Legends:** L - Lecture; T - Tutorial/Teacher Guided Student Activity; P - Practical; C - Credit;

\***Teacher Assessment** shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

**Course Objective:**

1. Learn Syntax and Semantics and create Functions in Python.
2. Handle Strings and Files in Python.
3. Understand Lists, Dictionaries and Regular expressions in Python.
4. Implement Object Oriented Programming concepts in Python.

**Course Outcome:**

After learning the course, the student will be able:

1. To develop proficiency in creating applications using the Python Programming Language.
2. To be able to understand the various data structures available in Python programming language and apply them in solving computational problems.
3. To be able to do testing and debugging of code written in Python.
4. To be able to draw various kinds of plots using PyLab.
5. To be able to do text filtering in Python.

**Syllabus**

**UNIT I**

Introduction: History of Python, Need of Python Programming, Running Python Scripts, Variables, Assignment, Operators and Expressions: Operators- Arithmetic Operators, Comparison (Relational) Operators, Assignment Operators, Logical Operators, Bitwise Operators, Membership Operators, Identity Operators, Expressions and order of evaluations.

**UNIT II**

Data Structures: Lists, Tuples, Sets, Dictionaries, Sequences.

Control Flow - if, if-elif-else, for, while, break, continue. Functions - Defining Functions, Calling Functions, Passing Arguments. Modules: Creating modules, import statement, from, import statement, name spacing.

**UNIT III**

Python packages, Introduction to PIP, Installing Packages via PIP, Using Python Packages



**Chairperson**  
Board of Studies  
Shri Vaishnav Vidyapeeth  
Vishwavidyalaya, Indore



**Chairperson**  
Faculty of Studies  
Shri Vaishnav Vidyapeeth  
Vishwavidyalaya, Indore



**Controller of Examinations**  
Shri Vaishnav Vidyapeeth  
Vishwavidyalaya, Indore



**Joint Registrar**  
Shri Vaishnav Vidyapeeth  
Vishwavidyalaya, Indore



**Shri Vaishnav Vidyapeeth Vishwavidyalaya, Indore**  
**Shri Vaishnav Institute of Technology and Science**  
**Choice Based Credit System (CBCS) in the Light of NEP-2020**  
**B.Tech.(EC/ EC-IOT/RA/EE/EX/EI/MTX)**  
**(2021-2025)**

| COURSE CODE | CATEGORY | COURSE NAME           | TEACHING & EVALUATION SCHEME |               |                      |                         |                      |   |   |   |         |
|-------------|----------|-----------------------|------------------------------|---------------|----------------------|-------------------------|----------------------|---|---|---|---------|
|             |          |                       | THEORY                       |               |                      | PRACTICAL               |                      | L | T | P | CREDITS |
|             |          |                       | END SEM University Exam      | Two Term Exam | Teachers Assessment* | END SEM University Exam | Teachers Assessment* |   |   |   |         |
| BTEC 507    | DCC      | Programming in Python | 0                            | 0             | 0                    | 30                      | 20                   | 0 | 0 | 2 | 1       |

**Legends:** L - Lecture; T - Tutorial/Teacher Guided Student Activity; P - Practical; C - Credit;

\*Teacher Assessment shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

**UNIT IV**

Object Oriented Programming OOP in Python: Classes, 'self variable', Methods, Constructor Method, Inheritance, Overriding Methods, Data Hiding.

**UNIT V**

File Handling: Types of Files, Creating and Reading Text Data, File Methods to Read and Write Data.

**List of Experiments:**

1. Develop programs to understand the control structures of python.
2. Develop programs to learn different types of structures (list, dictionary, tuples) in python.
3. Write a Python program to sum all the items in a list.
4. Write a Python program to get the largest and smallest number from a list.
5. Develop programs for data structure algorithms using python – searching and sorting.
6. Write a Python Program to perform Linear Search.
7. Write a Python Program to perform Binary Search.
8. Write a Python Program to perform Selection sort.
9. Write a Python Program to perform Insertion sort.
10. Write a Python Program to perform Merge sort.
11. Write a Python program to get a list, sorted in increasing order by the last element in each tuple from a given list of non-empty tuples: Sample List: [(2, 5), (1, 2), (4, 4), (2, 3), (2, 1)]  
Expected Result: [(2, 1), (1, 2), (2, 3), (4, 4), (2, 5)]
12. Write a Python program to check a list is empty or not.
13. Write a Python program to remove duplicates from a list.
14. Programs that take command line arguments (word count).
15. Write a Program that Reads a Text File and Counts the Number of Times a Certain Letter Appears in the Text File.
16. Write a Program to Read a Text File and Print all the Numbers Present in the Text File.



**Chairperson**  
Board of Studies  
Shri Vaishnav Vidyapeeth  
Vishwavidyalaya, Indore



**Chairperson**  
Faculty of Studies  
Shri Vaishnav Vidyapeeth  
Vishwavidyalaya, Indore



**Controller of Examinations**  
Shri Vaishnav Vidyapeeth  
Vishwavidyalaya, Indore



**Joint Registrar**  
Shri Vaishnav Vidyapeeth  
Vishwavidyalaya, Indore



**Shri Vaishnav Vidyapeeth Vishwavidyalaya, Indore**  
**Shri Vaishnav Institute of Technology and Science**  
**Choice Based Credit System (CBCS) in the Light of NEP-2020**  
**B.Tech.(EC/ EC-IOT/RA/EE/EX/EI/MTX)**  
**(2021-2025)**

| COURSE CODE | CATEGORY | COURSE NAME           | TEACHING & EVALUATION SCHEME |               |                      |                         |                      |   |   |   |         |
|-------------|----------|-----------------------|------------------------------|---------------|----------------------|-------------------------|----------------------|---|---|---|---------|
|             |          |                       | THEORY                       |               |                      | PRACTICAL               |                      | L | T | P | CREDITS |
|             |          |                       | END SEM University Exam      | Two Term Exam | Teachers Assessment* | END SEM University Exam | Teachers Assessment* |   |   |   |         |
| BTEC 507    | DCC      | Programming in Python | 0                            | 0             | 0                    | 30                      | 20                   | 0 | 0 | 2 | 1       |

**Legends:** L - Lecture; T - Tutorial/Teacher Guided Student Activity; P – Practical; C - Credit;

**\*Teacher Assessment** shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

17. Write a Program to find the most frequent words in a text read from a file.

18. Implement Object Oriented Programming concepts in Python.

19. Write A Program to Append, Delete and Display Elements of a List Using Classes.

20. Write A Program to Create a Class and Compute the Area and the Perimeter of the Circle.

21. Write A Program to Create a Class which Performs Basic Calculator Operations.

22. Write A Program to Create a Class in which One Method Accepts a String from the User and another prints it.

23. Learn to plot different types of graphs using PyPlot.

**References:**

1. John V Gutttag. "Introduction to Computation and Programming Using Python", 3<sup>rd</sup> edition, Prentice Hall of India, 2021
2. Wesley J. Chun. "Core Python Programming" 3<sup>rd</sup> Edition, Prentice Hall, 2012
3. Michael T. Goodrich, Roberto Tamassia, Michael H. Goldwasser, "Data Structures and Algorithms in Python", Wiley, 2013
4. Kenneth A. Lambert, "Fundamentals of Python – First Programs", CENGAGE Publication, 2<sup>nd</sup> edition, 2018.



**Chairperson**  
Board of Studies  
Shri Vaishnav Vidyapeeth  
Vishwavidyalaya, Indore



**Chairperson**  
Faculty of Studies  
Shri Vaishnav Vidyapeeth  
Vishwavidyalaya, Indore



**Controller of Examinations**  
Shri Vaishnav Vidyapeeth  
Vishwavidyalaya, Indore



**Joint Registrar**  
Shri Vaishnav Vidyapeeth  
Vishwavidyalaya, Indore