# Vidya Pratishthan's
# Kamalnayan BajajInstitute of Engineering and Technology, Baramati.



# Faculty of Science and Technology

## Board of Studies

## Electrical Engineering

## Syllabus

## Exit Courses Electrical Engineering

## (w.e.f. AY: 2023-24)

## Exit Course Syllabus: First Year (F.Y. B. Tech.) Electrical Engineering
### w.e.f. AY:2023-2024

| Course Code | Courses Name | Teaching Scheme | | | Examination Scheme and Marks | | | | | | | Credits | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | TH | PR | TUT | Activity | ISE | ESE | TW | PR | OR | Total | TH | PR | TUT | Total |
| EEL23101 | Skill Based Courses (Online) | | 4 | | 10 | | | 20 | | 30 | | | 2 | | |
| EEL23102 | Work Based Voc. Course (Offline) | | 4 | | 10 | | | 20 | | 30 | | | 2 | | |
| EEL23103 | Internship / Apprenticeship | | 25 | | 50 | | | 50 | | 30 | | | 4 | | |
| Total | | | | | 70 | | | 90 | | 90 | | | 8 | | |

| Skill Based Courses (Online) | | Work Based Voc. Course (Offline) | |
|---|---|---|---|
| EEL23101 - A | Renewable Energy: Fundamentals and Job Opportunities | EEL23102-A | Introduction of AutoCAD in Basic Electrical Engineering Applications |
| EEL23101 - B | Electric Industry Operations and Markets | EEL23102 - B | Electrical Wiring Course |

# Complete any one course from the following courses.

| EEL23101 Skill Based Courses Online - F. Y. B. Tech Exit | | |
|---|---|---|
| **Teaching Scheme:** | **Credits:02** | **Examination Scheme:** |
| **PR: 04 Hrs/Week** | | **Course Activity: 10 Marks** |
| | | **Term Work: 20 Marks** |
| | | **Oral Exam: 30 Marks** |

## Online Skill Based Courses

| Sr. No. | Course Code | NPTEL Course | Name of Course Coordinator | Coordinating Institute | Duration | No. of Credits |
|---|---|---|---|---|---|---|
| 1 | EEL23101 - A | Renewable Energy: Fundamentals and Job Opportunities | Timothy Cochran, Marjaneh Issapour | University at Buffalo | 21 Hrs | 2 |
| 2 | EEL23101 - B | Electric Industry Operations and Markets | Lincoln Pratson | Duke Universiy | 7 Hrs | 2 |

Online Skill Based Courses Links:

1. EEL23101 - A : - https://www.coursera.org/learn/renewable-energy-fundamentals#modules
2. EEL23101 - B: - https://www.coursera.org/learn/electricity#modules

# Complete any one course from the following courses.

## Offline Work Based Voc. Courses

| EEL23102 Work Based Voc. Course Offline) - F. Y. B. Tech Exit | | |
|---|---|---|
| **Teaching Scheme:** | **Credits:02** | **Examination Scheme:** |
| **PR: 04 Hrs/Week** | | **Course Activity: 10 Marks** |
| | | **Term Work: 20 Marks** |
| | | **Oral Exam: 30 Marks** |

## 1. Introduction of AutoCAD in Basic Electrical Engineering Applications
### (EEL23102-A)

### Course Objectives:

1. To develop different types of skills so that students are able to draw electrical and electronics circuits using software.

2. To get acquainted with simulation of electrical and electronics circuits using software.

### Course Outcomes:

On completion of the course, learner will be able to

CO-1 Use various symbols and notations in electrical and electronics engineering drawings.

CO-2 Draw and simulate various electrical and electronics circuits according to standard practices using AutoCAD software.

### List of Practicals : (Any 08 practicals to be performed by the student)

1. Introduction of AutoCAD.

2. Draw the electrical and electronic symbols using AutoCAD Software.

3. Draw the following circuits. (a)Two resistances in parallel (b) Resistance and inductance in parallel using AutoCAD Software.

4. Draw different types of rectifier circuit using AutoCAD and take print out of :(a)Single phase half wave (b)Single phase full wave (c) Single phase full wave bridge rectifier.

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5. Draw single phase half-wave rectifier circuit using AutoCAD Software.

6. Draw single phase full-wave rectifier circuit using AutoCAD Software.

7. Draw single phase full-wave rectifier with filter circuit using AutoCAD Software.

8. Draw the circuit diagram of the 3-Phase Star connected resistive load.

9. Draw the circuit diagram of the 3-Phase Delta connected resistive load.

10. Draw the assembly of a single-phase transformer.

## Reference books:

1. A handbook on Auto CAD tools practice by Azhar Wahab, SSR Krishna
   Notion press publication
2. Auto CAD 2022 training guide by Linkan Sagar, bpb publication

### Guidelines for Laboratory - Term work Assessment:

1. The distribution of weightage of term work marks should be informed to students before the start of the semester.
2. Term work assessment should be on a continuous basis. At frequent intervals students are expected to inform about their progress/lagging.

## Guidelines for Laboratory Conduction:

1. DO's and DON'TS, along with precautions, are needed to be displayed at prominent locations in the laboratory.
2. Students should be informed about DO'S and DON'T and precautions before performing.

## Guidelines For Students Lab Journal:

The Student's Lab Journal should contain following related to every experiment –

1. Theory related to the experiment.
2. Apparatus with their detailed specifications.
3. Connection diagram /circuit diagram.
4. Observation table/ simulation waveforms.
5. Sample calculations for one/two readings.
6. Result table.
7. Graph and Conclusions.

## 2 Electrical Wiring Course (EEL23102-B )

**Prerequisite Courses:** Basic knowledge of Electricity.

**Course Objectives:**

1. To demonstrate fuses, switches, indicators, lamps and energy meters used in Electrical Engineering applications.
2. To study and perform connections of different types Electrical wiring and various electrical apparatus such as fuse, switches, lamps, energy meters and tube lights.

**Course Outcomes:**

On completion of the course, learner will be able to

**CO-1:** Apply the knowledge of electrical wiring, fuses, switches, indicators, lamps and energy meters in various Electrical Engineering applications.

**CO-2:** Connect various electrical apparatus such as fuse, switches, lamps, energy meters and tube lights.

**LIST OF PRACTICALS (Any 08 to be performed by the student)**

1. To study and perform the connection of different methods of Electrical Wiring Systems (Joint box and Loop-in system).

2. To study and perform the connection of different types of Electrical Wiring Systems (casing and capping wiring, Conduit wiring)

3. To demonstrate different types of fuses and their applications.

4. To demonstrate different types of electrical switches and their applications.

5. To demonstrate different types of indicators and lamps used in electrical engineering applications

6. To study and perform the connection of fuse and lamp with a single pole switch.

7. To demonstrate different types of energy meters (Electromechanical, Electronic and Smart type)

8. To study and observe the lightning intensity of different wattages lamps connected in series and in parallel

9. To perform the connection of fluorescent tube light and study its working principle with choke and starter.

10. To perform the connection of LED tube light and study its working principle.

**Reference books:**

1. Practical Electrical Wiring Residential, Farm, Commercial, and Industrial 22nd Edition by Frederic P. Hartwell and Herbert P. Richter, March 2014.

2. Wiring Complete, Michael Mcaliste, Michael W. Litchfield, 3rd Edition, September 2017.

## Guidelines for Laboratory - Term work Assessment:

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4. Observation table/ simulation waveforms.
5. Sample calculations for one/two readings.
6. Result table.
7. Graph and Conclusions.

| EEL23103 Internship / Apprenticeship - F. Y. B. Tech Exit | | |
|---|---|---|
| Teaching Scheme: | Credits:04 | Examination Scheme: |
| PR: 25 Hrs/Week | | Course Activity: 50 Marks |
| | | Term Work: 50 Marks |
| | | Oral Exam: 30 Marks |

**Pre-requisites**: Fundamentals of Electrical Engineering covered in earlier courses

**Course objectives:**

1. To encourage and provide opportunities for students to get professional/personal experience through internships.
2. To get familiar with various tools and technologies used in industries and their applications.
3. To enable students to develop professional skills and expand their professional network with the development of employer-valued skills like teamwork, communication.

**Course outcomes** : On successful completion of this course, the learner will be able to:

CO1: To develop professional competence through industry internship

CO2: To apply academic knowledge in a personal and professional environment

**Recommended Evaluation Parameters**

Evaluation will be done through Seminar Presentation/Viva-Voce at the Institute. The student will present a seminar based on his training report, before an expert committee constituted by the department as per norms of the institute. The evaluation will be based on the following criteria:

1. Proper and timely documented entries.
2. Adequacy & quality of information recorded
3. Data recorded.
4. Thought process and recording techniques used.
5. Organization of the information.

**Internship Report:**

The report shall be presented covering following recommended fields but limited to:

1. Title/Cover Page
2. Internship completion certificate.
3. Internship Place Details- Company background-organization and activities/Scope and object of the study / personal observation.

4. Index/Table of Contents

5. Introduction

6. Title/Problem statement/objectives

7. Motivation/Scope and rationale of the study

8. Methodological details results / analysis / inferences and conclusion

9. Suggestions / Recommendations for improvement to industry, if any

10. Attendance Record

11. List of reference (Library books, magazines and other sources)

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Autonomy coordinator
Dept of Electrical Engg.

Mr. P.D.Upadhye
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Mrs. P. N. Jaiswal.
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Vidyanagari, Baramati-413133

## Exit Course Syllabus: Second Year (S.Y. B. Tech.) Electrical Engineering

### w.e.f. AY:2023-2024

| Course Code | Courses Name | Teaching Scheme | | | Examination Scheme and Marks | | | | | | | Credits | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | TH | PR | TUT | Activity | ISE | ESE | TW | PR | OR | Total | TH | PR | TUT | Total |
| EEL23201 | Skill Based Courses (Any One) | | 4 | | 10 | | | 20 | | 30 | | | 2 | | |
| EEL23202 | Mini-Project | | 4 | | 10 | | | 20 | | 30 | | | 2 | | |
| EEL23203 | Internship | | 25 | | 50 | | | 50 | | 30 | | | 4 | | |
| Total | | | | | 70 | | | 90 | | 90 | | | 8 | | |

| Skill Based Courses (Online/Offline) | |
|---|---|
| EEL23201 - A | Introduction of **MATLAB in** Electrical Engineering Applications (Offline) |
| EEL23201 - B | Electrical Power Generation - An Industrial Outlook (Online) |
| EEL23201 - C | Safety in the Utility Industry(Online) |

| EEL23201 Skill Based Courses Online / Offline – S.Y. B. Tech Exit | | |
|---|---|---|
| **Teaching Scheme:** | **Credits:02** | **Examination Scheme:** |
| **PR: 04 Hrs/Week** | | **Course Activity: 10 Marks** |
| | | **Term Work: 20 Marks** |
| | | **Oral Exam: 30 Marks** |

# Complete any one course from the following courses.

### 1. Introduction of MATLAB in Electrical Engineering Applications (EEL23201 - A)

**Prerequisite Courses:** Basic knowledge of MATLAB as a simulation tool.

**Course Objectives:**

1. Students learned graphic features of MATLAB and they are able to use these features effectively in the various applications.
2. To impart practical working knowledge of Electrical Simulations and Analysis using Mathematical computing language such as MATLAB

**Course Outcomes:**
On completion of the course, learner will be able to

**CO-1:** Apply working knowledge of MATLAB tools to simulate and solve Electrical, Electronics circuits and Applications.
**CO-2:** Understand the main features and importance of the MATLAB in Electrical, Electronic circuits and Applications.

### LIST OF PRACTICALS (Any 08 to be performed by the student)

1. Introduction of MATLAB.
2. Simulate KVL Circuit.
3. Simulate KCL Circuit.
4. Simulate Thevenin's Theorem.
5. Simulate Superposition Theorem.
6. Simulate single phase half-wave rectifier circuit with R Load.
7. Simulate single phase half-wave rectifier circuit with RL Load.
8. Simulate single phase full-wave rectifier circuit with R Load.
9. Simulate single phase full-wave rectifier circuit with RL Load.
10. Simulate R-L series circuit and observe voltage waveforms across each component.
11. Simulate R-C series circuit and observe voltage waveforms across each component.
12. Simulate R-L-C series circuit and observe voltage waveforms across each component.

**Reference books:**

1. MATLAB and it's Applications in Engineering by Rajkumar Bansal,Ashok Kumar Goel ,Manoj Kumar Sharma, (Second Edition).
2. Getting started with MATLAB A Quick Introduction for Scientists and Engineers by Rudra Pratap (Seventh Edition).

**Guidelines for Laboratory - Term work Assessment:**

1. The distribution of weightage of term work marks should be informed to students before the start of the semester.

2. Term work assessment should be on a continuous basis. At frequent intervals students are expected to inform about their progress/lagging.

**Guidelines for Laboratory Conduction:**

1. DO's and DON'TS, along with precautions, are needed to be displayed at prominent locations in the laboratory.

2. Students should be informed about DO'S and DON'T and precautions before performing.

**Guidelines For Students Lab Journal:**

The Student's Lab Journal should contain following related to every experiment –

1. Theory related to the experiment.
2. Apparatus with their detailed specifications.
3. Connection diagram /circuit diagram.
4. Observation table/ simulation waveforms.
5. Sample calculations for one/two readings.
6. Result table.
7. Graph and Conclusions.

# Online Skill Based Courses

| Sr. No. | Course Code | Course | Coordinating Institute | Duration | No. of Credits |
|---|---|---|---|---|---|
| 1 | EEL23201 - B | Electrical Power Generation - An Industrial Outlook | Larsen & Toubro Edu Tech | 4 weeks | 2 |
| 2 | EEL23201 - C | Safety in the Utility Industry | University at Buffalo | 4 weeks | 2 |

**Online Skill Based Courses Links: -**
1. **EEL23201 - B :** Electrical Power Generation - An Industrial Outlook | Coursera
2. **EEL23201 - C:** Safety in the Utility Industry | Coursera

| EEL 23202 Mini Project – S.Y. B. Tech Exit | | |
|---|---|---|
| **Teaching Scheme:** | **Credits:02** | **Examination Scheme:** |
| **PR: 04 Hrs/Week** | | **Course Activity: 10 Marks** |
| | | **Term Work: 20 Marks** |
| | | **Oral Exam: 30 Marks** |

**Course Objectives:**

1. To plan for various activities of the project and distribute the work amongst team members.

2. To develop student's abilities to transmit technical information clearly and test the same by delivery of Seminar based on the Mini Project.

**Course Outcome:**

On completion of the course, student will be able to

CO1: Understand, plan and execute a Mini Project with a team.

CO2: Prepare a technical report based on the Mini project.

CO3: Deliver technical seminar based on the Mini Project work carried out.

**Execution of Mini Project**

• Project designs ideas can be necessarily adapted from recent issues

• Use of software/ hardware devices/components/materials is mandatory.

• Assembly of components and enclosure design is mandatory.

**Topics for the project work:** Any modern/novel/advanced techniques related to the Electrical Engineering field.

**Report writing:** A project report with following contents shall be prepared:

1. Title
2. Introduction
3. Scope of the work
4. Problem Statement
5. Selection of components, calculations
6. Modelling/Testing Procedures
7. Results & Discussions
8. Conclusions
9. References

| EEL23203 Internship – S.Y. B. Tech Exit | | |
|---|---|---|
| Teaching Scheme: | Credits:04 | Examination Scheme: |
| PR: 25 Hrs/Week | | Course Activity: 50 Marks |
| | | Term Work: 50 Marks |
| | | Oral Exam: 30 Marks |

Pre-requisites: Fundamentals of Electrical Engineering covered in earlier courses

**Course objectives**

01: To encourage and provide opportunities for students to get professional/personal experience through internships.

02: To get familiar with various tools and technologies used in industries and their applications.

03: To enable students to develop professional skills and expand their professional network with the development of employer-valued skills like teamwork, communication.

**Course outcomes** On successful completion of this course, the learner will be able to:

CO1: To develop professional competence through industry internship

CO2: To apply academic knowledge in a personal and professional environment

**Recommended Evaluation Parameters**

Evaluation will be done through Seminar Presentation/Viva-Voce at the Institute. The student will present a seminar based on his training report, before an expert committee constituted by the department as per norms of the institute. The evaluation will be based on the following criteria.

1. Proper and timely documented entries.
2. Adequacy & quality of information recorded
3. Data recorded.
4. Thought process and recording techniques used.
5. Organization of the information.

**Internship Report:**

The report shall be presented covering following recommended fields but limited to:

1. Title/Cover Page
2. Internship completion certificate.
3. Internship Place Details- Company background-organization and activities/Scope and object of the study / personal observation.
4. Index/Table of Contents

5. Introduction
6. Title/Problem statement/objectives
7. Motivation/Scope and rationale of the study
8. Methodological details
9. Results / Analysis /inferences and conclusion
10. Suggestions / Recommendations for improvement to industry, if any
11. Attendance Record
12. List of reference (Library books, magazines and other sources)

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## Exit Course Syllabus: Third Year (T.Y. B. Tech.) Electrical Engineering

## w.e.f. AY:2023-2024

| Course Code | Courses Name | Teaching Scheme | | | Examination Scheme and Marks | | | | | | | Credits | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | TH | PR | TUT | Activity | ISE | ESE | TW | PR | OR | Total | TH | PR | TUT | Total |
| EEL23301 | Skill Based Courses (Online/Offline) | | 4 | | 10 | | | 20 | | 30 | | | 2 | | |
| EEL23302 | Mini Project | | 4 | | 10 | | | 20 | | 30 | | | 2 | | |
| EEL23303 | Internship | | 25 | | 50 | | | 50 | | 30 | | | 4 | | |
| **Total** | | | | | **70** | | | **90** | | **90** | | | **8** | | |

| Skill Based Courses (Online/Offline) | |
|---|---|
| EEL23301- A | Modelling and Analysis of performance parameters of Electrical Machines with MATLAB and Simulink |
| EEL23301 - B | Professional Electrical Inspection Course with Certificate. |
| EEL23301 - C | Electrical Power Distribution |
| EEL23301 - D | Exploring Renewable Energy Schemes |

| EEL23301 Skill Based Courses Online / Offline – T.Y. B. Tech Exit | | |
|---|---|---|
| Teaching Scheme: | Credits:02 | Examination Scheme: |
| PR: 04 Hrs/Week | | Course Activity: 10 Marks |
| | | Term Work: 20 Marks |
| | | Oral Exam: 30 Marks |

# Complete any one course from the following courses.

## 1. Modelling and Analysis of performance parameters of Electrical Machines with Matlab and Simulink (EEL23301- A)

**Prerequisite Courses:** Basic knowledge of MATLAB as a simulation tool.

**Course Objectives:**

1. To develop students skills in modeling, simulation, and analysis of transformer and DC machine circuits.

2. To impart practical working knowledge of Electrical Simulations and Analysis of Induction Machines using MATLAB

**Course Outcomes:**

On completion of the course, the learner will be able to

**CO-1:** Use MATLAB to model, simulate, and analyze performance parameters of transformer and DC machines

**CO-2:** Apply working knowledge of MATLAB tools to simulate and analyze performance parameters of transformer and DC machines

**LIST OF PRACTICALS (Any 08 to be performed by the student)**

1. Simulation of single phase transformer for step up and step down mode
2. Simulation of three phase of transformer for star-star and star-delta configuration
3. Analysis of characteristic of DC shunt motor using MATLAB Simulink
4. Analysis of characteristic of DC series motor using MATLAB Simulink
5. Speed control of DC series motor using MATLAB Simulink
6. Speed control of DC shunt motor using MATLAB Simulink.
7. Observation of transient response of speed for DC shunt motor using MATLAB Simulink
8. Observation of transient response of speed for DC series motor using MATLAB Simulink
9. Design and simulation of three phase induction motor at different load conditions in MATLAB Simulink
10. Analysis of Speed - Torque Characteristics of a Three Phase Induction Motor using MATLAB Simulink.

**Reference books:**

1. MATLAB and it's Applications in Engineering by Rajkumar Bansal, Ashok Kumar Goel, Manoj Kumar Sharma, (Second Edition).
2. Getting started with MATLAB A Quick Introduction for Scientists and Engineers by Rudra Pratap (Seventh Edition).

**Guidelines for Laboratory - Term work Assessment:**

1. The distribution of weightage of term work marks should be informed to students before the start of the semester.
2. Term work assessment should be on a continuous basis. At frequent intervals students are expected to inform about their progress/lagging.

**Guidelines for Laboratory Conduction:**

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5. Sample calculations for one/two readings.
6. Result table.
7. Graph and Conclusions.

# Online Skill Based Courses

| Sr. No. | Course Code | NPTEL Course | Name of Course Coordinator | Coordinating Institute | Duration | No. of Credits |
|---|---|---|---|---|---|---|
| 1 | EEL23301 - B | Professional Electrical Inspection Course with Certificate. | Basil A.ALI | Udemy | 12 Hr | 2 |
| 2 | EEL23301 - C | Electrical Power Distribution | Larsen & Toubro Edu Tech | Coursera | 4 weeks | 2 |
| 3 | EEL23301 - D | Exploring Renewable Energy Schemes | University of Pennsylvania | Coursera | 4 weeks | 2 |

**Online Skill Based Courses Links:-**
1. EEL23301 - B: - https://www.udemy.com/course/professional-electrical-inspection-course-with-certificate/
2. EEL23301 – C : - https://www.coursera.org/learn/electrical-power-distribution#about
3. EEL23301 – D: - https://www.coursera.org/learn/exploring-renewable-energy#about

| EEL23302 Mini Project – T.Y. B. Tech Exit | | |
|---|---|---|
| **Teaching Scheme:** | **Credits:02** | **Examination Scheme:** |
| **PR: 04 Hrs/Week** | | **Course Activity: 10 Marks** |
| | | **Term Work: 20 Marks** |
| | | **Oral Exam: 30 Marks** |

**Course Objectives:**

1. To plan for various activities of the project and distribute the work amongst team members.

2. To develop student's abilities to transmit technical information clearly and test the same by delivery of Seminar based on the Mini Project.

**Course Outcome:**

On completion of the course, student will be able to

CO1: Understand, plan and execute a Mini Project with a team.

CO2: Prepare a technical report based on the Mini project.

CO3: Deliver technical seminar based on the Mini Project work carried out.

**Execution of Mini Project**

1. Project designs ideas can be necessarily adapted from recent issues

2. Use of software/hardware devices/components/materials is mandatory.

3. Assembly of components and enclosure design is mandatory.

**Topics for the project work:** Any modern/novel/advanced techniques related to the Electrical Engineering field.

**Report writing:** A project report with following contents shall be prepared:

1. Title
2. Introduction
3. Scope of the work
4. Problem Statement
5. Selection of components, calculations
6. Modelling/Testing Procedures
7. Results & Discussions
8. Conclusions
9. References

| EEL23303 Internship – T.Y. B. Tech Exit | | |
|---|---|---|
| Teaching Scheme: | Credits:04 | Examination Scheme: |
| PR: 25 Hrs/Week | | Course Activity: 50 Marks |
| | | Term Work: 50 Marks |
| | | Oral Exam: 30 Marks |

Pre-requisites: Fundamentals of Electrical Engineering covered in earlier courses

## Course objectives

01: To encourage and provide opportunities for students to get professional/personal experience through internships.

02: To get familiar with various tools and technologies used in industries and their applications.

03: To enable students to develop professional skills and expand their professional network with the development of employer-valued skills like teamwork, communication.

**Course outcomes** On successful completion of this course, the learner will be able to:

CO1: To develop professional competence through industry internship.

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## Recommended Evaluation Parameters

Evaluation will be done through Seminar Presentation/Viva-Voce at the Institute. The student will present a seminar based on his training report, before an expert committee constituted by the department as per norms of the institute. The evaluation will be based on the following criteria.

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