

# UNIVERSITY OF JAMMU

(NAAC ACCREDITED 'A' GRADE UNIVERSITY)  
Baba Sahib Ambedkar Road, Jammu-180006 (J&K)

Academic Section

Email: [academicsectionju14@gmail.com](mailto:academicsectionju14@gmail.com)



## NOTIFICATION (22/Oct./Adp/63)

It is hereby notified for the information of all concerned that the Vice-Chancellor, in anticipation of the approval of the Academic Council, is pleased to authorize the adoption of the Syllabi and Courses of Study in the subject of **Electronics** of Semesters **Ist** and **IInd** for **Four Year Under Graduate Programme** under the **Choice Based Credit System** as per **NFP-2020** (as given in the annexure) for the examinations to be held in the years as per the details given below:

Subject	Semester	for the examination to be held in the years
Electronics	Semester-I Semester-II	December 2022, 2023 and 2024 May 2023, 2024 and 2025

The Syllabi of the courses are available on the University website: [www.jammuniversity.ac.in](http://www.jammuniversity.ac.in)

SD/-  
DEAN ACADEMIC AFFAIRS

No. F. Acd/II/22/8052-8066  
Dated: 6-10-2022

Copy for information and necessary action to:

1. Special Secretary to the Vice-Chancellor, University of Jammu for information of Hon'ble Vice-Chancellor
2. Dean, Faculty of Science
3. Head/Convenor, Board of Studies in **Electronics**
4. Sr. P.A. to the Controller of Examinations
5. All members of the Board of Studies
6. Confidential Assistant to the Controller of Examinations
7. I/C Director, Computer Centre, University of Jammu
8. Deputy Registrar/Asst. Registrar (Conf./Exams, UG/Exam Eval Non-Prof/CDC)
9. Incharge, University Website for Uploading of the notification

Sumit Sharma  
6/10/22  
Deputy Registrar (Academic)  
6/10/22  
6/10/22  
6/10/22

*Plans*

S.No	Course Type	Course No.	Course Title	Credits	Marks Theory	End Exam: 40 marks	Total Marks
1	Skill Enhancement	USELT 104	Solar Photovoltaic Systems and Maintenance	2	10 marks	Mid semester: 10 marks	50
<b>Two Credits Courses</b>							

S. No.	Course Type	Course No.	Course Title	Credits	Marks Theory	End Exam: 60 marks	Total Marks
1	Multidisciplinary	UMDEL103	Elementary analog electronics	3	15 marks	Mid Sem: 15 marks	75
<b>Three Credits Courses</b>							

S. No.	Course Type	Course No.	Course Title	Credits	Marks Theory	Marks Practical/Tutorial	Total Marks
1	Major	UMJEL101	Fundamentals of analog circuits design (3Th+1P)	4	15 marks	Mid Sem: 15 marks End Exam: 60 marks	100
2	Minor	UMIEL102	Analog electronics (3Th+1P)	4	15 marks	Mid Sem: 15 marks End Exam: 60 marks	100
<b>Four Credits Courses</b>							

## Semester – I

Syllabi and courses of studies in the subject of Electronics under CBCS at UG level for the examinations to be held in the years – 2022, 2023, and 2024.

Syllabi and courses of studies in the subject of Electronics under CBCS at UG level for the examinations to be held in the years – 2022, 2023, and 2024.

**University of Jammu**  
**Syllabi of Electronics at FYUP under CBCS as per NEP-2020**  
**Semester – I**  
**(Examination to be held December 2022, 2023, 2024)**  
**Major Course**  
**Course Code: UMJELT101**  
**Course Title: Fundamentals of analog circuits design**  
**Credits: 4**  
**Total no. of Lectures: Theory: 45 hours**  
**Practical: 30 hours**  
**Maximum Marks: 100 (Theory: 75 + Lab: 25)**  
**Duration of Mid Sem Exam (Theory: 15 + Lab: 10): 1½ hours**  
**End Sem Exam (Theory: 75 + Lab: 25): 3 hours**

**Unit I: Basic circuit elements**

Resistors: fixed and variable resistors, determination of equivalent resistance for series, parallel, and series-parallel combination of resistors; capacitors: fixed and variable capacitors, determination of equivalent capacitance for series, parallel, and series-parallel combination of capacitors, energy stored in a capacitor; inductors: fixed and variable inductors, determination of equivalent inductance for series, parallel, and series-parallel combination of inductors, energy stored in an inductor; Kirchhoff's voltage law (KVL), Kirchhoff's current law (KCL).

**Unit II: Semiconductor diodes**

PN junction diode: definition, working, characteristics, static and dynamic resistances, equivalent circuits, transition and diffusion capacitances; diode load line analysis; applications of PN junction diode; rectifier: definition, types, working; Efficiency and ripple factor calculations of half wave and full wave rectifiers; clippers: Biased, unbiased, and combination; clampers: positive and negative; Zener diode and its application as a voltage regulator.

**Unit III: Transistors**

Bipolar junction transistor (BJT): working of NPN and PNP transistors; characteristics of common base (CB), common-emitter (CE), and common-collector (CC) configurations; relation between  $\alpha$ ,  $\beta$ , and  $\gamma$ ; biasing: fixed bias, and voltage divider; BJT as an amplifier, field effect transistor (FET): construction, working, and characteristics; comparison of BJT and FET; FET as an amplifier; MOSFET: construction, working and characteristics; MOSFET as an amplifier.

**Unit IV: Lab implementation**

Resistance estimation from colour code and verification using multimeter; equivalent resistance, capacitance and inductance calculation for a serial and parallel combination, verification of KVL and KCL, static and dynamic resistance estimation of a PN junction diode from V-I characteristics, ripple factor calculation for rectifiers, design of clipping and clamping circuits.

**Reference books**

- V.K. Mehta and Rohit Mehta, **Principles of Electronics**, S. Chand & Company.
- Robert Boylestad, **Electronic Devices and Circuit Theory**, Prentice-Hall of India, New Delhi.
- David A. Bell, **Electronic Devices and Circuits**, Prentice-Hall of India, New Delhi.

**Note for the examiner:**

Mid Semester Examination (1½ hours, Theory: 15 marks, Lab: 10, from 50% syllabus) will be conducted by the Course Coordinator and result will be displayed on notice board at least one week before the commencement of End Semester Examination. The theory question paper (15 marks) will consist of two sections. Section-A (05 marks) will consist of 05 objective type questions and will be compulsory. Section-B will have four questions, two from each of the two units covered under 50% criterion. The students will have to attempt any two questions, selecting at least one from each unit. The 10 marks for the Lab will be based on the continuous assessment.

End Semester Examination (03 hours, Theory: 60 marks, Lab: 15, from 100% syllabus) will be conducted by the Controller of Examinations. The question paper will consist of two sections. Section-A will consist of four short answer questions having one question from each unit. The students are required to attempt all questions. Each question shall be of 3 Marks. Section B shall consist of eight long answer questions having two questions from each unit. The students are required to attempt one question from each unit. Each question shall be of 12 Marks. The 15 marks for the lab will be based on the experiment conducted and the viva-voce examination.

- Sudhakar and Shyam Mohan, Network and Circuits: Analysis Synthesis, Tata McGraw-Hill, New Delhi.
- M.E. Van Valkenburg, Network Analysis, Prentice-Hall of India, New Delhi.

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**University of Jammu**  
**Syllabi of Electronics at FYUP under CBCS as per NEP-2020**  
**Semester – I**  
**(Examination to be held December 2022, 2023, 2024)**  
**Major Course**  
**Course Code: UMJELT101**  
**Course Title: Fundamentals of analog circuits design**  
**Credits: 4**  
**Total no. of Lectures: Theory: 45 hours**  
**Practical: 30 hours**  
**Maximum Marks: 100 (Theory: 75 + Lab: 25)**  
**Duration of Mid Sem Exam (Theory: 15 + Lab: 10): 1½ hours**  
**End Sem Exam (Theory: 75 + Lab: 25): 3 hours**

Syllabi and courses of studies in the subject of Electronics under CBCS at UG level for the examinations to be held in the years – 2022, 2023, and 2024.

Syllabi and courses of studies in the subject of Electronics under CBCS at UG level for the examinations to be held in the years – 2022, 2023, and 2024.

### University of Jammu

Syllabi of Electronics at FYUP under CBCS as per NEP-2020

Semester – I

(Examination to be held December 2022, 2023, 2024)

Minor Course

Course Code: UMIELT102

Course Title: Analog Electronics

Credits: 4

Total no. of Lectures: Theory: 45 hours

Practical: 30 hours

Maximum Marks: 100 (Theory: 75 + Lab: 25)

Duration of Mid Sem Exam (Theory: 15 + Lab: 10): 1½ hours

End Sem Exam (Theory: 75 + Lab: 25): 3 hours

#### Unit I: Basic circuit elements

Resistors. fixed and variable resistors, determination of equivalent resistance for series, parallel, and series-parallel combination of resistors; capacitors: fixed and variable capacitors, determination of equivalent capacitance for series, parallel, and series-parallel combination of capacitors, energy stored in a capacitor; inductors, determination of equivalent inductance for series, parallel, and series-parallel combination of inductors, energy stored in an inductor; Kirchhoff's voltage law (KVL), Kirchhoff's current law (KCL).

#### Unit II: Semiconductor diodes

PN junction diode: definition, working, characteristics, static and dynamic resistances, equivalent circuits, transition and diffusion capacitances; diode load line analysis; applications of PN junction diode; rectifier: definition, types, working; Efficiency and ripple factor calculations of half wave and full wave rectifiers; clippers: Biased, unbiased, and combination; clampers: positive and negative; Zener diode and its application as a voltage regulator.

#### Unit III: Transistors

Bipolar junction transistor (BJT): working of NPN and PNP transistors; characteristics of common-base (CB), common-emitter (CE), and common-collector (CC) configurations; relation between  $\alpha$ ,  $\beta$ , and  $\gamma$ ; biasing: fixed bias, and voltage divider; BJT as an amplifier; field effect transistor (FET): construction, working, and characteristics; comparison of BJT and FET, FET as an amplifier; MOSFET: construction, working and characteristics; MOSFET as an amplifier.

#### Unit IV: Lab implementation

Resistance estimation from colour code and verification using multimeter, equivalent resistance, capacitance and inductance calculation for a serial and parallel combination, verification of KVL and KCL, static and dynamic resistance estimation of a PN junction diode from V-I characteristics, ripple factor calculation for rectifiers, design of clipping and clamping circuits.

#### Reference books

- V.K. Mehta and Rohit Mehta, **Principles of Electronics**, S. Chand & Company.
- Robert Boylestad, **Electronic Devices and Circuit Theory**, Prentice-Hall of India, New Delhi.
- David A. Bell, **Electronic Devices and Circuits**, Prentice-Hall of India, New Delhi.
- Sudhakar and Shyam Mohan, **Network and Circuits: Analysis Synthesis**, Tata McGraw-Hill, New Delhi.
- M.E. Van Valkenburg, **Network Analysis**, Prentice-Hall of India, New Delhi.



**Note for the examiner:**

Mid Semester Examination (1½ hours, Theory: 15 marks, Lab: 10, from 50% syllabus) will be conducted by the Course Coordinator and result will be displayed on notice board at least one week before the commencement of End Semester Examination. The theory question paper (15 marks) will consist of two sections. Section-A (05 marks) will consist of 05 objective type questions and will be compulsory. Section-B will have four questions, two from each of the two units covered under 50% criterion. The students will have to attempt any two questions, selecting at least one from each unit. The 10 marks for the Lab will be based on the continuous assessment.

End Semester Examination (03 hours, Theory: 60 marks, Lab: 15, from 100% syllabus) will be conducted by the Controller of Examinations. The question paper will consist of two sections. Section-A will consist of Four short answer questions having one question from each unit. The students are required to attempt all questions. Each question shall be of 3 Marks. Section B shall consist of Eight long answer questions having two questions from each unit. The students are required to attempt one question from each unit. Each question shall be of 12 Marks. The 15 marks for the lab will be based on the experiment conducted and the viva-voce examination.

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**University of Jammu**  
**Syllabi of Electronics at FYUP under CBCS as per NEP-2020**  
**Semester – I**  
**(Examination to be held December 2022, 2023, 2024)**  
**Minor Course**  
**Course Code: UMIELT102**  
**Course Title: Analog Electronics**  
**Credits: 4**  
**Total no. of Lectures: Theory: 45 hours**  
**Practical: 30 hours**  
**Maximum Marks: 100 (Theory: 75 + Lab: 25)**  
**Duration of Mid Sem Exam (Theory: 15 + Lab: 10): 1½ hours**  
**End Sem Exam (Theory: 75 + Lab: 25): 3 hours**

Syllabi and courses of studies in the subject of Electronics under CBCS at UG level for the examinations to be held in the years – 2022, 2023, and 2024.

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Reference Books:

1. Mitche L E Schultz, **Basics Electronic**, Tata McGraw Hill, 10th Edition, 2007.
2. Robert Boylestad and Louis Nashelsky, **Electronic Devices and Circuit Theory**, PHI; 8th Edition, 2008.
3. Thomas I. Floyd, **Electronic Devices**, 8th Edition, Pearson Education, Inc, 2007
4. Dr. S.L. Gupta and Dr. V. Kumar, **Hand Books of Electronics**, Pragati Edition, 2019.
5. V.K. Mehta and Rohit Mehta, **Principles of Electronics**, S. Chand & Company.
6. Robert Boylestad, **Electronic Devices and Circuit Theory**, Prentice-Hall of India, New Delhi.

**Unit III Electronic measurements**  
 Familiarization with passive components, implementation of simple resistive circuit, Ohm's law, Multimeters: Decibel scale, Amp-Clamp probe, High-Voltage probe, Digital multimeters: voltage measurements, resistance measurements, current measurements, diode test, resolution, range overload, application of digital multimeters in electrical measurements; connecting a current meter in the circuit, voltage tests for an open circuit, checking continuity with the ohmmeter.

**UNIT II Electronic components**  
 PN-junction diode construction and working, half wave and full wave rectifiers, Zener Diode and its application as Voltage Regulator, Bipolar Junction Transistor (BJT) types and working, Field Effect Transistor (FET) construction and working, MOSFET construction and working  
 Kirchhoff's voltage law, Kirchhoff's current law.

**UNIT II Electric components**  
 Electrical circuits: Familiarization with active and passive components, Resistors: types, colour coding variable resistors, potentiometers and rheostats, Capacitor, charge stored in capacitor, types of capacitors, electrolytic capacitor, Inductor, self-inductance and mutual inductance, series and parallel combinations of resistor, capacitor and inductor.

**Unit I: Basics of electricity**  
 Negative and positive polarities, electric charge, potential difference, resistance, voltage, current, electric power, power dissipation, ohm's law, direction of current, sources of electricity, open circuit, closed circuit, EMI, batteries, fundamentals of direct current (DC) and alternating current (AC), series circuit and parallel circuits.

Maximum Marks: 75  
 Duration of Mid Sem Exam (Theory): 1½ hours  
 End Sem Exam (Theory): 60): 3 hours

Course Code: UMDELTI03  
 Credits: 3  
 Total no. of Lectures: 45 hours  
 Course Title: Elementary Analog Electronics  
 Multidisciplinary Course  
 (Examination to be held December 2022, 2023, 2024)  
 Semester – I  
 Syllabi of Electronics at FYUP under CBCS as per NEP-2020  
 University of Jammu

Syllabi and courses of studies in the subject of Electronics under CBCS at UG level for the examinations to be held in the years – 2022, 2023, and 2024.

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End Semester Examination (03 hours, Theory: 60 marks, from 100% syllabus) will be conducted by the Controller of Examinations. The question paper will consist of two sections. Section-A will consist of four short answer questions having one question from each unit. The students are required to attempt all questions. Each question shall be of 3 Marks. Section B shall consist of eight long answer questions having two questions from each unit. The students are required to attempt one question from each unit. Each question shall be of 12 Marks.

**Note for the examiner:**  
Mid Semester Examination (1½ hours, Theory: 15 marks, from 50% syllabus) will be conducted by the Course Coordinator and result will be displayed on notice board at least one week before the commencement of End Semester Examination. The theory question paper (15 marks) will consist of two sections. Section-A (05 marks) will consist of 05 objective type questions and will be compulsory. Section-B will have four questions, two from each of the two units covered under 50% criterion. The students will have to attempt any two questions, selecting at least one from each unit.

7. David A. Bell, **Electronic Devices and Circuits**, Prentice-Hall of India, New Delhi.
8. Sudhakar and Shyam Mohan, **Network and Circuits: Analysis Synthesis**, Tata McGraw-Hill, New Delhi.

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Syllabi and courses of studies in the subject of Electronics under CBCS at UG level for the examinations to be held in the years – 2022, 2023, and 2024.

**University of Jammu**  
Syllabi of Electronics at RYUP under CBCS as per NEP-2020  
Semester – I  
(Examination to be held December 2022, 2023, 2024)  
Multidisciplinary Course  
Course Code: UMDEL103  
Course Title: Elementary Analog Electronics  
Credits: 3  
Total no. of Lectures: 45 hours  
Maximum Marks: 75  
Duration of Mid Sem Exam (Theory: 15): 1½ hours  
End Sem Exam (Theory: 60): 3 hours



Syllabi and courses of studies in the subject of Electronics under CBCS at UG level for the examinations to be held in the years – 2022, 2023, and 2024.

## University of Jammu

Syllabi of Electronics at FYUP under CBCS as per NEP-2020

Semester – I

(Examination to be held December 2022, 2023, 2024)

Skill Enhancement Course

Course Code: USREI/T104 Course Title: Solar Photovoltaic Systems and Maintenance

Credits: 2

Total no. of Lectures: 30 hours

Maximum Marks: 50

Duration of Mid Sem Exam (10 marks): 1½ hours

End Sem Exam (40 marks): 2½ hours

### Unit 1: Introduction to Solar Cells and PV modules

Principle of solar cell, Parameters of Solar Cells, Solar Cell Technologies, Factors Affecting performance of Solar Cell; Effect of Conversion Efficiency, Change in the Amount of Input Light, Change in Solar Cell Area, Change in Angle of Light Falling on Solar Cell and Change in Solar Cell Operating Temperature, Solar PV Modules; Ratings of PV Module, Standard PV Module Parameters: I-V and P-V Characteristic of SPV Module, Number of Cells in Module, Estimating Wattage of a PV Module, Factors Affecting Electricity Generated by a Solar PV Module: Effect of Conversion Efficiency, Change in the Amount of Input Light, Effect of Change in PV Module Temperature, Change in PV Module Area, Change in Angle of Light Falling on PV Module; Measurement of Module Parameters: Measuring  $V_{oc}$  and  $I_{sc}$ , Higher Wattage Modules

### Unit 2: Solar PV Module Arrays and Batteries

Connection of Modules in Series: Estimating Number of PV Modules Required in Series and Their Total Power; Connection of Modules in Parallel Combination: Power Generated by Parallel Connected PV Modules, Estimating the Number of PV Modules to be connected in Parallel and Their Total Power; Connection of Modules in Series and Parallel: Estimation Number of Modules to be connected in Series and Parallel and Their Total Power; Battery Terminal Voltage, Battery Open Circuit Voltage and Terminal Voltage, Battery Storage Capacity, State of Charge and Depth of Discharge, Charging/Discharging Rate, Battery Efficiency, Operating Temperature, Life Cycle, Self Discharge/Shelf Life, Shelf Life, Batteries for Photovoltaic (PV) Systems.

### Unit 3: Installation, Troubleshooting and Safety of PV system

Types of PV systems: Standalone, Grid-connected, Hybrid; Installing PV System Components, Installing Mechanical Structure and Mounting of PV Modules, Maintenance of Solar PV System, Troubleshooting of PV System Components, Safety in Installation of Solar PV Systems: Electrical Safety, Safety Precautions for Batteries, Mechanical Safety, Installation and Troubleshooting of Solar PV Power Plants: Preparation for Installation, Installation of Array Support Structure, Installation of Modules, Interconnection of Modules, Strings and Combiner Boxes, DC and AC Cable Layout and Connection Guidelines, Grounding Considerations, Installation of DC and AC Power Distribution Boxes, Installation of Inverter.

Reference Books:

C.S. Solanki, Solar Photovoltaic Technology and Systems, PHI.

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Syllabi and courses of studies in the subject of Electronics under CBCS at UG level for the examinations to be held in the years – 2022, 2023, and 2024.

### University of Jammu

Syllabi of Electronics at FYUP under CBCS as per NEP-2020

Semester – I

(Examination to be held December 2022, 2023, 2024)

Skill Enhancement Course

Course Code: USEELT104 Course Title: Solar Photovoltaic Systems and Maintenance

Credits: 2

Total no. of Lectures: 30 hours

Maximum Marks: 50

Duration of Mid Sem Exam (10 marks): 1½ hours

End Sem Exam (40 marks): 2½ hours

Note for the examiner:

Mid Semester Examination (1½ hours, 10 marks, from 50% syllabus) will be conducted by the Course Coordinator and result will be displayed on notice board at least one week before the commencement of End Semester Examination. The question paper (10 marks) will consist of two sections, Section-A (05 marks) will consist of 05 objective type questions, all compulsory. Section-B (5 marks) will have two questions from the unit covered under 50% criterion. The students will have to attempt any one question.

End Semester Examination (2½ hours, 40 marks, from 100% syllabus) will be conducted by the Controller of Examinations. The question paper will consist of two sections, Section-A will consist of four short answer questions having at least one question from each unit. The students are required to attempt all questions, each of 2½ marks. Section B shall consist of six long answer questions having two questions from each unit. The students are required to attempt one question from each unit. Each question shall be of 10 marks.

Syllabi and courses of studies in the subject of Electronics under CBCS at UG level for the examinations to be held in the years – 2023, 2024, and 2025.

## Semester – II

S. No.	Course Type	Course No.	Course Title	Credits	Theory	Practical/Tutorial	Total Marks
1	Major	UMJELT201	Fundamentals of digital circuits design (3Th+1P)	4	Mid Sem: 15 marks End Exam: 60 marks	Assessment 10 marks Exam: 15 marks	100
2	Minor	UMIELT202	Digital electronics (3Th+1P)	4	Mid Sem: 15 marks End Exam: 60 marks	Assessment 10 marks Exam: 15 marks	100
<b>Four Credits Courses</b>							

S. No.	Course Type	Course No.	Course Title	Credits	Marks	Total Marks
1	Multidisciplinary	UMDEL203	Elementary digital electronics	3	Mid Sem: 15 marks End Exam: 60 marks	75
<b>Three Credits Courses</b>						

SNo	Course Type	Course No.	Course Title	Credits	Marks	Total Marks
1	Skill Enhancement	USELT 204	Internet of Things	2	Mid semester: 10 marks End Exam: 40 marks	50
<b>Two Credits Courses</b>						

*Signature*

- A.P. Malvino, D. P. Leach and Saha, **Digital Principles and Applications**, TataMcGraw.
- Anand Kumar, **Fundamentals of Digital Circuits**, PHI Learning Pvt. Ltd.
- Venugopal, **Digital Circuits and systems**, Tata McGraw Hill.
- R. J. Tocci, N. S. Widmer, **Digital Systems: Principles & Applications**, PHI Learning.
- Thomas L. Floyd, **Digital Fundamentals**, Pearson Education Asia.
- R. L. Tokheim, **Digital Principles**, Schaum's Outline Series, Tata McGraw-Hill.
- AP Godse, **Digital Electronics**, Technical Publications Pune.

**Reference books**

**Unit IV: Design and verification**  
 Verification of different logic gates, verification of NAND and NOR as universal gates, design and verification of half adder and full adder, design and verification of half subtractor and full subtractor, design and verification of multiplexer and demultiplexer, design and verification of encoder and decoder, design and verification of SR and D flip-flops, design and verification of JK and T flip-flops.

**Unit III: Registers, memories, and converters**  
 Unidirectional shift registers: serial-in-serial out, serial-in-parallel out, parallel-in-serial out, and parallel-in-parallel out; bidirectional shift registers: ROM, PROM, EPROM, and EEPROM; RAM: static and dynamic; converters: 4 bit binary weighted and R-2R D-A converters; successive approximation, dual slope, single slope and flash A-D converters

**Unit II: Combinational and sequential circuits design**  
 Standard representation of logic functions (SOP and POS), minimization techniques (Karnaugh map minimization up to 4-variables for SOP), combinational circuits: half and full (adders and subtractors), multiplexers, de-multiplexers, decoders, encoders; sequential circuits: SR, D, JK, and T clocked (level and edge triggered) flip-flops, race-around conditions in JK flip-flop, master-slave JK flip-flop, counters: asynchronous and synchronous counters.

**Unit I: Number system and logic gates**  
 Decimal, binary, octal, and hexadecimal number systems; base conversions; binary, octal, and hexadecimal arithmetic; addition and subtraction by 2's complement method; Definition, truth table, symbol, and logic expression of OR, AND, NOT, NOR, NAND, XOR and XNOR gates; universal gates; basic postulates and fundamental theorems of Boolean algebra.

**Course Code: UMJELT201**  
**Credits: 4**  
**Total no. of Lectures: Theory: 45 hours**  
**Practical: 30 hours**  
**Maximum Marks: 100 (Theory: 75 + Lab: 25)**  
**Duration of Mid Sem Exam (Theory: 15 + Lab: 10): 1½ hours**  
**End Sem Exam (Theory: 75 + Lab: 25): 3 hours**

**University of Jammu**  
**Syllabi of Electronics at FYUP under CBCS as per NEP-2020**  
**Semester – II**  
**(Examination to be held May 2023, 2024, 2025)**  
**Major Course**

Mid Semester Examination (1½ hours, Theory: 15 marks, Lab: 10, from 50% syllabus) will be conducted by the Course Coordinator and result will be displayed on notice board at least one week before the commencement of End Semester Examination. The theory question paper (15 marks) will consist of two sections. Section-A (05 marks) will consist of 05 objective type questions and will be compulsory. Section-B will have four questions, two from each of the two units covered under 50% criterion. The students will have to attempt any two questions, selecting at least one from each unit. The 10 marks for the Lab will be based on the continuous assessment. End Semester Examination (03 hours, Theory: 60 marks, Lab: 15, from 100% syllabus) will be conducted by the Controller of Examinations. The question paper will consist of two sections. Section-A will consist of four short answer questions having one question from each unit. The students are required to attempt all questions. Each question shall be of 3 marks. Section B shall consist of eight long answer questions having two questions from each unit. The students are required to attempt one question from each unit. Each question shall be of 12 marks. The 15 marks for the lab will be based on the experiment conducted and the viva-voce examination.

Note for the examiner:

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University of Jammu  
Syllabi of Electronics at FYUP under CBCS as per NEP-2020  
Semester – II  
(Examination to be held May 2023, 2024, 2025)  
Major Course  
Course Code: UMJELT201  
Course Title: Fundamentals of digital circuits design  
Credits: 4  
Total no. of Lectures: Theory: 45 hours  
Practical: 30 hours  
Maximum Marks: 100 (Theory: 75 + Lab: 25)  
Duration of Mid Sem Exam (Theory: 15 + Lab: 10): 1½ hours  
End Sem Exam (Theory: 75 + Lab: 25): 3 hours

Syllabi and courses of studies in the subject of Electronics under CBCS at UG level for the examinations to be held in the years – 2023, 2024, and 2025.

Syllabi and courses of studies in the subject of Electronics under CBCS at UG level for the examinations to be held in the years – 2023, 2024, and 2025.

## University of Jammu

Syllabi of Electronics at FYUP under CBCS as per NEP-2020

Semester – II

(Examination to be held May 2023, 2024, 2025)

Minor Course

Course Code: UMIELT202

Course Title: Digital electronics

Credits: 4

Total no. of Lectures: Theory: 45 hours

Practical: 30 hours

Maximum Marks: 100 (Theory: 75 + Lab: 25)

Duration of Mid Sem Exam (Theory: 15 + Lab: 10): 1½ hours

End Sem Exam (Theory: 75 + Lab: 25): 3 hours

### Unit I: Number system and logic gates

Decimal, binary, octal, and hexadecimal number systems; base conversions; binary, octal, and hexadecimal arithmetic; addition and subtraction by 2's complement method; Definition, truth table, symbol, and logic expression of OR, AND, NOT, NOR, NAND, XOR and XNOR gates; universal gates; basic postulates and fundamental theorems of Boolean algebra.

### Unit II: Combinational and sequential circuits design

Standard representation of logic functions (SOP and POS), minimization techniques (Karnaugh map minimization up to 4-variables for SOP), combinational circuits: half and full (adders and subtractors), multiplexers, de-multiplexers, decoders, encoders; sequential circuits: SR, D, JK, and T clocked (level and edge triggered) flip-flops, race-around conditions in JK flip-flop, master-slave JK flip-flop, counters: asynchronous and synchronous counters.

### Unit III: Registers, memories, and converters

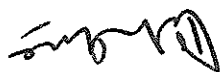
Unidirectional shift registers: serial-in-serial out, parallel-in-parallel out, parallel-in-serial out, and parallel-in-parallel out; bidirectional shift registers: memories: ROM, PROM, EPROM, and EEPROM; RAM: static and dynamic; converters: 4 bit binary weighted and R-2R D-A converters; successive approximation, dual slope, single slope and flash A/D converters.

### Unit IV: Design and verification

Verification of different logic gates, verification of NAND and NOR as universal gates, design and verification of half adder and full adder, design and verification of half subtractor and full subtractor, design and verification of multiplexer and demultiplexer, design and verification of encoder and decoder, design and verification of SR and D flip-flops, design and verification of JK and T flip-flops.

### Reference books

- A.P. Malvino, D. P. Leach and Saha, **Digital Principles and Applications**, TataMcGraw.
- Anand Kumar, **Fundamentals of Digital Circuits**, PHI Learning Pvt. Ltd.
- Venugopal, **Digital Circuits and systems**, Tata McGraw Hill.
- R. J. Tocci, N. S. Widmer, **Digital Systems: Principles & Applications**, PHI Learning.
- Thomas L. Floyd, **Digital Fundamentals**, Pearson Education Asia.
- R. L. Tokheim, **Digital Principles**, Schaum's Outline Series, Tata McGraw-Hill.
- AP Godse, **Digital Electronics**, Technical Publications Pune.
- RK Gaur, **Digital Electronics**.



End Semester Examination (03 hours, Theory: 60 marks, Lab: 15, from 100% syllabus) will be conducted by the Controller of Examinations. The question paper will consist of two sections. Section-A will consist of four short answer questions having one question from each unit. The students are required to attempt all questions. Each question shall be of 3 Marks. Section B shall consist of eight long answer questions having two questions from each unit. The students are required to attempt one question from each unit. Each question shall be of 12 Marks. The 15 marks for the lab will be based on the experiment conducted and the viva-voce examination.

Mid Semester Examination (1½ hours, Theory: 15 marks, Lab: 10, from 50% syllabus) will be conducted by the Course Coordinator and result will be displayed on notice board at least one week before the commencement of End Semester Examination. The theory question paper (15 marks) will consist of two sections. Section-A (05 marks) will consist of 05 objective type questions and will be compulsory. Section-B will have four questions, two from each of the two units covered under 50% criterion. The students will have to attempt any two questions, selecting at least one from each unit. The 10 marks for the Lab will be based on the continuous assessment.

Note for the examiner:

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Course Code: UMIELT202  
 Credits: 4  
 Total no. of Lectures: Theory: 45 hours  
 Practical: 30 hours  
 Maximum Marks: 100 (Theory: 75 + Lab: 25)  
 Duration of Mid Sem Exam (Theory: 15 + Lab: 10): 1½ hours  
 End Sem Exam (Theory: 75 + Lab: 25): 3 hours

Minor Course  
 Course Title: Digital electronics  
 (Examination to be held May 2023, 2024, 2025)  
 Semester – II  
 Syllabi of Electronics at FYUP under CBCS as per NEP-2020  
 University of Jammu

Syllabi and courses of studies in the subject of Electronics under CBCS at UG level for the examinations to be held in the years – 2023, 2024, and 2025.

- A.P. Malvino, D. P. Leach and Saha, **Digital Principles and Applications**, TataMcGraw.
- Anand Kumar, **Fundamentals of Digital Circuits**, PHI Learning Pvt. Ltd.
- Venugopal, **Digital Circuits and systems**, Tata McGraw Hill.
- R. J. Tocci, N. S. Widmer, **Digital Systems: Principles & Applications**, PHI Learning.
- Thomas I. Floyd, **Digital Fundamentals**, Pearson Education Asia.
- R. L. Tokheim, **Digital Principles**, Schaum's Outline Series, Tata McGraw-Hill.
- AP Godse, **Digital Electronics**, Technical Publications Pune
- RK Gaur, **Digital Electronics**.

#### Reference books

**Unit IV: digital circuits realization**  
 Realization of OR, AND, NOT, NOR, NAND, XOR and XNOR gates using basic elements like diodes, transistors, and registers; verification of logic gates using multimeter; design and verification of half adder & full adder; design verification of half subtractor and full subtractor; design verification of multiplexer and demultiplexer; design verification of encoder & decoder; design verification of SR, D, JK, and T flip flops.

**Unit III: Registers and memories & converters**  
 Unidirectional Shift Registers: serial-in-serial out, parallel-in-serial out, and parallel-in-parallel out; bidirectional Shift Registers: ROM, PROM, EPROM, and EEPROM; RAM: static and dynamic; **Converters**: 4 bit binary weighted and R-2R D-A converters; successive approximation, Dual Slope, Single Slope and Flash A-D Converters.

**Unit II: Combinational & sequential circuits Design**  
 Standard representation of logic functions (SOP and POS), minimization techniques (Karnaugh map minimization up to 4-variables for SOP), **Combinational Circuits**: Half and Full (Adders & Subtractors), Multiplexers, De-Multiplexers, Decoders, Encoders. **Sequential circuits**: SR, D, JK & T Flip-Flops, Clocked (Level and Edge Triggered) Flip-Flops, Race-around conditions in JK Flip-Flop, Master-slave JK Flip-Flop. **Counters**: asynchronous and synchronous counters.

**Unit I: Number system & logic gates**  
 Decimal, Binary, Octal and Hexadecimal number systems; base conversions; binary, octal and hexadecimal arithmetic; addition, subtraction by 2's complement method, logic gates and Boolean algebra: Truth Tables of OR, AND, NOT, NOR, NAND, XOR and XNOR, Universal gates, basic postulates and fundamental theorems of Boolean algebra.

University of Jammu  
 Syllabi of Electronics at FYUP under CBCS as per NEP-2020  
 Semester – II  
 (Examination to be held May 2023, 2024, 2025)  
 Multidisciplinary Course  
 Course Code: UMDEL1203  
 Course Title: Elementary Digital Electronics  
 Credits: 3  
 Total no. of Lectures: Theory: 45 hours  
 Duration of Mid Sem Exam (Theory): 1½ hours  
 End Sem Exam (Theory): 60: 3 hours

Syllabi and courses of studies in the subject of Electronics under CBCS at UG level for the examinations to be held in the years – 2023, 2024, and 2025.



End Semester Examination (03 hours, Theory: 60 marks, from 100% syllabus) will be conducted by the Controller of Examinations. The question paper will consist of two sections. Section-A will consist of four short answer questions having one question from each unit. The students are required to attempt all questions. Each question shall be of 3 marks. Section B shall consist of eight long answer questions having two questions from each unit. The students are required to attempt one question from each unit. Each question shall be of 12 marks.

Note for the examiner:  
 Mid Semester Examination (1½ hours, Theory: 15 marks, from 50% syllabus) will be conducted by the Course Coordinator and result will be displayed on notice board at least one week before the commencement of End Semester Examination. The theory question paper (15 marks) will consist of two sections. Section-A (05 marks) will consist of 05 objective type questions and will be compulsory. Section-B will have four questions, two from each of the two units covered under 50% criterion and each of 5 marks. The students will have to attempt any two questions, selecting at least one from each unit.

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 Course Code: UMDEL1203  
 Course Title: Elementary Digital Electronics  
 Credits: 3  
 Total no. of Lectures: Theory: 45 hours  
 Duration of Mid Sem Exam (Theory: 15): 1½ hours  
 End Sem Exam (Theory: 60): 3 hours

Syllabi of Electronics at FYUP under CBCS as per NEP-2020  
 Semester – II  
 (Examination to be held May 2023, 2024, 2025)  
 Multidisciplinary Course  
 University of Jammu  
 Syllabi and courses of studies in the subject of Electronics under CBCS at UG level for the examinations to be held in the years – 2023, 2024, and 2025.

End Semester Examination (2½ hours, 40 marks, from 100% syllabus) will be conducted by the Controller of Examinations. The question paper will consist of two sections. Section-A will consist of four short answer questions having at least one question from each unit. The students are required to attempt all questions, each of 2½ marks. Section B shall consist of six long answer questions having two questions from each unit. The students are required to attempt one question from each unit. Each question shall be of 10 marks.

**Note for the examiner:**  
Mid Semester Examination (1½ hours, 10 marks, from 50% syllabus) will be conducted by the Course Coordinator and result will be displayed on notice board at least one week before the commencement of End Semester Examination. The question paper (10 marks) will consist of two sections. Section-A (05 marks) will consist of 05 objective type questions, all compulsory. Section-B (5 marks) will have two questions from the unit covered under 50% criterion. The students will have to attempt any one question.

**Reference books**  
K. G. Srinivasa, G. M. Siddesh, R. Hanumantha, **Internet of Things**, (CENGAGE, New delhi.

**Unit III: Applications of IoT**  
IoT protocol classification; MQTT (Message que telemetry transport): characteristics and IoT protocol classification; Introduction to domain specific IoT; home automation; smart cities; environment; retail; logistics; agriculture; health and life cycle.

**Unit II: IoT reference model**  
Level-I physical devices and controllers; Level-II connectivity: communication model, protocols, communication APIs; Level-III edge (fog) computing; Level-IV data communication; Level-V data abstraction; Level-VI application; Level-VII collaborations and processes.

**Unit I: Introduction to IoT**  
Concept of IoT; IoT Vs IOT; characteristics of IoT: intelligence, connectivity, dynamic nature, vast scale, sensing, heterogeneity, security; IoT ecosystem; enabling technologies in IoT: sensors, edge devices, embedded systems, communications, wireless sensor networks, cloud computing, digital twin, big data analytics.

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**University of Jammu**  
**Syllabi of Electronics at FYUP under CBCS as per NEP-2020**  
**Semester – II**  
**(Examination to be held May 2023, 2024, 2025)**  
**Skill Enhancement Course**  
**Course Code: USEELT204**  
**Course Title: Internet of things**  
**Credits: 2**  
**Total no. of Lectures: 30 hours**  
**Duration of Mid Sem Exam (10 marks): 1½ hours**  
**End Sem Exam (40 marks): 2½ hours**

Syllabi and courses of studies in the subject of Electronics under CBCS at UG level for the examinations to be held in the years – 2023, 2024, and 2025.