B.Sc.ELECTRONICS
SYLLABUS
(Common core syllabus under CBCS)

With effect from the academic year: 2025-2026 and onwards

Accredited with 'A^{+}' by NAAC

DEPARTMENT OF PHYSICS
KAKATIYA UNIVERSITY
WARANGAL-506009,
TELANGANA

Annexure-I (Credits)

Proposed CBCS Structure from 2025-2026 for Under Graduate Courses

Courses		Papers	Total Credits	Credits for each paper/ Semester					
				B.Sc					
				I	II	III	IV	V	VI
Core Courses (DSC)	Major-1	6	30	5	5	5	5	5	5
	Major-2	6	30	5	5	5	5	5	5
	Minor-1	4	20	5	5	5	5	---	----
MIL/AEC (First language)	English	4	20	5	5	5	5	---	----
Second Language (Telugu, Hindi, Urdu etc.,)		4	20	5	5	5	5	---	----
Multi Disciplinary Course	MDC-1	1	4	---	----	---	----	4	----
SEC 1,2		2	4	---	----	---	----	2	2
SEC 3,4		2	4	---	----	---	----	2	2
Value added course (VAC)	VAC 1,2	2	6	---	----	---	----	3	3
Internships	Internship/Project	1	4	---	----	---	----	---	4
Total Credits in each semester		----	142	25	25	25	25	21	21
Total Credits in UG		---	142						

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B.Sc. ELECTRONICS SYLLABUS

SCHEME OF INSTRUCTIONS UNDER CBCS (w.e.f. 2025-26 academic year onwards)

Year	Semester	Title of the Paper [Theory and Practical]	Instructions Hrs/week	Number of Credits	Total Credits	Marks
1st Year	I Sem	Paper - I : Circuit Analysis	4	4	5	100
		Practical - I : Circuit Analysis Lab	2	1		25
	II Sem	Paper - II : Electronic Devices	4	4	5	100
		Practical - II : Electronic Devices Lab	2	1		25
2nd Year	III Sem	Paper - III : Analog Circuits	4	4	5	100
		Practical - III : Analog Circuits Lab	2	1		25
	IV Sem	Paper - IV : Linear Integrated circuits and Analog Modulation	4	4	5	100
		Practical - IV : Linear Integrated Circuits and Analog modulation Lab	2	1		25
3rd Year	V Sem	Paper - V : Digital Electronics	4	4	5	100
		Practical -V : Digital Electronics Lab	2	1		25
		Multi Disciplinary Courses (MDC-1):				
		Digital System Design using VHDL	4	4	4	100
		Skill Enhancement Courses (SEC):				
		SEC-1: Communications Skills/Professional Development Skills/ Entrepreneurship & Starts up	2	2	2	50
		SEC-3: Fundamentals of AI Tools/Ability Skills (Competitive Mathematics)	2	2	2	50
		Value Added Course (VAC)				
		VAC-1-Paper-1: Environmental Science (EVS)/ Cyber Security & Cyber laws	3	3	3	75
	VI Sem	Paper –VI :	4	4	5	100

		Electronic Communication Systems				
		Practical – VI: **Electronic Communication Systems Lab**	**3**	**1**		**25**
		Skill Enhancement Courses (SEC):				
		SEC-2: **Professional Development Skills /Communications Skills/Entrepreneurship & Starts up**	**2**	**2**	**2**	**50**
		SEC-4: **Basic Instrumentation skills**	**2**	**2**	**2**	**50**
		Value Added Course (VAC)				
		VAC-2--Paper-2: **Cyber Security & Cyber laws/Environmenta Science (EVS)**	**3**	**3**	**3**	**75**
		Project work /Internship:				
		(Innovative Products making Skill (IPMS))	**4**	**4**	**4**	**100**

Total Credits: 52

KAKATIYA UNIVERSITY-WARANGAL-TELANGANA

Under Graduate Courses (Under CBCS 2025–2026 onwards)

B.Sc (ELECTRONICS) I Year SEMESTER – I

Paper–I: CIRCUIT ANALYSIS

w.e.f academic year (2025-26) (CBCS)

Total: 56 Hrs (4hrs/week)

UNIT – I

AC Fundamentals: (7 hrs)

The sine wave - average and RMS values - The J Operator - Polar and Rectangular forms of complex numbers - Phasor Diagram - Complex impedance and admittance.

Kirchhoff's Current and Voltage Laws: (7 hrs)

Concept of voltage and current sources - KVL and KCL application to simple circuits (AC and DC) consisting of resistors and sources - Node voltage analysis and Mesh analysis.

UNIT-II

Network Theorems (DC and AC): (7 hrs)

Superposition Theorem, Thevenin's Theorem, Norton's Theorem, Maximum power transfer Theorem, Reciprocity Theorem, Milliman's Theorem, Application to simple Networks,

UNIT-III

RC and RL Circuits: (7 hrs)

Transient Response of RL and RC Circuits with step input, Time constants. Frequency response of RC and RL circuits, Types of filters - Low pass filter and High pass filter frequency response, passive differentiating circuit and passive integrating circuit.

UNIT-IV

Resonance: (3 hrs)

RLC Series and parallel resonance circuits - Resonant frequency - Q Factor - Bandwidth Selectivity.

Cathode Ray Oscilloscope: (4 hrs)

Cathode Ray Tube (CRT) and its working, electron gun focusing, Horizontal and vertical deflection, deflection sensitivity, florescent screen. Applications - Measurement of Time period, Frequency, Phase and amplitude.

Reference Books:

1) Basic Electronics-Bernard Grob10th edition (TMH).
2) Circuit Analysis-P.Gnanasivam Pearson Education.
3) Circuit and Networks-A. Sudhakar& S. Pallri (TMH).
4) Pulse, digital & switching waveforms-Milliman & Taub.
5) Networks, Lines and Fields-John Ryder (PHI).
6) Network theory-Smarajit Ghosh (PHI).

B.Sc (Electronics) I Year, Semester – I:

Paper – I: Circuit Analysis Practical Lab

No. of hours per week: 2

1) Measurement of peak voltage, frequency using CRO.
2) Measurement of phase using CRO.
3) Thevenin's theorem and Norton's theorem-verification.
4) Maximum power transfer theorem- verification.
5) CR circuit – Frequency response - (Low pass and High pass)
6) CR and LR circuits -Differentiation and integration -tracing of waveforms.
7) LCR-Series resonance circuit-frequency response-Determination of f_o, Q and band width.
8) Simulation: i) verification of KVL and KCL.
   ii) Study of network theorems.
   iii) Study of frequency response (LR).

Note: Student has to perform minimum of Six experiments.

Reference Books:

1) Lab manual for Electronic Devices and Circuits- 4th Edition, By David A Bell-PHI.

2) Basic Electronics- A Text Lab Manual –Zbar, Malvino, Miller.

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Under Graduate Courses (Under CBCS 2025–2026 onwards)

B.Sc (ELECTRONICS) I Year, SEMESTER – II

Paper–II: ELECTRONIC DEVICES

w.e.f academic year (2025-26) (CBCS)

Total: 56 Hrs (4hrs/week)

UNIT-I

PN Junction: (14 hrs)

Formation of PN junction, Depletion region, Junction capacitance, Diode equation

(no derivation) Effect of temperature on reverse saturation current, V-I characteristics and simple applications of i) Junction diode, ii) Zener diode, iii) Tunnel diode and iv) Varactor diode.

UNIT-II

Bipolar Junction Transistor (BJT): (14 hrs)

PNP and NPN transistors, current components in BJT, BJT static characteristics (Input and Output), Early effect, CB, CC, CE configurations of transistor and bias conditions (cut off, active, and saturation regions), CE configuration as two port network, h–parameter model and its equivalent circuit. Determination of h-parameters from the characteristics, Load line analysis (AC and DC). Transistor Biasing – Fixed and self-bias.

UNIT-III

Field Effect Transistor (FET): (7 hrs)

Construction and working of JFET, output and transfer characteristics of FET, Determination of FET parameters. Application of FET as amplifier and Voltage variable resistor. Advantages of FET over BJT.

MOSFET: **(4 hrs)**

Construction and working of enhancement and depletion modes, output and transfer characteristics Application of MOSFET as a switch.

Uni Junction Transistor (UJT): (3 hrs)

Construction and working of UJT and its Characteristics. Intrinsic stand-off ratio, Application of UJT as a relaxation oscillator.

UNIT-IV

Silicon Controlled Rectifier (SCR): (7 hrs)

Construction and working of SCR. Two transistor representation, Characteristics of SCR. Application of SCR for power control.

Photo electronic Devices: (7 hrs)

Construction and Characteristics of Light Dependent Resistor (LDR), Photo voltaic Cell (Solar Cell), Photo diode, Photo transistor and Light Emitting Diode (LED).

Reference Books:

1) Electronic Devices and circuits-Millman and Halkias,(TMH)
2) Physics of Semiconductor Devices, Telugu Academy, Hyderabad
3) Principles of Electronics-V.K.Mehta & Rohit Mehta
4) Electronic Devices and Circuits-Allen Moltershed (PHI)
5) Basic Electronics and Linear Circuits-Bharghava.U
6) Electronic Devices and Circuits-Y.N.Bapat
7) Electronic Devices and Circuits-Mithal.
8) Experiments in Electronics-S.V.Subramanyam.

B.Sc. Electronics I Year, Semester – II

Paper – II: Electronic Devices Practical Lab

No. of hours per week: 2

1) To draw volt- ampere characteristics of Junction diode and determine the cut – in voltage, forward and reverse resistances.
2) Zener diode V – I Characteristics – Determination of Zener breakdown voltage.
3) Voltage regulator (line and load) using Zener diode.
4) BJT input and output characteristics (CE configuration) and determination of 'h' parameters.
5) FET – Characteristics and determination of FET parameters.
6) UJT characteristics – determination of intrinsic standoff ratio.
7) UJT as relaxation oscillator.
8) Characteristics of LDR/Photo diode/Photo transistor/Solar cell.

Note: Student has to perform minimum of Six experiments.

Reference Books:

1) Lab manual for Electronic Devices and Circuits – 4th Edition., By David A Bell – PHI.

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Internal Question paper pattern

Faculty of Science
B.Sc Electronics

Duration: 90 Minutes**]** [Max. Marks: 20

Semester: **Internal: I**

Subject: **Date:**

Paper:

Answer all the Questions

Each question carries equal marks (2 x 10 = 20)

1) Unit – I
2) Unit – I
3) Unit – I
4) Unit – I
5) Unit – I
6) Unit – II
7) Unit – II
8) Unit – II
9) Unit – II
10) Unit – II

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Internal Question paper pattern

Faculty of Science
B.Sc Electronics

Duration: 90 Minutes**]** [Max. Marks: 20

Semester: **Internal: II**

Subject: **Date:**

Paper:

Answer all the Questions

Each question carries equal marks (2 x 10 = 20)

1) Unit – III
2) Unit – III
3) Unit – III
4) Unit – III
5) Unit – III
6) Unit – IV
7) Unit – IV
8) Unit – IV
9) Unit – IV
10) Unit – IV

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Question paper pattern

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Title of the paper:
Paper:

Duration: 3Hrs] [Max. Marks : 80

Section-A: Short Answer Questions **(8 x 4 = 32)**

Answer any EIGHT questions

1) Unit – I
2) Unit – I
3) Unit – I (Problem)
4) Unit – II
5) Unit – II
6) Unit – II (Problem)
7) Unit – III
8) Unit – III
9) Unit – III (Problem)
10) Unit – IV
11) Unit – IV
12) Unit – IV (Problem)

Section B: Essay Answer Questions **(4 x 12 = 48)**

13) (a) Unit – I
OR

(b) Unit – I

14) (a) Unit – II

OR

(b) Unit – II

15) (a) Unit – III

OR

(b) Unit – III

16) (a) Unit – IV

OR

(b) Unit – IV

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Annexure – I (Credits)

Proposed CBCS Structure from 2025-26 for Under Graduate Courses

Courses		Papers	Total Credits	Credits for each paper / Semester						Credits for each paper / Semester						Credits for each paper / Semester					
				BA						B.Com.						B.Sc.					
				I	II	III	IV	V	VI	I	II	III	IV	V	VI	I	II	III	IV	V	VI
Core Courses DSC	Major-1	6	30	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
	Major - 2	6	30	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
	Minor-1	4	20	5	5	5	5	-	-	5	5	5	5	-	-	5	5	5	5	-	-
MIL/AEC (First Language)	English	4	20	5	5	5	5	-	-	5	5	5	5	-	-	5	5	5	5	-	-
Second Language (Telugu, Hindi, Urdu, etc.)		4	20	5	5	5	5	-	-	5	5	5	5	-	-	5	5	5	5	-	-
Multi-Disciplinary Course	MDC 1	1	4	-	-	-	-	4	-	-	-	-	-	4	-	-	-	-	-	4	-
Sec 1, 2		2	4					2	2					2	2					2	2
Sec 3, 4		2	4					2	2					2	2					2	2
Value added course (VAC)	VAC 1, 2	2	6	-	-	-	-	3	3	-	-	-	-	3	3	-	-	-	-	3	3
Internships	Internship / Project	1	4	-	-	-	-	-	4	-	-	-	-	-	4	-	-	-	-	-	4
Total Credits in each semester			142	25	25	25	25	21	21	25	25	25	25	21	21	25	25	25	25	21	21
Total Credits in UG				142						142						142					
Credits under Non-CGPA (Community engagement and service)		NSS /NCC /sports / Extra curricular	6	Upto 6 (2 in each year)						Upto 6 (2 in each year)						Upto 6 (2 in each year)					
		IKS	4	Upto 4 (2 in each, after I & II years)						Upto 4 (2 in each, after I & II years)						Upto 4 (2 in each, after I & II years)					