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 : Electronic Communication Systems	4	4	5	100
		Practical – VI:	3	1		25

		Electronic Communication Systems Lab				
		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

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Under Graduate Courses (Under CBCS 2025–2026 onwards)

B.Sc ELECTRONICS II Year, SEMESTER – III

Paper–III: ANALOG CIRCUITS

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

Total: 56 Hrs (4hrs/week)

UNIT - I

Rectifiers and filters: (14 hrs)

Rectifiers– half wave, full wave and bridge rectifiers, Efficiency, Ripple factor, regulation, harmonic components in rectified output, Filters – choke input (inductor) filter, Shunt capacitor filter, L section and π section filters.

UNIT - II

Regulated Power Supplies: (14 hrs)

Block diagram of regulated power supply, Transistor Voltage Regulators-series and shunt type, three terminal fixed voltage IC regulators (78XX and 79XX), Difference between linear and switching regulation, Principle and working of switch mode power supply (SMPS). UPS-Principle and working.

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UNIT - III

Transistor amplifier: (7 hrs)

Transistor biasing methods – Base resistor, collector-to-base, feedback rsitor, and self-bias (voltage divider); Classification of amplifiers, Hybrid π model of a transistor, Types of coupled amplifiers, Single stage RC coupled amplifier- frequency response and analysis.

Feedback in amplifiers: (7 hrs)

Positive and negative feedback, Feedback topologies, Effect of negative feedback on gain, bandwidth, noise, input and output impedances. Emitter follower, Darlington pair and its advantages.

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UNIT - IV

Oscillators: (10 hrs)

Barkhausen's criterion for sustained oscillations, RC oscillators- RC phase shift and Wien's bridge oscillators, LC oscillators- Hartley and Colpitts.

Multi-vibrators: (4 hrs)

Astable,Mono stable and Bi-stable multi-vibrators (Qualitative treatment only).

Reference Books:

1) Electronic Devices and Circuits-Millman and Halkias (TMH).
2) Basic Electronics – Telugu Academy, Hyderabad.
3) Basic Electronics and linear circuits - Bhargava, Kulshreshtha & Gupta TMH.
4) A first course in Electronics-AA Khan and KK Dey-PHI.
5) Electronic Devices and Circuit Theory-Robert L Boylestad& Louis Nashelsky.
6) Pulse, Digital and Switching circuits by Milliman and Taub.

B.Sc. (Electronics) II YEAR, Semester – III

Paper - III: Analog Circuits Practical Lab

No. of hours per week: 2

1) Study of HWR, FWR and bridge rectifier, determination of ripple factor.
2) Series inductor, shunt capacitor, L-section and π-section filters; determination of ripple factor using Full wave Rectifier.
3) Study of voltage regulator using IC's - 78XX & 79XX.
4) Colpitts oscillator – determination of frequency.
5) RC Phase shift oscillator - determination of frequency.
6) Astable multi-vibrator - determination of time period and duty cycle.
7) Simulation experiments:

   i) Rectifiers ii) RC coupled amplifier iii) Wien bridge oscillator iv) Colpitts oscillator

   v) RC phase shift oscillator vi) Astable multi-vibrator

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 II Year, SEMESTER – IV

Paper–IV: LINEAR INTEGRATED CIRCUITS AND ANALOG MODULATION

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

Total: 56 Hrs (4hrs/week)

UNIT – I

Operational Amplifiers: (14 hrs)

Emitter Coupled Differential amplifier, Block diagram of Op-Amp. Characteristics of Op-Amp, Op-Amp Parameters - Input resistance, Output resistance, Common mode rejection ratio (CMMR), Slew rate, offset voltages, Input bias current, Basic Op-Amp circuits, **Ideal characteristics of Op-Amp,** Inverting Op-Amp, Non-inverting Op-Amp, Op Amp as: Summing amplifier, subtractor, Comparator, Voltage follower, Integrator, and Differentiator and logarithmic amplifier.

UNIT- II

Applications of Op-Amps: **(14 hrs)**

Sine wave [Wien Bridge] generator and square wave [Astable] generator, Triangular wave generator, Mono stable multi-vibrator, IC 555 Timer [Block diagram and its working], IC 555 as Monostable multivibrator and astable multivibrators.

UNIT – III

Modulation: (7 hrs)

Need for modulation-Types of modulation- Amplitude, Frequency and Phase modulation. **Amplitude modulation**: **(7 hrs)**

Analysis of Amplitude modulation, side bands, modulation index, AM modulator, balanced modulator, Demodulation – diode detector.

UNIT – IV

Frequency modulation: (14 hrs)

Analysis of FM**,** Working of simple frequency modulator, - detection of FM waves – FM Discriminator. Advantages of frequency modulation. AM and FM Transmitters and radio receivers [block diagram approach]. Introduction to PAM, PPM, PWM, and PCM, Delta modulation.

Reference Books:

1) Op amps and linear Integrated Circuits – Ramakant Gayakwad, PHI.
2) ***Operational Amplifier – Coughlin and Driscoll.***
3) Linear Integrated Circuits- D Roy Choudhury and Shail B Jain
4) Electronic Communication Systems-George Kennedy & Bernard Davis
5) Principles of Electronic Communication Systems-Louis E Freznel, TMH

B.Sc. Electronics II YEAR, Semester – IV

Paper - IV: Linear Integrated Circuits and Analog Modulation Practical Lab

No. of hours per week: 2

Practical : Using IC 741 Op-Amp and IC 555 Timer :

1) Op amp as inverting amplifier- determination of gain (with AC and DC).
2) Op amp as non-inverting amplifier- determination of gain (with AC and DC).

3) OP Amp as Summing amplifier and comparator (Zero crossing detector).

4) Astable multi-vibrator – determination of time period and duty cycle.

5) Mono stable multi-vibrator- determination of gate width.

6) Integrator/ Differentiator – study of wave forms.

7) Astable multi-vibrator using IC 555.

8) Mono stable multi-vibrator using IC 555.

9) AM modulator and detector.

10) FM modulator and detector.

11) ***Simulation of all the above experiments***.

1. Inverting and Non-inverting amplifiers and comparator
2. Integrator/ Differentiator using op amp
3. Wein bridge oscillator
4. Astable multi-vibrator using Op Amp
5. Astable multi-vibrator using IC 555

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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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

Faculty of Science

B.Sc Electronics

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)					