BAGALKOT UNIVERSITY

Mudhol Road, Jamkhandi-587301 Dist: Bagalkot

PROGRAM /COURSE STRUCTURE AND SYLLABUS
FOR

ELECTRONICS

as per the Choice Based Credit System (CBCS) designed in accordance with Learning Outcomes-Based Curriculum Framework (LOCF)

For

Bachelor of Science
(ELECTRONICS)

(General Degree)
I and II Semester

w.e.f.

Academic Year 2024-25

Preamble for UG Syllabus of Bagalkot University

Bagalkot University Jamkhandi has been established by the Government of Karnataka and has started functioning from the academic year 2023-24. All the degree colleges other than engineering and medical colleges in the district of Bagalkote, are affiliated to this university as per the Karnataka State Universities Act 2000, as modified by the 26th Act of 2022. The students taking admission to any of the colleges in the district of Bagalkote, from the academic year 2023-24 will be students of Bagalkot University. The Government of Karnataka has instructed all the Universities to revise the under graduate syllabus as per the Government order no. ED 166 UNE 2023 Bengaluru Dated 08-05-2024 from the academic year 2024-25.

Hence the Bagalkot University has revised the syllabus as suggested by its Board of Studies and approved by Academic Council and Syndicate. The subject code format for all the subjects of the new syllabus is also revised.

The subject code format is described in the following.

Subject Code Format

1	2	3	4	5	6	7	8	9	10
VER	DEGREE	SEM	DISCIPLINE			SUB. TYPE	SL. NO. FOR SUB. TYPE		TH/LAB/F
2	A	1	C	H	E	M	0	1	T
2	B	1	P	O	L	M	0	1	T

[1] The Version information gives the version of the syllabus. It can take values 1,2..9,a,b,…

[2] The UG degree codes to be provided as / The code applicable to all degrees

Sl. No	Degree Code		Degree
1	B.Sc.	A	Bachelor of Science
2	B.A	B	Bachelor of Arts
3	B.Com.	C	Bachelor of Commerce
4	BBA	D	Bachelor of Business Administration
5	BCA	E	Bachelor of Computer Applications
6	BSW	F	Bachelor of Social Work
7.	----------	S	Applicable to all degrees

[3] The Semester Information is provided as

Sl. No	Semester
1	1
2	2
3	3
….	

[4-6]The Discipline Information to be provided as

Sl No	Degree	Discipline Code
1	B.Com.	XXX
2	BCA	XXX
3	BBA	XXX
4	BSW	XXX
5	B.A	‘HIS’, POL’,GEO’,’KAN’, ‘HIN’ etc. The detailed list is to be provided
6	B.Sc.	‘PHY’,’CHE’, ‘BOT’,’ELE’ etc. The detailed List is to be Provided

[7] The Subject Type to be provided as

Sl. No.	TYPE	Description
1	Major	M
2	Language	L
3	Constitutional Moral Values	C
4.	Elective	E
5.	Skill / Practical based learning	S
6.	Mini Project	P
7.	Internship	I
8.	Case study/ Survey using principles of Research methodology	R

[8-9] The Running Serial Number is to be provided for a particular Subject type 01 to 99

[10] This character specifies the category of the subject namely, T=Theory, L-Practical, P-Project Work, F-Field work, Viva-V, I-Internship, Dissertation-D

ELECTRONICS SYLLABUS I and II SEMESTER
PREAMBLE

This curriculum structure as per the Karnataka Government order number ED 166 UNE 2023 Bengaluru Dated 08-05-2024 for B.Sc. Electronics, is intended to enable the graduates to respond to the current needs of the industry and equip them with skills relevant for national and global standards. The framework encourages innovation in teaching-learning process and appropriate assessment of student learning levels.

PROGRAM OBJECTIVES

The overall Objectives of the B.Sc. Electronics program are to:

- Provide students with learning experiences that develop broad knowledge and understanding of key concepts of electronics and equip students with advanced scientific / technological capabilities for analyzing and tackling the issues and problems in the field of electronics.
- Develop ability in students to apply knowledge and skills they have acquired to solve specific theoretical and applied problems in electronics.
- Develop abilities in students to design and develop innovative solutions for benefits of Society.
- Provide students with skills that enable them to get employment in industries or pursue Higher studies or research assignments or turn as entrepreneur.

PROGRAM OUTCOMES

- Ability to apply knowledge of Logic thinking and basic science for solving electronics related Problems.
- Ability to perform electronics experiments, as well as to analyze and interpret data.
- Ability to design and manage electronic systems or processes that conforms to a given specification within ethical and economic constraints.
- Ability to identify, formulate, solve and analyze the problems in various sub disciplines of electronics.
- Ability to use Modern Tools / Techniques.

Concept Note:

1. CBCS is a mode of learning in higher education which facilitates a student to have some freedom in selecting his/her own choices, across various disciplines for completing a UG program
2. A credit is a unit of study of a fixed duration. For the purpose of computation of workload as per UGC norms the following is mechanism be adopted in the University: One credit (01) = One Theory Lecture (L) period of one (1) hour.
   One credit (01) = One Tutorial (T) period of one (1) hour. One credit (01) = One practical (P) period of two (2) hours.
3. Wherever there is a practical there will be no tutorial and vice-versa
4. A major subject is the subject that's the main focus of Core degree/concerned.
5. In addition to three majors and specialization courses it is suggested three compulsory courses:
   - First, a course with Practical (Skill) orientation. A course with a Practical orientation but linked with theoretical major course will improve employability as it will impart practical experience and skill.
   - The second compulsory course suggested is language, Kannada / other Indian languages, and English as per the policy of the Government. This course will have to be devised in a manner such that it not only gives the knowledge of the language per say, but also, the communication skills including translation from Kannada to English vice versa, and also subject - based knowledge which is contained in the Kannada literature, or what is called Kannada language knowledge system.
   - The third compulsory subject is Value or Moral education. The value/moral education course will include teaching which may involve the following :
     a. Constitutional moral values/principles of equality, liberty, fraternity, and national unity, and non-discrimination and similar values
     b. Practical experience through tutorial assignment and based on a small survey be conducted with the purpose to develop a student as a good citizen not only with awareness about the goals of equality, liberty, fraternity, and national unity but also the present situation which is contradictory to the constitutional principles and the challenges before a citizen.
6. Internship is a designated activity that carries some credits involving more than 25 days of working in an organization (either in same organization or outside) under the guidance of an identified mentor. Internship shall be an integral part of the curriculum.

PROGRAM STRUCTURE

Syllabus and Credits Structure under Choice Based Credit System [CBCS] General Degree for the Three Years B.Sc. with Electronics Undergraduate Programme with effect from 2024-25

First Semester B.Sc. (Electronics) Scheme

SEMESTER-I											
Category	**Course code**	**Title of the Paper**	**Marks**			**Teaching hours/ week**			**Credits**	**Duration of Exam** (Hrs)	**Teaching Department**
			IA	**SEE**	**Total**	**L**	**T**	**P**			
L1	------	Language 1	20	80	100	3	-	-	3	3	--------
L2	-------	Language 2	20	80	100	3	-	-	3	3	----------
Major	2A1ELEM01T	Network Analysis And Instrumentation	20	80	100	3	-	-	3	3	Electronics
	2A1ELEM01L	Practical I	10	40	50	-	-	4	2	3	Electronics
Major	----------	Major Subject 2	20	80	100	3	-	-	3	3	---
	----------	Practical	10	40	50	-	-	4	2	3	---
Major	----------	Major Subject 3	20	80	100	3	-	-	3	3	---
	----------	Practical	10	40	50	-	-	4	2	3	---
Common	2S1XXXC01T	Constitutional Values/	10	40	50	2	-	-	2	2	Constitutional Values: Political Science
	2S1XXXC02T	Environment studies									Environmental Studies: Chemistry/ /Geography/ Botany
Total Marks					**700**	**Semester Credits**			**23**		

L1 & L2: Languages

DSC: Discipline Specific Course

Second Semester B.Sc. (Electronics) Scheme

	SEMESTER-II										
Category	**Course code**	**Title of the Paper**	**Marks**			**Teaching hours/ week**			**Credits**	**Duration of exams (Hrs)**	**Teaching Department**
			IA	**SEE**	**Total**	**L**	**T**	**P**			
L3	----------	Language 3	20	80	100	3	-	-	3	3	---------
L4	----------	Language 4	20	80	100	3	-	-	3	3	----------
Major	2A2ELEM02T	Electronic Circuits and Special Purpose Devices	20	80	100	3	-	-	3	3	Electronics
	2A2ELEM02L	Practical II	10	40	50	-	-	4	2	3	Electronics
Major	-----	Major Subject 2	20	80	100	3	-	-	3	3	--------
	-------	Practical	10	40	50	-	-	4	2	3	---------
Major	--------	Major Subject 3	20	80	100	3	-	-	3	3	--------
	-------	Practical	10	40	50	-	-	4	2	3	---------
Common	2S1XXXC01T	Constitutional Values	10	40	50	2	-	-	2	2	Constitutional Values: Political Science
	2S1XXXC02T	Environment Studies									Environmental Studies: Chemistry/Geography / Botany
Total Marks					**700**	**Semester Credits**			**23**		

L3 & L4 : Languages

DSC : Discipline Specific Course

First Semester B.Sc. (Electronics)

Course outcomes

At the end of the course the student should be able to:

- CO1: Apply the knowledge of basic circuit law and simplify the network using reduction techniques
- CO2: Analyze the circuit using Kirchhoff's and Study and analyze basic networks using network theorems in a systematic manner
- CO3: Build simple electronic circuits used in various applications
- CO4:Describe the various types of passive filters
- CO5:Students should be able to know about the use of the instruments

First Semester B.Sc. (Electronics)

<table>
<tr><td colspan="4">Paper Code: 2A1ELEM01T
Paper Title: Network Analysis And Instrumentation</td></tr>
<tr><td colspan="2">Teaching Hours/week: 3</td><td>Formative Assessment Marks: 20
Summative Assessment Marks:80
Total Marks= 100</td><td>Total Hours: 42</td><td>Credits: 3</td></tr>
<tr><td>UNITS</td><td colspan="3">Syllabus</td><td>Teaching Hours</td></tr>
<tr><td>I</td><td colspan="3">• Electronic Components: Electronic passive and active components, types and their properties, Concept of Voltage and Current Sources, electric energy and power (Qualitative only)
• .DC Transient Analysis: Series RC Circuit- Charging and discharging with initial charge, RC time constant.
Series RL circuit, current at any instant during growth and decay– equations (qualitative analysis only). Graphical representation, RL time constant, AC applied to Series RC and RL circuits: Impedance of series RC & RL circuits (qualitative study-no derivations). AC applied to Series and parallel RLC circuit (qualitative study–no derivations), series and parallel resonance, condition for resonance, resonant frequency, bandwidth, significance of quality factor, Comparison between series and parallel resonance numerical problems.
• Transformer: Principle, construction and working.
• Switches: SPST, SPDT, DPST and DPDT, fuse and Electromagnetic relay, MCB and ELCB, RCCB–Qualitative studies only.</td><td>12</td></tr>
<tr><td>II</td><td colspan="3">• Network theorems (DC analysis only): Review of Kirchhoff's laws, voltage divider and current divider theorems, open and short circuits. Superposition Theorem. Thevenin's Theorem. Norton's Theorem. Reciprocity Theorem. Maximum Power Transfer Theorem. Problems.
• Two Port Networks: h, y and z parameters and their conversion.</td><td>10</td></tr>
</table>

III	• T and pi Networks, Network transformation T to pi and vice versa. Characteristic impedance. • **Filters**-Concept of filters, Constant K-type filters- Low pass filter, high pass filters, band pass filters & band elimination. Derivation (Design impedance, Characteristic impedance, Cut off Frequencies, Attenuation constant and Phase constant) and design of filters	10
IV	• Suspension Galvanometer, Torque and deflection of the Galvanomete permanent –magnet-moving mechanism, • DC Ammeters, Multirange DC ammeter DC Voltmeters, Voltmeter sensitivity, DC Mutirange Voltmeter , • **Ohmmeter:** Series type ohmmeter, Shunt type ohmmeter, **Analog** multi-meter or VOM. Digital Multimeter, Advantages • **Cathode Ray Oscilloscope:** Block diagram, Cathode Ray Oscilloscope.	10
	Reference Books: 1. Electronic Devices and circuit theory, Robert Boylstead and Louis Nashelsky, 9thEdition, 2013, PHI 2. Basic electronics- B.L. Theraja - S. Chand and Co. 3rd edition - 2012. 3. Electronics text lab manual, Paul B. Zbar. 4. Electric circuits, Joeseph Edminister, Schaums series. 5. Electric circuits Book 1, Schaums series - Syed. A. Nasar. Mc-Graw hill edition. 6. Basic Electronics and Linear circuits, N.N. Bhargava, D.C. Kulshresta and D.C Gupta-TMH. 7. Electronic devices, David A Bell, Reston Publishing Company/DB Tarapurwala Publ. 8. Principles of Electronics By- V.K. Mehta, S. Chand& Co. 9. Electronic devices, applications and Integrated circuits, Mathur,Kulshreshta and Chadha, Umesh Publications. 0. Modern Electronic Instrumentation and Measurement techniques- Albert D. Helfrick and William D. Cooper	

B.Sc. I semester Practical

Course out comes
After the completion of the lab course the student will be able to:

- CO1:.Illustrate electrical network theorems.
- CO2;Evaluate time constant of RC circuits
- CO3:.Analyze network parameter for different application.
- CO4.: Design different filters
- CO5:Design the analog Voltmeter Ammeter and Ohmmeter

Paper Code: 2A1ELEM01L **Paper Title: Practical – I**		
Lab Hours /week: 4	Formative Assessment Marks: 10 Summative Assessment Marks:40 Total Marks= 50	Credits: 2

Syllabus

Demonstration experiments- not for evaluation

1. To familiarize with basic electronic components (R, C, L,), digital Multimeter, Function Generator and Oscilloscope.
2. Measurement of Amplitude, Frequency & Phase difference using Oscilloscope.

Experiments to be performed

1. Series Resonance
2. Verification of Kirchhoff's Laws
3. Verification of (a) Thevenin's theorem and (b) Norton's theorem.
4. Verification of (a) Superposition Theorem and (b) Reciprocity Theorem.
5. Verification of the Maximum Power Transfer Theorem.
6. RC Circuits: Time Constant, Differentiator, Integrator.
7. Determination of hybrid parameters of a two-port network.
8. Study of Low pass filter T/π section.
9. Study of High pass filter T/π section.
10. Study of Band pass filter T section
11. Study of Band Elimination filter T/π section
12. Conversion of Galvanometer into Multirange voltmeter
13. Conversion of Galvanometer into Multirange milliammeter
14. Design of Ohmmeter

Note:

1. Experiments are of four hours duration
2. Minimum of eight experiments to be performed.

Second Semester B.Sc. (Electronics)

Second Semester B.Sc. (Electronics)

Course outcomes:

At the end of the course the student should be able to

CO1: Describe the behavior of basic semiconductor devices

CO2: Calculate various device parameters' values from their V I characteristics.

CO3: Students should be able to bias the transistor using different biasing circuits

CO4: Describe the frequency response of BJT , JFET amplifiers and Power Amplifiers

CO5: Explain the behavior, characteristics and applications of special purpose devices, LED, LCD, Solar Cells, UJT, SCR, Triac and Diac.

Paper Code: **2A2ELEM02T** Paper Title: **Electronic Circuits and Special Purpose Devices**			
Teaching Hours/week: 3	Formative Assessment Marks: 20 Summative Assessment Marks:80 Total Marks= 100	Total Hours: 42	Credits: 3

UNITS	Syllabus	Teaching Hours
I	• **Junction Diode and its applications:** PN junction diode (Ideal and practical) constructions, Formation of Depletion Layer, Diode Equation and I-V characteristics. , Zener diode, Reverse saturation current, Zener and avalanche breakdown. • **Rectifiers**- Half wave rectifier, Full wave rectifiers (center tapped and bridge), circuit diagrams, working and waveforms (Definition of TUF, PIV and expression for efficiency (η), ripple factor(γ) and voltage regulation), Comparison between HWR & FWR. • **Filter**- Inductor filter, Capacitor filter, LC filter (Inductor Input) and π-section filter (Capacitor Input) Qualitative study only.. • **Switching Circuits:** Clipping circuits (Positive, Negative and both side), Clamping circuits (Positive & Negative).	12
II	• **Bipolar Junction Transistor:** Bipolar Junction Transistor: Construction, working and characteristics of three modes (CB, CE and CC), relation between α, β and γ. Regions of operation (active, cut off and saturation). Problems. • **Transistor biasing:** Need for biasing, DC load line, operating point, thermal runaway, stability and stability factor. Different types of biasing– Fixed bias, collector to base bias, Emitter feedback bias, voltage divider bias, (Explanation Q point derivation. advantages& disadvantages in each case). Transistor as a switch circuit and working. Problems.	10

III	• **Small Signal Amplifiers:** Classification of amplifiers based on different criteria, small signal CE amplifier-circuit, working, frequency response. • **Cascaded Amplifiers:** Two stage RC Coupled Amplifier and its Frequency Response. • **Hybrid model**: h-parameter, Determination of h-parameter of transistor for CE configuration, derivation for Av, expressions for Zin and Zout using h-parameters. Numerical problems on Av, Zin and Zout. • **Power amplifier:** Introduction, Classification of power Amplifiers, Conversion efficiency of class A amplifier, class B amplifier and class C amplifier (Qualitative only). Transformer coupled push pull amplifier. • **FET:** Introduction, FET types, JFET – construction, working, characteristics, parameters and their relationships. Comparison of BJT & FET. • **JFET Amplifier:** Common Source – mode, operation and frequency response • **MOSFET**-Types, circuit symbols of depletion type MOSFET (both N channel and P Channel). Circuit symbols of enhancement type MOSFET (both N channel and P channel).N channel enhancement type MOSFET-construction, working, characteristic curves	10
IV	• **UJT-** Basic construction, equivalent circuit, intrinsic standoff ratio, working, characteristics and relaxation oscillator-expression of frequency. Numerical problems. • **SCR**-construction, working, characteristic curves, explanation of working by using equivalent circuit, full wave-controlled rectifier-derivations for average values of load current and voltage, numerical problems. • **Triac and Diac** – Circuit symbol, construction, working, characteristic curves. Applications (mention only). • **LED**– Circuit symbol, operation and applications (mention only) • **LCD –**Types, applications (mention only), advantages over LED. • **Special purpose devices:** Tunnel diode, Varactor diode, Photo diode, Photo transistor & Solar cell – circuit symbol, working, characteristics, applications (mention only).	10

	REFERENCE BOOKS: 1. Basic electronics- B.L. Theraja - S. Chand and Co. 3rd edition -2012. 2. Electronics text lab manual, Paul B. Zbar. 3. Basic Electronics and Linear circuits, N.N. Bhargava, D.C. Kulshresta and D.C Gupta-TMH. 4. Electronic devices, David A Bell, Reston Publishing Company/DB Tarapurwala Publ. 5. Principles of Electronics By V.K. Mehta, S. Chand& Co. 6. Electronic devices, applications and Integrate circuits, Mathur, Kulshreshta andChadha,UmeshPublications. 7. Basic electronics &linear circuits TTTI Chandigarh-Kulashresta and Bhargava Tata McGrawhill publication 8. Electronic Devices and circuit theory, Robert Boylstead and Louis Nashelsky, 9th Edition, 2013, PHI 9. Semiconductor devices –Kannan Kano LPE Pearson publication. 10. Electronic devices, applications and Integrated circuits, Mathur,

B.Sc. II semester Practical

Course out comes

After the completion of the lab course the student will be able to:

- CO1: Describe the characteristics of basic electronic devices.
- CO2: Explain the behavior and characteristics of power devices such as UJT, SCR, etc.
- CO3: Explain about the biasing circuits
- CO4: Explain the frequency response of Transistor amplifier and FET amplifier

Paper Code: 2A2ELEM02L **Paper Title: Practical – II**		
Lab Hours/week: 4	Formative Assessment Marks: 10 Summative Assessment Marks:40 Total Marks= 50	Credits: 2

Syllabus

Section-A: Demonstration experiments- not for evaluation

Measurement of voltage, time period and frequency using C.R.O.

Section-B: Performance Experiments

1. Study of the I-V Characteristics of (a) P-N junction Diode, and (b) Zener diode.
2. Full wave bridge rectifier with LC/π -section filter.
3. Study of Clipping and Clamping circuits
4. Transistor Characteristics in CE mode
5. Fixed Bias circuit using transistor
6. Voltage Divider Bias circuit using transistor
7. FET characteristics
8. CE Amplifier – frequency response
9. Common source FET amplifier- frequency response
10. UJT characteristics
11. UJT relaxation oscillator.
12. SCR characteristics.
13. LED Characteristics
14. Solar cell characteristics

Note:

1. Experiments are of three hours duration
2. Minimum of eight experiments to be performed

ASSESSMENT METHODS

Formative Assessment for Theory

Evaluation Scheme for Internal Assessment: Continuous Internal Assessment (CIA)

Assessment Criteria 20 marks		
1st Internal Assessment Test for 20 marks of 1 hour duration after 8 weeks and later marks should be reduced to 5	CIA : C1	5 Marks
2nd Internal Assessment Test for 40 marks 2 hours duration after 15 weeks and marks should be reduced to 10	CIA : C2	10 Marks
Assignment/ Activity	CIA : C3	05 Marks
Total		20 Marks

Summative Assessment for Theory:

SEMESTER END EXAM : SEE	C4	80 Marks

Formative Assessment for Practical:

Assessment Criteria 10 marks		
Internal Test including basic understanding of the concept, Viva Voce, Journal. Test should be conducted for 50 marks and later it should be reduced for 10 marks	CIA : C1	10 Marks

Summative Assessment for Practical:

SEMESTER END EXAM : SEE	C2	40 Marks

Summative Assessment: Scheme of Evaluation for Practical Examination

SL. No	Particulars	Marks Allotted
1.	Basic formula with description, nature of graph if any & indication of unit	04
2.	Tracing of schematic ray diagram/Circuit diagram with description	04
3.	Tabulation	04
4.	Experimental skill & connection	04
5.	Record of observation and performance of experiment	08
6.	Calculation including drawing graph	06
7.	Accuracy of result with unit	02
8.	Journal assessment	04
9.	Oral performance	04
	Total	40

Instructions to set the question paper and question paper pattern :

Instruction to set the question paper.

1. Question number 1 has 12 sub questions consisting of 3 questions from each unit. Each question carries two marks. Student has to answer any ten questions.
2. Question number 2 to 7 are from unit I to IV.
   Each question carries five marks. Student has to answer any four questions
3. Question number 8 to 12 are from unit I to IV.
   Each question carries ten marks. Student has to answer any four questions

Question Paper pattern

B.Sc. Degree Examination
ELECTRONICS

Time: 3 hours Max. Marks: 80

		Part- A	
1.		**Answer any <u>TEN</u> questions**	**10 x 2 = 20**
	a)		
	b)		
	c)		
	d)		
	e)		
	f)		
	g)		
	h)		
	i)		
	j)		
	k)		
	l)		
		Part-B	
		Answer any <u>Four</u> questions	**4 x 5 = 20**
	2		
	3		
	4		
	5		
	6		
	7		
		Part-C	
		Answer any FOUR questions	**4 X 10 = 40**
	8		
	9		
	10		
	11		
	12		