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Undergraduate Programme in

Electronics and Communication Science

Curriculum and Syllabus for

B.Sc Electronics and Communication Science

(With effect from the Academic Year 2020-21)

February 2020

Note: The Committee is designed Learning Outcome Based Curriculum Framework of Under Graduate Electronics and Communication Programmes prescribed by UGC

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I. Preamble

Electronics today is a part of our daily lives. It is tough to think the way the world would be without electronics. Almost everything we use in our day today life uses electronics or electronic components in some way. Electronic devices are being used in healthcare, not only to assist diagnosis and determination of medical problems, but in the research providing treatment for illnesses and even cures for genetic anomalies. Medical Electronics equipments are used to test diabetes, cholesterol and blood component tests quickly and accurately. Pacemakers and similar equipments implanted in the body is now almost routine. Electronics is a broad discipline comprising of various studies. New technologies are evolved and are being discussed in various forums. It is a need to include the recent technology in the curriculum without affecting the basics of electronics. In short, there should be a balance between the basic and recent electronics applications.

The learning outcome based curriculum in general and Electronics in particular will definitely help the teachers of the discipline to visualize the curriculum more specifically as expected from the students at the end of the instructional process. It is pertinent to mention here that the purpose of education is to develop an integrated personality of the individual and the educational system provides all knowledge and skills to the learner for this.

The curriculum as developed has the provision of ensuring the integrated personality of the students in terms of providing opportunity for exposure to the students towards core courses, elective courses, non-major electives and skill enhancement courses with special focus on technical, communication and subject specific skills through practical and other innovative transactional modes to develop their employability skills. The template of learning outcome based curriculum has categorically mentioned very well defined expected outcomes for the programme like core competency, communication skills, research-skills, teamwork, moral and ethical awareness, leadership readiness along with very specific learning course outcomes at the starting of each course.

Therefore, this template on Learning Outcomes based Curriculum Framework (LOCF) for B.Sc.Electronics and Communication Science will definitely be a landmark in the field of outcome based curriculum framing.

2. Programme Learning Outcome

Curriculum is the heart of any educational system. Course contents, learning activities and assessment types are designed to be consistent with the achievement of desired learning outcomes. The learning outcomes are in terms of knowledge, professional attitude, work

ethics, critical thinking, self managed learning, adaptability, problem solving skills, communication skills, interpersonal skills and team activities. At the end of a particular course/program, assessment is carried out to determine whether the desired outcomes are being achieved. This outcome assessment provides feedback to ensure that element in the teaching and learning environment are acting in consent to facilitate the nurturing of the desired outcomes. The expected learning outcomes are used as reference points that would help formulate graduate attributes, qualification descriptors, programme learning outcomes and course learning outcomes which in turn help not only in curriculum planning and development, but also in delivery and review of academic programmes.

The objective based curriculum refers to the overall targets to be achieved through curriculum which may be long term or immediate. On the other hand, the learning outcome based curriculum is very specific in terms of changes in the cognitive, affective and psychomotor behavior of the students as a result of their exposure to the curriculum. The outcome based curriculum provides the teacher very specific targets which he can achieve through the selected instructional process as compared to the objective based curriculum which provides general outcomes.

The learning outcome based curriculum has very close relationship with the learning of the students whereas objective based curriculum focusses on only providing knowledge to the students. In other words, higher cognitive skills are developed through learning outcome based curriculum. Hence, it is preferred to develop learning outcome based curriculum which will provide specific directions to the teacher with respect to the transaction process and expected changes in the behavior of the students as well.

Nature and Extent of the Programme

B.Sc Electronics and Communication Science is a professional program which develops specialized skill set among the graduates to cater the need of industries. In recent years, electronic science has made unprecedented growth in terms of new technologies, new ideas and principles. The research organizations and industries that work in this frontier area are in need of highly skilled and scientifically oriented manpower. This manpower can be available only with flexible, adaptive and progressive training programs and a cohesive interaction among the research organizations, academicians and industries. The key areas of study within subject area of Electronic Science comprise: Electronic Devices, Analog and digital circuit design, Analog, digital and Satellite Communication, Electronics Instrumentation, Antenna and Radar Systems, Microprocessors & Microcontroller, computer coding/programming in C and C++.

The curriculum covers topics that overlap with areas outlined above and with applied fields such as Real Time Embedded system, Computer Networks and Biomedical

Instrumentation, Sensor Technology, Mobile Communication, Theory of Robotics and Automation, Industrial Electronics and Consumer Electronics.

The present learning outcomes based model curriculum of B.Sc Electronics and Communication Science, is designed to provide better learning experience to the graduates. Besides, imparting disciplinary knowledge, curriculum is aimed to equip the graduates with competencies like problem solving, analytical reasoning and leadership which provide them high professional competence.

Aim of the Programme

The broad aims of bachelors degree programme in Electronics and Communication Science is to

1. Develop the skills that enable the students to get employment in industries or pursue higher studies or research assignments or turn as entrepreneurs.
2. Develop the ability in students to apply their knowledge and skills they have acquired to the solution of specific theoretical and applied problems in Electronics.
3. Provide students with learning experiences that develop broad knowledge and understanding of key concepts of Electronics and equip students with recent Scientific or Technological capabilities for analyzing and tackling the issues and problems in the field of Electronics.
4. Provide ability in students to design and develop innovative solutions for benefits of society, by leadership, team work and lifelong learning.
5. Motivate the students to prepare them for national as well as international competitive examinations.

Graduate attributes

This curriculum framework for the bachelor program in Electronics and Communication Science is developed keeping in view of the student centric learning pedagogy, which is entirely outcome oriented. Augmented in this framework includes Graduate attribues like (1) gaining knowledge, (2) critical thinking (3) problem solving (4) use of modern tools (5) collaborative and multidisciplinary work (6) communication (7) life-long learning (8) ethical practices and social responsibility.

1. Obtain in-depth knowledge with an ability to discriminate, evaluate, analyze and synthesize existing and new evolution and to integrate it for the enhancement of knowledge.
2. Study the complex scientific and technological problems critically and apply the same for synthesizing information to make intellectual and creative advances for conducting research in a wider theoretical, practical contexts.

3. Solve scientific and technological problems and to evaluate a wide range of potential solutions for the problems and arrive at feasible solutions after considering public health and safety, cultural, societal and environmental factors in the core areas of expertise.
4. Select and apply appropriate techniques, resources, and modern engineering and IT tools to complex scientific and technological activities with an understanding of the limitations.
5. Possess knowledge and understanding of group dynamics, recognize opportunities and implement positively to collaborative multidisciplinary scientific research, demonstrates self-management and teamwork, decision-making, objectivity and rational analysis in order to achieve common goals.
6. Communicate with the society, regarding complex scientific and technological activities effectively, such as being able to write effective reports and design documentation by adhering to appropriate standards, make effective presentations and to follow clear instructions.
7. Need for the preparation and ability to engage in life-long learning with a high level of enthusiasm and commitment to improve knowledge and competence.
8. Secure professional and intellectual integrity, ethics of research and scholarship, professional code of conduct and an understanding of responsibility to contribute to the community for sustainable development of the society.

In line with recent trends in education system, this framework foster implementation of modern pedagogical tools and concepts such as flip-class, hybrid learning, MOOCs and other e-learning platforms.

3. COURSE STRUCTURE:

FIRST SEMESTER

Course Content	Name of the Course	Ins. Hrs	Credits	Int. Marks	Ext. Marks	Total
Part – I	Language Paper – I	6	3	25	75	100
Part - II	**BP2-ENG01-Communicative English I**	**3**	**3**	**50**	**50**	**100**
Part -III	BES-DSC01 – Basic Circuit Theory	5	3	25	75	100
	BMA-CSA01 – Allied Mathematics-I	6	5	25	75	100
	BES-DSC02 – Core Practical-I	6	3	40	60	100
Part IV	Basic Tamil/Adv.Tamil/NME*	-	2	25	75	100
	BP4-EPSC01-English for Physical Sciences I	**4**	**4**	**50**	**50**	**100**

***NME: Choose any one from other department**

SECOND SEMESTER

Course Content	Name of the Course	Ins. Hrs	Credits	Int. Marks	Ext. arks	Total
Part – I	Language Paper – II	6	3	25	75	100
Part - II	**BP2-ENG02-Communicative English II**	**3**	**3**	**50**	**50**	**100**
Part - III	BES-DSC03 – Electronic Devices	5	3	25	75	100
	BMA-CSA02 – Allied Mathematics–II	6	5	25	75	100
	BES-DSC04 – Core Practical II	6	3	40	60	100
Part IV	Basic Tamil/Adv.Tamil/ NME*	-	2	25	75	100
	BP4-EPSC02-English for Physical Sciences II	**4**	**4**	**50**	**50**	**100**

***NME: Choose any one from other department**

THIRD SEMESTER

Course Content	Name of the Course	Ins. Hrs	Credits	Int. Marks	Ext. Marks	Total
Part - III	BES-DSC05 – Analog Electronics	5	4	25	75	100
	BES-DSC06 – Numerical Methods	5	3	25	75	100
	BES-DSC07 – Digital Electronics	4	4	25	75	100
	BES-DSA03 – Allied Basic Physics-I	4	4	25	75	100
	Allied Practical I	3	Examination will be held in semester IV			
	BES-DSC08 – Core Practical III	3	3	40	60	100
	BES-DSC09 – Core Practical IV	3	3	40	60	100
PART IV	Environmental Studies	1	Examination will be held in Semester IV			
	Soft Skills	2	3	50	50	100

FOURTH SEMESTER

Course Content	Name of the Course	Ins. Hrs	Credits	Int. Marks	Ext. Marks	Total
Part - III	BES-DSC10 – Principles of Communication	4	3	25	75	100
	BES-DSC11 – Programming in C Theory and Practical*	4	3	40	60	100
	BES-DSC12 – Microprocessor – Intel 8085	5	4	25	75	100
	BES-DSA04 – Allied Basic Physics – II	5	4	25	75	100
	BES-DSAP1 – Allied Basic Physics-I & II (Practical)	3	2	40	60	100
	BES-DSC13 – Core Practical - V	6	3	40	60	100
Part-IV	Environmental Studies	1	2	25	75	100
	Soft skills	2	3	50	50	100

* The Distribution of marks for Programming in C Theory and Practical which have both theory and practical (syllabus combined both theory and practical in each paper together) be followed:

PAPER	INTERNAL	EXTERNAL	TOTAL
Theory	25	75	100
Practical	40	60	100

Finally, theory marks (100) be reduced to 60% and practical marks (100) be reduced to 40%.

FIFTH SEMESTER

Course Content	Name of the Course	Ins. Hrs	Credits	Int. Marks	Ext. marks	Total
Part-III	BES-DSC14 – Microcontroller	6	4	25	75	100
	BES-DSC15 – Electrical and Electronics Instrumentation	6	4	25	75	100
	BES-DSC16 – Antennas Theory and Radar System	6	4	25	75	100
	BES-DSC17 – Core Practical – VI	6	3	40	60	100
	Elective-I: Choose any one from list	5	5	25	75	100
Part-IV	Value Education	1	2	25	75	100

SIXTH SEMESTER

Course Content	Name of the Course	Ins. Hrs	Credits	Int. Marks	Ext. Marks	Total
Part-III	BES-DSC18 – Computer Networks	5	4	25	75	100
	BES-DSC19 – Real Time Embedded System	5	4	25	75	100
	BES-DSC20 – Biomedical Instrumentation	5	4	25	75	100
	Elective II : Choose any one from list	5	5	25	75	100
	BES-DSC21 – Core Practical - VII	6	3	40	60	100
	BES-DSC22 – Project	3	5	20	80	100
Part V	Extension Activities	1	1			

4. Course Learning Outcomes and Syllabus

The course learning outcomes are aligned with program learning outcomes but these are specific to specific courses offered in a program. The course level learning shall be reflected as program level learning. The core courses shall be the backbone of this framework whereas electives and skill enhancement would add academic excellence in the subject together with multi-dimensional and multidisciplinary approach. In course learning outcomes, the student will attain subject knowledge in terms of individual course as well as holistically.

Learning outcomes:

The student graduating with the Degree B.Sc Electronics and Communication Science should be able to

1. Acquire core competency in Electronics
2. Use modern technology and software tools for professional practices
3. Solve Electronics related problems by apply knowledge of mathematics and science
4. Demonstrate electronics experiments, analyze and interpret data
5. Implement designs and manage Electronic systems that conforms to a given specification
6. Analyze, formulate and solve the problems in various disciplines of Electronics.
7. Integrate as a member of a multidisciplinary team with sense of ethics,integrity and social responsibility
8. Use oral and written communication skill to communicate
9. Recognize the need and be able to engage in lifelong learning

Course Learning Outcomes and Syllabus

(i) Core Courses

I Semester

Core Paper 1 Circuit Theory (6 h)

Core Paper 2 Practical I (6 h)

II Semester

Core Paper 3 Electronic Devices (6 h)

Core Paper 4 Practical II (6 h)

III Semester

Core Paper 5 Analog Electronics (5 h)

Core Paper 6 Numerical Methods (5 h)

Core Paper 7 Digital Electronics (4 h)

Core Paper 8 Practical III (6 h)

Core Paper 9 Practical IV (6 h)

Environmental Studies (1 h)

IV Semester

Core Paper 10 Principles of Communication (4 h)

Core Paper 11 Programming in C Theory & Practical (4 h)

Core Paper 12 Microprocessor – Intel 8085 (5 h)

Core Paper 13 Practical V (6 h)

Environmental Studies (1 h)

V Semester

Core Paper 14 Microcontroller (6 h)

Core Paper 15 Electrical and Electronics Instrumentation (6 h)

Core Paper 16 Antennas Theory and Radar System (6 h)

Core Paper 17 Practical VI (6 h)

Elective-I & II (5 h EACH) Choose any two papers

1. Sensor Technology
2. Mobile Communication
3. Industrial Electronics
4. Consumer Electronics
5. Microwave and Fiberoptic Communication Systems
6. Theory of Robotics and Automation
7. Programming in C++
8. Solar Technology

Value Education (1 h)

VI Semester

Core Paper 18 Computer Networks (5 h)

Core Paper I9 Real Time Embeded System (5 h)

Core Paper 20 Biomedical Instrumentation (5 h)

Core Paper 21 Practical VII (6 h)

Extension Activities (1 h)

(ii) Allied Courses

Mathematics I (6 hr)
Mathematics II (6 hr)
Basic Physics - I (4 h)
Basic Physics - II (4 h)
Basic Physics Practical (3 h)

(iii) Non major Elective Courses

Non-major elective I (2 h)

1. Home Appliances and Wiring
2. History of Electronics

Non-major elective II (2 h)

1. Handling of Domestic Appliances
2. Trends in Personal Computers

Question paper pattern

Time: 3 Hours **Maximum Marks**: 75

PART- A

Answer any TEN questions in each 30 words. (1 to 12) **10 x 2 = 20**

PART - B

Answer any FIVE questions in each 200 words. (13-19) **5 x 5 = 25**

PART C

Answer any THREE questions in each 500 words. (20-24) **3 x 10 = 30**

The pattern of internal valuation shall be:

Test: 15 Marks (the average of best two tests out of three tests)
Assignment: 5 marks; Attendance: 5 marks = Total: 25 marks.

Practical: 25 Marks (the average of best two tests out of three tests)
Record: 10 marks; Attendance: 5 marks = Total: 40 marks.

Project: 10 Marks (the average of best two tests out of three tests)
Report: 5 marks; Attendance: 5 marks = Total: 20 marks.
