Network Analysis		Semester	3
Course Code	BEC304	CIE Marks	50
Teaching Hours/Week (L:T:P: S)	3:0:0	SEE Marks	50
Total Hours of Pedagogy	40	Total Marks	100
Credits	03	Exam Hours	3
Examination type (SEE)	Theory		

Course objectives:

1. Apply mesh and nodal techniques to solve an electrical network.
2. Solve different problems related to Electrical circuits using Network Theorems and Two port network.
3. Familiarize with the use of Laplace transforms to solve network problems.
4. Study two port network parameters and their applications.
5. Study of RLC Series and parallel tuned circuit.

Teaching-Learning Process (General Instructions)

These are sample Strategies, which teachers can use to accelerate the attainment of the various course outcomes.

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- Lecture method (L) does not mean only traditional lecture method, but different type of teaching methods may be adopted to develop the outcomes.
- Encourage collaborative (Group)Learning in the class.
- Ask at least three HOTS(Higher order Thinking)questions in the class, which promotes critical thinking.
- Adopt Problem Based Learning (PBL), which fosters students' Analytical skills, develop thinking skills such as the ability to evaluate, generalize, and analyze information rather than simply recall it.
- Topics will be introduced in a multiple representation.
- Show the different ways to solve the same problem and encourage the students to come up with their own creative ways to solve them.
- Discuss how every concept can be applied to the real world-and when that's possible, it helps improve the students' understanding.
- Adopt Flipped class technique by sharing the materials/Sample Videos prior to the class and have discussions on the topic in the succeeding classes.

Module-1

Basic Concepts: Practical sources, Source transformations, Network reduction using Star - Delta transformation, Loop and node analysis with linearly dependent and independent sources for DC and AC networks.

Module-2

Network Theorems: Superposition, Millman's theorems, Thevenin's and Norton's theorems, Maximum Power transfer theorem.

Module-3

Transient behavior and initial conditions: Behavior of circuit elements under switching condition and their Representation, evaluation of initial and final conditions in RL, RC and

RLC circuits for AC and DC excitations.

Module-4

Laplace Transformation &Applications: Solution of networks, step, ramp and impulse responses, waveform Synthesis.

Module-5

Two port network parameters: Definition of Z,Y, h and Transmission parameters, modelling with these parameters, relationship between parameters sets.

Resonance:

Series Resonance: Variation of Current and Voltage with Frequency, SelectivityandBandwidth,Q-Factor,CircuitMagnificationFactor,Selectivity with Variable Capacitance, Selectivity with Variable Inductance.

Parallel Resonance: Selectivity and Bandwidth, Maximum Impedance Conditions with C, L and f Variable, current in Anti-Resonant Circuit, The General Case-Resistance Present in both Branches.

Course outcome (Course Skill Set)

At the end of the course, the student will be able to :

1. Determine currents and voltages using source transformation/ source shifting/ mesh/ nodal analysis and reduce given network using star- delta transformation.
2. Solve problems by applying Network Theorems and electrical laws to reduce circuit complexities and to arrive at feasible solutions.
3. Analyse the circuit parameters during switching transients and apply Laplace transform to solve the given network
4. Evaluate the frequency response for resonant circuits and the network parameters for two port networks

Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks out of 50) and for the SEE minimum passing mark is 35% of the maximum marks (18 out of 50 marks). The student is declared as a pass in the course if he/she secures a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

Continuous Internal Evaluation:

- There are 25 marks for the CIE's Assignment component and 25 for the Internal Assessment Test component.
- Each test shall be conducted for 25 marks. The first test will be administered after 40-50% of the coverage of the syllabus, and the second test will be administered after 85-90% of the coverage of the syllabus. The average of the two tests shall be scaled down to 25 marks
- Any two assignment methods mentioned in the 22OB2.4, if an assignment is project-based then only one assignment for the course shall be planned. The schedule for assignments shall be planned properly by the course teacher. The teacher should not conduct two assignments at the end of the semester if two assignments are planned. Each assignment shall be conducted for 25 marks. (If two assignments are conducted then the sum of the two assignments shall be scaled down to 25 marks)
- The final CIE marks of the course out of 50 will be the sum of the scale-down marks of tests and assignment/s marks.

Internal Assessment Test question paper is designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.

Semester-End Examination:

Theory SEE will be conducted by University as per the scheduled timetable, with common question papers for the course **(duration 03 hours)**.

1. The question paper will have ten questions. Each question is set for 20 marks.
2. There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), **should have a mix of topics** under that module.
3. The students have to answer 5 full questions, selecting one full question from each module.

Suggested Learning Resources:

Books

1. M.E.Van Valkenburg (2000), Network Analysis, Prentice Hall of India, 3rdedition, 2000, ISBN:9780136110958.
2. Roy Choudhury-Networks and Systems, 2nd edition, New Age International Publications, 2006, ISBN: 9788122427677

ReferenceBooks:

3. Hayt, Kemmerly and Durbin-Engineering Circuit Analysis, **TMH7**th Edition, 2010.
4. **J.**David Irwin/ R.Mark Nelms- Basic Engineering Circuit Analysis JohnWiley,8thed,2006.
5. Charles K Alexander and Mathew NO Sadiku-Fundamentals of Electric Circuits, Tata McGraw-Hill,3rc1 Ed,2009.