


<b>Green IT and Sustainability</b>		Semester	4
Course Code	<b>BCS456A</b>	CIE Marks	50
Teaching Hours/Week (L: T:P: S)	1:0:0:0	SEE Marks	50
Total Hours of Pedagogy	14	Total Marks	100
Credits	01	Exam Hours	01
Examination type (SEE)	Theory(MCQ)		
<b>Course objectives:</b> <ul style="list-style-type: none"><li>Understand challenges for Green ICT and the environmental impact.</li><li>Learn different aspects of ICT metrics and Sustainable Cloud Computing.</li><li>Explore effects of software design on the sustainability.</li></ul>			
<b>Teaching-Learning Process (General Instructions)</b> <p>These are sample Strategies, which teachers can use to accelerate the attainment of the various course outcomes.</p> <ol style="list-style-type: none"><li>Lecturer method (L) need not to be only traditional lecture method, but alternative effective teaching methods could be adopted to attain the outcomes.</li><li>Use of Video/Animation to explain functioning of various concepts.</li><li>Encourage collaborative (Group Learning) Learning in the class.</li><li>Ask at least three HOT (Higher order Thinking) questions in the class, which promotes Critical thinking.</li><li>Adopt Case study Based Learning (CBL), which fosters students' analytical skills, develop thinking skills such as the ability to evaluate, generalize, and analyse information rather than simply recall it.</li><li>Discuss how every concept can be applied to the real world - and when that's possible, it helps improve the students' understanding.</li></ol>			
<b>Module-1</b>			
<b>Green ICT -History, Agenda, and Challenges Ahead:</b> Introduction, Industrial Revolution, The Emergence of Information and Communication Technologies, The Agenda and Challenges Ahead.			
<b>Module-2</b>			
<b>Emerging Technologies and Their Environmental Impact:</b> Introduction, Number of Connected Devices , Increased , Functionality, Increased Number of Separate Functions , Increased Demand for Speed and Reliability , Obsolescence—The Problem of Backward Compatibility, The Other Side of the Balance Sheet, Videoconference as an Alternative to Business Travel, Dematerialization of Product Chain, Travel Advice/Road Traffic Control, Intelligent Energy Metering , Building Management Systems, Saving IT			
Resources.	<b>Module-3</b>		
<b>Measurements and Sustainability:</b> Introduction, ICT Technical Measures, Ecological Measures and Ethical Consideration, Systems Engineering for Designing Sustainable ICT-Based Architectures.			
<b>Module-4</b>			
<b>Sustainable Cloud Computing:</b> Introduction, Challenges in the Use of Cloud Computing As Green Technology, Cloud Computing and Sustainability, Sustainable Applications of Cloud Computing, Technologies Associated With Sustainable Cloud Computing, Future Prospects of Sustainable Cloud Computing, Reflections on Sustainable Cloud Computing Applications.			
<b>Module-5</b>			

<p><b>Sustainable Software Design:</b> Overview and Scope, Evaluating Sustainability Effects , Sustainability and the Product Life Cycle , Direct Effects: Sustainability During Use, Runtime Energy Consumption Basics , Analyzing the Energy Consumption of an Application , Energy Consumption Reduction Using Physical Properties of Semiconductors, Optimizing the Energy Consumption of an Application: Compiler Techniques, Optimizing the Energy Consumption of an Application: Runtime Approaches.</p>
<p><b>Course outcome (Course Skill Set)</b></p> <p>At the end of the course the student will be able to:</p> <ol style="list-style-type: none"> <li>1. Classify the challenges for Green ICT</li> <li>2. Relate the environmental impact due to emerging technologies.</li> <li>3. Demonstrate different aspects of ICT metrics.</li> <li>4. Compare the various parameters related to Sustainable Cloud Computing.</li> <li>5. Interpret the effects of software design on the sustainability.</li> </ol>
<p><b>Assessment Details (both CIE and SEE)</b></p> <p>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). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student 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.</p> <p><b>Continuous internal Examination (CIE)</b></p> <ul style="list-style-type: none"> <li>• For the Assignment component of the CIE, there are 25 marks and for the Internal Assessment Test component, there are 25 marks.</li> <li>• The first test will be administered after 40-50% of the syllabus has been covered, and the second test will be administered after 85-90% of the syllabus has been covered</li> <li>• 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 teacher should not conduct two assignments at the end of the semester if two assignments are planned.</li> <li>• For the course, CIE marks will be based on a scaled-down sum of two tests and other methods of assessment.</li> </ul> <p><b>Internal Assessment Test question paper is designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.</b></p> <p><b>Semester End Examinations (SEE)</b></p> <p>SEE paper shall be set for 50 questions, each of the 01 marks. The pattern of the question paper is MCQ (multiple choice questions). The time allotted for SEE is <b>01 hour</b>. The student has to secure a minimum of 35% of the maximum marks meant for SEE.</p> <p><b>Suggested Learning Resources: Books</b></p> <ol style="list-style-type: none"> <li>1. Green Information Technology – A Sustainable Approach, Mohammad Dastbaz Colin Pattinson, Babak Akhgar, Elsevier, 2015 Inc.</li> <li>2. San Murugesan; G. R. Gangadharan, Harnessing Green IT: Principles and Practices, Wiley-IEEE Press</li> </ol> <p><b>Web links and Video Lectures (e-Resources):</b></p>

- [https://www.youtube.com/watch?v=kvn\\_-mJ2tSo](https://www.youtube.com/watch?v=kvn_-mJ2tSo)
- <https://www.youtube.com/watch?v=kxngsYn5N3Y>
- <https://www.youtube.com/watch?v=EgdFi3sCgzU>
- <https://www.brightest.io/sustainability-measurement>
- <https://www.youtube.com/watch?v=S2m490p25Zw>

**Activity Based Learning (Suggested Activities in Class)/ Practical Based learning**

- Literature survey/review

  
HOD's Signature  
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