PG DEPARTMENT OF COMPUTER SCIENCE

OUTCOME BASED SYLLABUS

SEMESTER I

PICSB20 – GREEN COMPUTING

Year: I **Sem:** I	**Course Code:** PICSB20	**Title of the Course:** Green Computing	**Course Type:** Theory	**Course Category:** Independent Elective	**H/W** -	**Credits** 2	**Marks** 100

Course Objectives

1. Understand the dimensions and goals of Green IT.
2. Discuss the green enterprise architecture with environmental intelligence.
3. Analyze the Grid framework with the collaboration of cloud computing.
4. Understand the concept of Green compliance.
5. Apply Green IT strategies and applications of home appliances.

Course Outcomes (COs)

1. Understand the Concept of Green IT.
2. Discuss Green IT in relation to technology.
3. Evaluate IT use in relation to environmental perspectives.
4. Discuss the methods and tools to measure energy consumption.
5. Conclude with a Green IT to sustainable development and develop energy saving.

CO	**PSO**					
	PSO1	**PSO2**	**PSO3**	**PSO4**	**PSO5**	**PSO6**
CO1	H	M	L	M	M	L
CO2	M	L	M	H	M	M
CO3	L	M	M	M	L	H
CO4	M	M	L	M	L	M
CO5	H	M	L	L	M	L

CO	PO					
	1	2	3	4	5	6
CO1	L	L	M	M	L	H
CO2	M	L	M	L	H	M
CO3	L	M	L	M	L	M
CO4	M	M	L	H	M	L
CO5	M	H	M	L	M	L

(Low - L, Medium – M, High - H)

Course Syllabus

Unit I

1.1 Green IT: An Overview: Introduction - Environmental Concerns and Sustainable Development - Environmental Impacts of IT (K1)

1.2 Green IT: OCED Green IT Framework – Green IT 1.0 and 2.(K1)

1.3 Holistic Approach to Greening IT:Greening Computer's Entire life Cycle – The Three Rs of Green IT (K1)

1.4 Greening IT: Green PCs, Notebooks and Servers – Green Data Centres – Green Cloud Computing – Green Data Storage – Green Software – Green Networking and Communication (K1, K2)

1.5 Applying IT for Enhancing Environmental Sustainability-Green IT Standards and Eco Labelling of IT - Enterprise Green IT Strategy(K1, K2)

1.6 Green Devices and Hardware: Introduction-Life Cycle of a Device or Hardware- Reuse, Recycle and Dispose (K1)

Unit II

2.1 Sustainable Software Development: Introduction - Current Practices - Sustainable Software-Software Sustainability Attributes (K1)

2.2 Software Sustainability Metrics: Modifiability and Reusability – Portability – Supportability – Performance – Dependability – Usability – Accessibility – Predictability – Efficiency – Project's Carbon Footprint (K1, K2)

2.3 Sustainable Software Methodology: Collecting Metrics – Code metrics Tools – Simplified Usability Study – Platform Analysis – Existing Project Statistics - Defining Actions (K2, K3)

2.4 Green Data Centres: Data Centres and Associated Energy Challenges(K1)

2.5 Data Centre IT Infrastructure: Servers – Networking – Storage – IT Platform Innovation - Data Centre Facility Infrastructure-Implications for Energy Efficiency: Power System – Cooling – Facilities Infrastructure Management (K1, K3)

2.6 IT Infrastructure Management: Server Power – Consolidation – Virtualization (K2)

Unit III

3.1 Green Cloud Computing and Environmental Sustainability: Introduction -What is Cloud Computing? - Cloud Computing and Energy Usage Model (K1)

3.2 Features of Clouds Enabling Green Computing (K2)

3.3 Towards Energy Efficiency of Cloud Computing (K3)

3.4 Green Cloud Architecture (K2, K3)

3.5 Enterprise Green IT Strategy: Introduction-Approaching Green IT Strategies- Business Drivers of Green IT Strategy (K1, K3)

3.6 Business Dimensions for Green IT Transformation - Organizational Considerations in a Green IT Strategy (K3, K4,K6)

Unit IV

4.1 Sustainable Information Systems and Green Metrics: Introduction- Multilevel Sustainable Information (K2)

4.2 Sustainability Hierarchy Models: Sustainability Frameworks – Sustainability Principles – Tools for Sustainability (K4, K5, K6)

4.3 Product Level Information: Life-Cycle Assessment – The four stages of LCA – CRT Monitors versus LCD Monitors: Life Cycle Assessment (K3, K4)

4.4 Individual Level Information (K3)

4.5 Functional Level Information: Data Centre Energy Efficiency – Data centre Power Metrics – Emerging Data Centre Metrics (K4, K6)

4.6 Organizational Level Information: Reporting Greenhouse Gas Emissions (K4, K5)

Unit V

5.1 Green Enterprises and the Role of IT: Introduction-Organizational and Enterprise Greening: The Green Enterprise: A value chain Perspective(K2, K3)

5.2 Information Systems in Greening Enterprises: Environmental Management Information systems – Software and Databases – ERP EMISs – ERP Challenges and Deficiencies with Respect to EMIS – Integrating Environmental and LCA Information with ERP – Electronic Environmental and Sustainability Reporting (K3, K4, K5, K6)

5.3 Greening the Enterprise-IT Usage and Hardware: Environmental Information Technology Standards – Green Management of Data Centre (K2, K3)

5.4 Inter-organizational Enterprise Activities and Green Issues: Electronic Commerce and Greening the Extended Enterprise – Demanufacturing and Reverse Logistics- Eco-Industrial Parks and Information Systems - Enablers and Making the Case for IT and the Green Enterprise (K4, K5,K6)

5.5 Managing Green IT: Introduction-Strategizing Green Initiatives: Strategic Thinking – Strategic Planning – Strategic Implementation – Enterprise Architecture Planning(K2, K4)

5.6 Implementation of Green IT: Return on Investment – Metrics – The Goal-Question-Metric

(GQM) - Information Assurance: Risk Management -Communication and Social Media(K5, K6)

Text Books:

1. San Murugesan, G.R. Gangadharan-Harnessing Green It Principles and Practices, A John Wiley & Sons, Ltd., Publication 2012.

Reference Books:

1. John Lamb, "The Greening of IT", Pearson Education, 2009.
2. Jason Harris, "Green Computing and Green IT– Best Practices on Regulations &Industry", Lulu.com, 2008.
3. Woody Leonhard, Katherrine Murray, "Green Home Computing for Dummies", August 2009.
4. Swarup K. Das, "Cloud Computing", Dominant Publishers, 2015.
2. PrasantaPattnaik, ManasKabat," Fundamentals of Cloud Computing", S.Chand (G/L) & Company Ltd; First edition (2014).

Open Educational Resources (OER):

1. https://www.google.com/url?sa=t&source=web&rct=j&url=http://www.vandemataramcollege.com/app/webroot/files/NOTES_sem246/Green_IT-FYCS-Sem2.pdf&ved=2ahUKEwjYgJaM_IXrAhUBX30KHeNtAFcQFjAAegQIARAB&usg=AOvVaw0gQehqD562q0zVa7ulBEH3&cshid=1596721284883
2. https://youtu.be/QYThOy_QiTU
3. https://www.youtube.com/watch?v=CRdm3xEJ97E
4. https://youtu.be/Nc8sNUcE-yk
5. https://youtu.be/6dSZyDRgl1M
6. https://youtu.be/X43KVeWVk