Syllabus for B.Tech – Energy Engineering

Course Number & Title: EN307 Materials Science for Energy Applications	
L-T-P-C: 3-0-2-8	
Offered in (Odd/ Even / Any): Semester VI	
Pre-Requisite: Nil	
Preamble / Objectives (Optional): To make student understand the principles of materials, and different types of materials used for energy production, harvesting conversion, and storage. Furthermore, to classify the different energy materials based on analytical tools.	
Course Content/ Syllabus: Introduction to Materials science, materials for solar energy: semiconductor, principal and concepts, silicon types, perovskite, advanced materials; energy harvesting materials: piezoelectric, pyroelectric, thermoelectric, turbines; energy storage and conversion materials: inorganic, organic materials, polymers; advanced materials: nano/quantum materials, biomaterials, additives, composites, hybrids, self-healing, 3D printing materials; characterization: principles, instrumentation, operation and applications of X-ray methods, electron microscopy, spectroscopy tools (UV – Vis, IR, Raman, mass, and NMR), thermal analysis (DTA, DSC and TGA), chromatography	
Books (In case UG compulsory courses, please give it as "Text books" and "Reference books". Otherwise give it as "References".	
Text Books: (Format: Authors, *Book Title in Italics font,* Volume/Series, Edition Number, Publisher, Year.)	
1.	A S Bandarenka, *Energy Materials, A short Introduction to Functional Materials for Energy Conversion and Storage*, CRS Press, 2022.
2.	T Ratna, *Nanomaterial Characterization: An Introduction*, Wiley, 2016.
Reference Books: (Format: Authors, *Book Title in Italics font,* Volume/Series, Edition Number, Publisher, Year.)	
1.	V Raghavan, *Materials Science And Engineering*: A First Course, PHI Publication, 2015.
2.	C Tong, *Introduction to Materials for Advanced Energy Systems*, Springer, 2019.
3.	J A Kilner, *Functional Materials for Sustainable Energy Applications*, Elsevier, 2012.