Name: **Enrolment No:**	UPES UNIVERSITY WITH A PURPOSE

UNIVERSITY OF PETROLEUM AND ENERGY STUDIES
End Semester Examination, May 2019

Course: Materials Chemistry **Semester : VI**
Program: B.Tech Mech. **Time : 03 hrs.**
Course Code: MTEG203 **Max. Marks: 100**

Instructions:

SECTION A

S. No.		Marks	CO
Q 1	With the help of labeled diagram explain the fermi level.	4	CO1
Q2	Differentiate semiconductors, conductors and insulators based on energy band gap.	4	CO2
Q3	Elucidate the features of solar Photovoltaic modules.	4	CO2
Q4	Define the following terms with respect to battery (i) State of charge (ii) Depth of discharge (iii) Self-discharge (iv) Types of battery	4	CO4
Q5	With the help of suitable examples explain bio-inspired materials.	4	CO3

SECTION B

Q6	Elucidate the working of Light emitting diode (LED) with the help of neat sketch. Also name the semiconductor material for designing the LED.	10	CO4
Q7	With the help of labeled diagram and examples explain the following terms. (i) Superconductors (ii) Thermoelectric	10	CO3

Q8	Explain amorphous materials and their applications in Nano technology.	**10**	**CO2**
Q9	Explain the smart materials with the help of examples. Also explain the difference between thermochromic, photochromic and electrochromic materials with example.	**10**	**CO3**
SECTION-C			
Q10	What is Carbon dioxide Capture and Storage (CCS)? What are the procedures for capturing the CO_2 and explain each of them in detail.	**20**	**CO4**
Q11	(i) Elucidate the complete procedure for the conversion of solar energy in to electrical energy. What are the factors affecting electricity generated by a solar cell? (ii) Calculate the output power for solar PV of efficiencies 16%. When the input power is say 1000, 800, 600 and 400 W/m^2 and area of solar cell is 100 cm^2. **OR** (iii) If the actual operating temperature of the solar PV is 40°C. The output voltage of a solar cell at standard operating temperature is, say 0.7 V. The output voltage decreases by 2.3 mV/® C. Calculate the new value of output voltage? (iv) With help of labeled diagram show the working and components of a battery cell.	**20**	**CO3**