Name: Enrolment No:	UPES UNIVERSITY OF TOMORROW

School of Business
UPES
End Semester Examination December 2023

Program: BBA (GES) **Semester: 3rd**
Subject/Course: Solar Energy Resource Management **Max. Marks: 100**
Course Code: OGET 2003 **Duration: 3 Hour**

SECTION A
10Qx2M=20Marks

Q.No		Marks	Cos
Q1	Solar Energy Corporation of India has been incorporated to promote solar power in India. (True/False)	2	**CO1**
Q2	Which of the following is not a Renewable Source of Power Generation: a) Naphtha b) Solar c) Geothermal d) Municipal Solid Waste	2	**CO2**
Q3	What is the role of Solar Energy in Smart Grids.	2	**CO2**
Q4	Making Renewable Purchase Obligations mandatory for Power Utilities was suggested by the Mission Strategy of the JNNSM. (True/False)	2	**CO1**
Q5	What is understood by Distributed Solar Generation?	2	**CO2**
Q6	What are the advantages of the REC Mechanism over the Preferential Tariff?	2	**CO2**
Q7	What is understood by "Environmental Impact" with reference to the importance and relevance of Solar Energy in India?	2	**CO1**
Q8	Write a short note about Solar Energy in India.	2	**CO1**
Q9	The REC Mechanism was proposed by the JNNSM. (True/False)	2	**CO1**
Q10	Renewable Energy has the potential to reduce the impact of climate change. Express your views in favour of or against the statement.	2	**CO1**
SECTION B **4Qx5M= 20 Marks**			
Q11	Briefly discuss how the Government has promoted the generation and consumption of solar power.	5	**CO2**

Q12	Write a note on the efficiency of generating stations in India.	5	**CO3**
Q13	Discuss the REC Mechanism.	5	**CO3**
Q14	Discuss the Fixed and Variable Cost of Electricity.	5	**CO2**
SECTION-C 3Qx10M=30 Marks			
Q15	Discuss the relevance and importance of Solar energy for India.	10	**CO3**
Q16	Discuss the applications of Active and Passive Solar Techniques.	10	**CO4**
Q17	"Distributed Solar Applications have benefits beyond comprehension". Justify the statement by providing valid arguments in favor of the statement.	10	**CO4**
SECTION-D 3Qx10M= 30 Marks			
Q18	Read the following case and answer the questions that follow**:** ONergy Energy Solutions for BoP Founded in 2008, Switch ON was dedicated to generating awareness of renewable energy and the environment. With a desire to make a substantial contribution to the sector, in 2009, ONergy – a for-profit venture – was formed. ONergy is dedicated to providing renewable energy solutions to India's BoP (bottom-of-the-pyramid) population. Based in Kolkata, ONergy has established operations in West Bengal and Orissa, with plans to expand throughout east and north-east India including Jharkhand, Bihar, and Chhattisgarh in the next five years. Building an Energy Ecosystem Awareness, accessibility, and affordability of renewable energy technologies are three significant challenges that ONergy is working towards solving. Income-generating activities are required for rural beneficiaries to sustainably afford these energy systems over the long term. Thus, a holistic approach needs to be taken for renewable energy to successfully achieve connecting technology, finance, and grassroots organizations to manage the energy needs, aspirations, and resources of rural BoP beneficiaries. This means starting from the ground level to generate awareness for renewable technologies, running capacity-building workshops for technical training and skill building that can be used for income generation, offering quality products with a strong servicing infrastructure, and ultimately, providing financing options for low-income rural consumers that have traditionally been labeled as 'un-bankable'. Having a strong after-sales servicing and maintenance infrastructure is also vital to ONergy's model, as reliability and confidence in the systems are critical factors for customers. ONergy employs a unique 'hub and spoke distribution model. RECs (Renewable energy centers) or Shakti Kendras are set up in communities to act as a hub—hosting a retail	30	**CO4**

	center, training facility, and servicing team. Rural entrepreneurs are recruited locally for sales and distribution and are provided with technical training to install, service, and sell the systems, thereby creating direct jobs in the community. The RECs are run in partnership with grassroots organizations. The distribution and service network is managed by ONergy, leveraging the network, infrastructure, and local knowledge of the partner. By managing the entire renewable energy distribution and servicing process in rural areas – providing training, after-sales service, and financing options to the end consumer – ONergy fills the missing link in the rural BoP market. Economics Cost: ONergy provides customized solutions at a wide range of price points (Rs 1000–30,000+) and also takes up kilowatt-level projects for institutions, to ensure no one is excluded from the benefits of solar. Its low-cost LED night lights start at Rs 1000, with small home lighting systems from Rs 2000–5000. Larger home electrification systems, which can power lights, and fans/TVs/radios range from Rs 7500–15,000+, while inverter-based systems, solar water heaters, solar street lights, and so on are priced at Rs 30,000+. Financing: ONergy partners with various organizations such as MFIs (micro-finance institutions), who typically only lend to their current clients, with SHGs (self-help groups), many of whom have purchased ONergy products after setting solar as a savings goal, and most recently with financial institutions such as rural banks to provide low-interest long-term energy loans for the rural market consisting of low-income villagers. For low-cost products, (for example, solar LED lamps), customers typically can pay the entire cost upfront. Slightly more expensive products (for example, portable lanterns, and small home lighting systems) can be afforded by some, or are taken on in installment payments over 6 months–1 year. The larger home lighting systems and other larger scale technologies (solar water heaters, solar street lights), are typically paid back over a 1–5 year period. Project Impact Since 2009, ONergy has achieved the following: • Energized 75,000+ lives with solar light or renewable energy • Established operations across West Bengal and the Balangir district of Odisha • Set up six RECs in West Bengal and Odisha • Partnered with 20+ grassroots organizations (NGOs, MFIs, and CBOs) • Reached out to over 300 villages • Trained 300+ rural entrepreneurs and 50+ women's SHGs Based on its impact assessment surveys, • ONergy beneficiaries have reported the following benefits. ▪ Average saving of Rs 100–200 per month per household on kerosene and mobile charging ▪ Average reduction in kerosene usage by 3.5 liters per month ▪ About 82% of people are using their solar light for education purposes, 46% for income generation, and 78% for cooking ▪ About 64% report an increase in their children's study time		

	▪ About 94% report that their household savings have increased due to a reduction in kerosene use. Terms of credit/loan For MFIs, the loans are typically for one to three years at higher interest rates of 12%–25%. SHGs are offered a typically flat rate interest as the required sum is saved up before purchasing of the product. For banks, the program initiated by the National Solar Mission outlines the suggested terms of credit as • 15%–20% cost of the system as a down payment • remaining 75%–80% paid in installments over the life of the loan • five-year loan • 5% interest rate Returns / Profit • Unit economics (per REC) • Cost: 6,00,000 and Net margin: 10% • Breakeven: 6 months • Company economics • Gross margin: 25% and Net margin: 6% • Breakeven: 2 years Payback period ranges from 6 months to 5 years based on the size of the system Ques: 18 (a) How has ONergy filled in the missing links in the Rural BoP markets? Ques: 18 (b) Discuss in detail the achievements of ONergy since 2009 Ques: 18 (c) Discuss the suggested terms of credit for banks as outlined by the National Solar Mission.		