


<b>Name:</b>	 <b>UPES</b> <small>UNIVERSITY OF TOMORROW</small>
<b>Enrolment No:</b>	

**UNIVERSITY OF PETROLEUM AND ENERGY STUDIES**

**End Semester Examination, May 2023**

**Course: Wind Energy Resource Management**

**Semester: IV**

**Program: BBA GES**

**Time : 03 hrs.**

**Course Code: OGET2005**

**Max. Marks: 100**

**Instructions:**

**SECTION A**  
**10Qx2M=20Marks**

S. No.	Question	Marks	CO
Q 1	Complete the Abbreviations a. CUF b. MNRE c. IREDA d. CERC	2	CO1
Q2.	Name 2 regions in India where we will find most number of Wind Power Plants.	2	CO1
Q3	Name 2 manufacturers of Wind Turbines	2	CO1
Q4	What is Rated Wind Speed?	2	CO1
Q5	As per Tariff Regulations Capital cost of Wind Energy Plant is fixed. True or False.	2	CO1
Q6	What is Cut out Speed?	2	CO1
Q7	What is the minimum distance allowed between 2 HAWT.	2	CO1
Q8	What is VAWT?	2	CO1
Q9	1 GW is equivalent to how many KW?	2	CO1
Q10	How much wind energy is produced in India ?	2	CO1

**SECTION B**  
**4Qx5M= 20 Marks**

Q 11	What are the variables that we consider for calculating initial investment cost of a Wind Energy Plant?	5	CO2
Q 12	To replace 500 MW thermal power plants we require 1500 MW of Wind Energy plant. Discuss.	5	CO2
Q 13	What are the losses involved in Wind Energy?	5	CO2

Q 14	Name any 5 factors on which Wind energy demand forecasting is done as per Regulations in India.	5	CO2
<b>SECTION-C</b> <b>3Qx10M=30 Marks</b>			
Q 15	Solve the following problem:  There is a wind power plant of 50 MW located in state of Gujarat. The capital cost for installing the power plant is Rs. 5 crores per MW. The CUF considered for the project is 35%. The selling price of electricity is Rs. 5 per kwh. From the above data calculate the following variables  a) Annual Electricity production b) Pay back Period of the power plant	10	CO3
Q 16	Critically explain alternative sources of energy and its impact in Indian energy market?	10	CO3
Q 17	How much carbon dioxide emission we can reduce by installing 100 MW of Wind Energy? Consider the following data  a. Calorific value of coal= 4000 Kcal/kg b. 1 kg of Coal produces 3 kg of carbon dioxide c. SHR= 2500 kcal/kwh	10	CO3
<b>SECTION-D</b> <b>2Qx15M= 30 Marks</b>			
	<b>Reviving the Wind Sector: Challenges &amp; Suggestions</b> Wind is an intermittent and site-specific resource of energy and therefore an extensive Wind Resource Assessment is essential for the selection of potential sites. The Government of India (GoI), through National Institute of Wind Energy (NIWE), has installed over 800 wind-monitoring stations all over the country and issued wind potential maps at 50m, 80m, 100m and 120m above ground level. The recent assessment indicates a gross wind power potential of 695.50 GW at 120 meter above ground level.  Wind Installed Capacity  India's wind energy sector is led by indigenous wind power industry and has shown consistent progress. The expansion of the wind industry has resulted in a strong ecosystem, project operation capabilities and manufacturing base of 10,000+ MW per annum. The country currently has the fourth highest wind installed capacity in the world with total		

installed capacity of 39.87 GW (as on 30 th Sept. 2021) which is about 66% of the wind capacity target of 60 GW under 175 GW RE target by 2022. The wind generated was around 24.57 Billion Units during April-July, 2021.

### **Government Policies to promote Wind Sector**

The Government is promoting wind power projects in entire country through private sector investment by providing various fiscal and financial incentives such as Accelerated Depreciation benefit; concessional custom duty exemption on certain components of wind electric generators. Besides, Generation Based Incentive (GBI) Scheme was available for the wind projects commissioned before 31 st March 2017. In addition to fiscal and other incentives as stated above, following steps also have been taken to promote installation of wind capacity in the country:

- Technical support including wind resource assessment and identification of potential sites through the National Institute of Wind Energy, Chennai.
- In order to facilitate inter-state sale of wind power, the inter-state transmission charges have been waived off for wind projects to be commissioned by June, 2025.
- Issued Guidelines for Tariff Based Competitive Bidding Process for Procurement of Power from Grid Connected Wind Power Projects.

### **Challenges**

The wind power sector is an important component in India's plans to decarbonise its power sector. Wind power target set by GoI is 60 GW out of 175 GW target of installed renewable energy (RE) capacity by 2022 and 140 GW out of 450 GW RE target by 2030.

However, India's wind power sector is struggling to match the growth of the solar sector and since 2017 and it has not been able to achieve its annual capacity installation target. The wind power industry and experts highlight that the reason for the stagnation is the shift to reverse auction route in the wind sector, lack of financial incentives and difficulties in finding land at windy sites and power evacuation infrastructure for the projects.

### **Reverse Bidding, Land & PLF issues**

For winning the bids under the current reverse bidding process, the investors are bidding in only the highest PLF states to win the bid as discovery of the lower tariff i.e. below Rs. 3.00 per Kwh as above this tariff Discom's are not willing to enter into long term power purchase agreement (PPA) . This scenario is resulting in low capacity addition (approx 1.50 GW per annum) in India in the last 5 years.

There are constraints to install beyond 1.5-2.0 GW per annum of Wind Energy projects in any State because of challenges related to land availability & RoW, power evacuation, grid capacity, logistics constraints and infrastructure capability.

Concentration of projects create severe pressure on land and power evacuation infrastructure creation which leads to choking situation as witnessed in Gujarat.

This is creating execution challenges at the state level and not able to generate volumes.

In spite of land and infrastructure available in other States, investors do not prefer states like MP, Rajasthan and Maharashtra as the proposed Projects cannot compete on PLF & reverse auction economics basis in

comparison to projects in Gujarat and Tamil Nadu.

Because of reverse bidding, we are not able to utilise seven windy states, wherein each wind state has capability to deliver 2 GW per annum. So, if we can use all the seven windy states, we will be able to build 14 GW per annum. Due to the current reverse bidding process, we cannot build more than 1.5 GW to 2 GW per annum of wind power projects.

While approx. 28.1 GW of capacity bidding has been done since Feb, 2017 (5 years since auction regime), approx.19.7 GW of wind capacity has been allotted, out of which only about ~4.5 GW of capacity has been commissioned so far.

At present, states are trying to avoid the Captive projects to be set up, due to loss of their revenue stream by power intensive industrial customers.

The above slow development has led to reduction in number of domestic Wind turbine manufacturers from 12 – 13 to 4 – 5 and in-turn reduction of the number of MSMEs engaged in the wind sector from 4000 to about 1000 and reduction in jobs in the wind energy sector from 2 Million to about 63,000.

It has been observed that the reverse bidding is not very successful in the projects where project components are supplied from domestic manufacturing. In India, the reverse bidding has impacted domestic manufacturing & export based wind sector and also it was not very successful in the earlier coal mines auctions.

GST rate

The GST rate on wind turbine has been increased from 5% to 12% w.e.f. 1st Oct'21 which has become an additional 7% cost in the wind turbine as there is no pass through.

This will result in further slowdown of the wind turbine manufacturing

	<p>and capacity additions over the next 18 months besides lower participation in the upcoming bids by prospective bidders/investors due to decreased returns.</p> <p>Wheeling Charges &amp; Captive use</p> <p>Currently all states with viable wind resource have different wheeling, transmission and banking policies; in few of the states these policies changes very frequently on yearly basis, Recently APTEL vide its Judgement dated January 28, 2021 also directed CEA to come up with a uniform banking procedure which will be followed by all the States.</p> <p>MoP amended order dated 21st June, 2021 for waiver of ISTS charges further creates ambiguity w.r.t. its applicability to Captive and third party users and waiver of transmission losses to the stakeholders.</p> <p>Investors are not opting for captive option even when Third Party Consumer consumers with &gt; 1 MW project are allowed because of high cost due to Wheeling &amp; Transmission Charges and Losses, Banking Charges and its frequent changes by various states through SERCs and due to poor enforceability of RPO compliance.</p>		
Q18	What are challenges wrt Wind Energy in India?	<b>15</b>	<b>CO4</b>
Q19	Suggest what steps can be undertaken to promote wind Energy projects in India.	<b>15</b>	<b>CO4</b>