Reg. No.																

Question Paper Code	13182

B.E. / B.Tech. - DEGREE EXAMINATIONS, NOV / DEC 2024

Seventh Semester

Electrical and Electronic Engineering

20EEEL701 - POWER ELECTRONICS FOR RENEWABLE ENERGY SYSTEMS

Regulations - 2020

Duration: 3 Hours | Max. Marks: 100

PART - A (MCQ) (20 × 1 = 20 Marks)

Answer ALL Questions

		Marks	K – Level	CO
1.	Which of these resources does not produce CO2 during electricity generation? (a) Coal (b) Methane (c) Uranium (d) Biogas	1	K1	CO1
2.	The unit of energy yield ratio is _____ (a) joule (b) watt (c) joule/Kelvin (d) dimensionless	1	K1	CO1
3.	To focus on Renewable and Other alternative sources of energy, _____ was established in March 1981 by the Government of India. (a) commission for additional sources of energy (b) commission for alternative sources of energy (c) council of scientific & industrial research (d) centre for science and environment	1	K1	CO1
4.	Which of the following pollutants are emitted by the burning of fossil fuel? (a) Oxides of Carbon, Nitrogen, and Sulphur (b) Oxides of Carbon, Uranium, and Radium (c) Calcium Halides and Oxides of Nitrogen (d) Noble Gases	1	K1	CO1
5.	Induction Generator deliver power at ---------- power factor (a) Lagging (b) Leading (c) Unity (d) Zero	1	K1	CO2
6.	What advantage does permanent magnet synchronous motor offer in terms of torque production? (a) High torque at zero speed (b) Low torque at high speeds (c) Inconsistent torque output (d) Variable rotor current for torque adjustment	1	K1	CO2
7.	What is the primary purpose of using digitally controlled inverters with permanent magnet motors? (a) Increase maintenance costs (b) Achieve ease of control (c) Induce DC supply (d) Enhance rotor current	1	K1	CO2
8.	When the induction motor runs faster than the synchronous speed, the induction motor runs as (a) Asynchronous generator (b) Induction generator (c) Synchronous motor (d) Such condition is not possible	1	K1	CO2
9.	What is the main challenge in protecting power systems with integrated renewable sources? (a) Increased grid stability (b) Reduction in energy losses (c) Enhanced fault tolerance (d) Complexity due to reverse power flow	1	K1	CO3
10.	_____ is used to convert the dc power produced by the pv array into ac power. (a) Dc-dc converter (b) Inverter or pcu (c) Mppt (d) Batteries	1	K1	CO3
11.	The _____ of power supplied by pv systems depends heavily on weather conditions. (a) Stability (b) Magnitude (c) Orientation (d) Cost	1	K1	CO3
12.	In a boost converter shown below, what happens to the current through the diode I_1 when the switch M_2 is closed. (a) Linearly increases (b) Linearly decreases (c) Remains constant (d) Zero	1	K1	CO3

13.	Why is ac-dc conversion necessary for most electronic devices? (a) Most electronic devices operate on DC voltage (b) DC voltage is easier to transmit (c) AC voltage is more efficient for electronic devices (d) Electronic devices work better with AC voltage	*1*	*K1*	*CO4*
14.	Which switching power supply topology is commonly employed in isolated uncontrolled rectifiers for galvanic isolation? (a) Buck-boost converter (b) Ringing choke converter (c) Flyback converter (d) SEPIC converter	*1*	*K1*	*CO4*
15.	In which scenario would an isolated uncontrolled rectifier be preferred over a non-isolated one? (a) When galvanic isolation is necessary (b) When small size is important (c) When cost is the primary concern (d) When high efficiency is required	*1*	*K1*	*CO4*
16.	What is the significance of pwm technology in inverters regarding load connection? (a) It restricts the types of loads that can be connected (b) It makes the inverter suitable for different loads (c) It adjusts the load's power consumption (d) It simplifies the connection process	*1*	*K1*	*CO4*
17.	What is the purpose of the brick chamber in the biomass burner? (a) To provide structural support (b) To enclose the burner and maintain correct air temperature (c) To enhance airflow (d) To act as a fuel storage	*1*	*K1*	*CO5*
18.	What happens to the heated air inside the dryer cabinet? (a) It remains at the bottom (b) It goes downward (c) It goes upward and picks up moisture from the product (d) It escapes through the vents immediately	*1*	*K1*	*CO5*
19.	Which country has implemented a standalone hres in a remote region? (a) Pakistan (b) Algeria (c) Greece (d) Palestine	*1*	*K1*	*CO5*
20.	Micro hydel systems generally need a _____ to store water for use during the night. (a) Reservoir (b) Battery (c) Transformer (d) Small dam	*1*	*K1*	*CO5*

PART - B (10 × 2 = 20 Marks)

Answer ALL Questions

21.	Justify how fuel cell becomes renewable energy source.	*2*	*K1*	*CO1*
22.	Outline the merits of renewable energy source.	*2*	*K2*	*CO1*
23.	Show the merits of DFIG for WECS.	*2*	*K2*	*CO2*
24.	Illustrate the slip-torque characteristics of PMSG.	*2*	*K2*	*CO2*
25.	Summarize the significance of buck boost converter.	*2*	*K2*	*CO3*
26.	Draw the I-V and P-V characteristics of solar cell.	*2*	*K2*	*CO3*
27.	Infer how the power quality issues that affect wind power integration.	*2*	*K2*	*CO4*
28.	What are the major problems associated with grid interconnections of WECS.	*2*	*K1*	*CO4*
29.	Illustrate the advantages of PV-Diesel hybrid system.	*2*	*K2*	*CO5*
30.	Summarize the importance of MPPTin the operation of a photovoltaic system.	*2*	*K2*	*CO5*

PART - C (6 × 10 = 60 Marks)

Answer ALL Questions

31.	a)	Describe the influence of different renewable energy sources with special reference to the global warming and climate change context.	*10*	*K2*	*CO1*

OR

	b)	Explain the construction, working and performance characteristics of wind energy in detail.	*10*	*K2*	*CO1*
32.	a)	Explain with a neat diagram the principle operation and construction of SCIG.	*10*	*K2*	*CO2*
		OR			
	b)	Demonstrate the principle of operation of DFIG with neat diagram used for renewable energy conversion.	*10*	*K2*	*CO2*
33.	a)	Explain the philosophy of operation of a solar source fed boost converter with neat diagram.	*10*	*K2*	*CO3*
		OR			
	b)	Elaborate the operation of solar model in grid integrated system without battery backup.	*10*	*K2*	*CO3*
34.	a)	Illustrate the operation of fixed speed and semi variable mode of wind energy conversion system with neat sketch.	*10*	*K2*	*CO4*
		OR			
	b)	Describe the power electronic circuit to interface wind electrical system to the grid.	*10*	*K2*	*CO4*
35.	a)	Develop the model of Wind-PV hybrid system and describe its working operation.	*10*	*K3*	*CO5*
		OR			
	b)	Construct the hybrid energy conversion system and explain the working performance.	*10*	*K3*	*CO5*
36.	a) i)	Explain how to get maximum power generation in wind energy conversion system.	*5*	*K2*	*CO4*
	ii)	Classify the working of MPPT in a solar photovoltaic system.	*5*	*K2*	*CO5*
		OR			
	b) i)	Describe about SCIG based WECS.	*5*	*K2*	*CO4*
	ii)	Outline maximum power point tracking techniques for WECS.	*5*	*K2*	*CO5*