Reg. No.															

Question Paper Code	14443

B.E. / B.Tech. - DEGREE EXAMINATIONS, APRIL / MAY 2026

Sixth Semester

Electronics and Instrumentation Engineering

20ICEL601 - POWER PLANT INSTRUMENTATION

Regulations - 2020

Duration: 3 Hours | Max. Marks: 100

PART – A (i) (MCQ)
(16 × 1 = 16 Marks)
Answer ALL Questions

		Marks	*K – Level*	*CO*
1.	Choose the renewable energy source from the following. a) Nuclear b) Gas turbine c) Wind d) Thermal	*1*	*K1*	*CO1*
2.	Infer the type of heat required to convert water from liquid to vapour at constant temperature a) Specific heat b) Stable heat c) Latent heat d) Superheat	*1*	*K2*	*CO1*
3.	Apply the concept of sustainability to **select** the appropriate energy source for long-term use. a) Oil b) Coal c) Nuclear d) Solar	*1*	*K3*	*CO1*
4.	Choose the device used as a primary element in differential pressure flow measurement. a) Pitot vane b) RTD c) Orifice plate d) Thermocouple	*1*	*K1*	*CO2*
5.	Explain the working principle of a flue gas oxygen analyzer. a) Measures temperature using thermocouple b) Detects oxygen based on paramagnetic property c) Measures pressure using diaphragm d) Detects flow using orifice plate	*1*	*K2*	*CO2*
6.	Apply the concept of smoke density measurement to select the condition indicating incomplete combustion. a) Low smoke density b) Moderate smoke density c) High smoke density d) Zero smoke density	*1*	*K3*	*CO2*
7.	Identify the draught system that creates negative pressure inside the furnace. a) Natural draught b) Forced draught c) Induced draught d) Balanced draught	*1*	*K1*	*CO3*
8.	Relate to the concept of combustion control in order to select the correct action during a sudden increase in boiler load. a) Increase fuel flow first, then air flow b) Increase air flow first, then fuel flow c) Reduce both fuel and air flow d) Keep air–fuel ratio unchanged without adjustment	*1*	*K2*	*CO3*
.	Apply the concept of stoichiometric air–fuel ratio to select the correct condition. a) Maximum air required b) Minimum theoretical air required c) Excess air supplied d) Actual air supplied	*1*	*K3*	*CO3*

10.	Identify the device commonly used for boiler drum level measurement. a) Venturimeter b) Tachometer c) Sight glass d) Hygrometer	*1*	*K1*	*CO4*
11.	Explain the purpose of a deaerator in boiler feed water processing. a) Increase steam pressure b) Remove dissolved gases from feed water c) Increase fuel supply d) Reduce chimney losses	*1*	*K2*	*CO4*
12.	Apply the concept of steam temperature control to select the suitable action when main steam temperature exceeds the desired value. a) Increase fuel flow b) Reduce spray water flow c) Stop feed water supply d) Increase spray water flow	*1*	*K3*	*CO4*
13.	Choose the system primarily used to remove heat from power plant equipment. a) Lubrication system b) Cooling system c) Ash handling system d) Fuel handling system	*1*	*K1*	*CO5*
14.	Interpret the importance of lubricant oil temperature control in turbines. a) Maintains proper lubrication performance b) Increases chimney height c) Controls furnace pressure d) Reduces steam generation	*1*	*K2*	*CO5*
15.	Apply the concept of steam pressure control to select the corrective action when steam pressure drops below the desired level. a) Reduce fuel supply b) Increase fuel supply c) Increase cooling water flow d) Stop feed water flow	*1*	*K3*	*CO5*
16.	Use the concept of vibration monitoring to select the condition indicating rotor imbalance in a turbine. a) Constant low vibration b) Sudden increase in vibration amplitude c) Decrease in steam pressure d) Stable lubricant oil temperature	*1*	*K3*	*CO5*

PART – A (ii) (Short Answer Questions)
(8 × 3 = 24 Marks)

Answer ALL Questions

17.	Choose the selection of a renewable energy source suitable for continuous power generation.	*3*	*K3*	*CO1*
18.	Analyze the advantages of cogeneration compared with conventional thermal power generation systems.	*3*	*K4*	*CO1*
19.	Apply correction factors to determine the effect of varying steam operating conditions on flow measurement accuracy.	*3*	*K3*	*CO2*
20.	Examine the role of flue gas oxygen analyzers in pollution monitoring systems.	*3*	*K4*	*CO2*
21.	Select the importance of fuel–air ratio control in improving combustion efficiency in boilers.	*3*	*K3*	*CO3*
22.	Identify the role of boiler interlocks in maintaining safe power plant operation.	*3*	*K3*	*CO4*
23.	Examine the relationship between super heater control and steam temperature regulation in power plants.	*3*	*K4*	*CO4*
24.	Select the importance of lubricant oil temperature control in turbine operation.	*3*	*K3*	*CO5*

PART - B (Descriptive Answer Questions)

(5 × 12 = 60 Marks)

Answer ALL Questions

25.	a)	Build the operation of a Hydro power plant using a block diagram and indicate monitoring points.	*12*	*K3*	*CO1*
		OR			
	b)	Experiment with the performance and efficiency implications of a Combined Heat and Power (Cogeneration) system with regards to a thermal power plant.	*12*	*K3*	*CO1*
26.	a)	Apply differential pressure principles to measure air flow in combustion systems and feed water flow in a boiler.	*12*	*K3*	*CO2*
		OR			
	b)	Choose the functioning of various pollution monitoring instruments used in thermal power plants.	*12*	*K3*	*CO2*
27.	a)	Apply fuel–air ratio control to achieve efficient combustion in a boiler.	*12*	*K3*	*CO3*
		OR			
	b)	Develop the different types of draught in furnaces and the control employed in furnace draught systems.	*12*	*K3*	*CO3*
28.	a)	Analyze the use of feed forward and feedback control techniques for maintaining desired steam temperature in power plants.	*12*	*K4*	*CO4*
		OR			
	b)	Examine the various drum level control techniques and their role in minimizing boiler hazards caused by shrink and swell conditions during load variations.	*12*	*K4*	*CO4*
29.	a)	Distinguish the cooling system methods used to remove excess heat from turbine components.	*12*	*K4*	*CO5*
		OR			
	b)	Compare at least two methods used for monitoring turbine vibration under varying load conditions and examine the importance of vibration monitoring in safe turbine operation.	*12*	*K4*	*CO5*