Reg. No.																

Question Paper Code	14575

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

Sixth Semester

Electrical and Electronics Engineering

20EEEL603 - ELECTRIC ENERGY UTILIZATION AND CONSERVATION

Regulations - 2020

Duration: 3 Hours | Max. Marks: 100

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

		Marks	K – Level	CO
1.	In fluorescent lamp one capacitor is connected across the lamp circuit and another is connected across the starter. Then a) Both the capacitors are used for improving power factor b) Both the capacitors are used for reducing radio interference c) Former capacitors is used for improving power factor and later is used for reducing radio interference d) Former capacitors is used for reducing radio interference and later is used for improving power factor	1	K1	CO1
2.	Identify the type of the Flood Light as per Luminous Intensity Distribution. a) Rotational symmetry b) Symmetry about four plane c) Rotational asymmetry d) Translational symmetry	1	K2	CO1
3.	Which of the following statements is correct? a) Light is a form of heat energy b) Light is a form of electrical energy c) Light consists of shooting particles d) Light consists of electromagnetic waves	1	K3	CO1
4.	What type of cooling system is commonly used in water coolers? a) Vapor compression system b) Absorption cooling system c) Direct evaporative cooling d) Liquid nitrogen cooling	1	K1	CO2
5.	The motor life cycle includes which of the following phases? a) Manufacturing, Installation, Operation, Maintenance b) Buying, Selling, Discarding c) Heating, Cooling, Replacing d) Powering, De-powering, Restarting	1	K2	CO2
6.	Which sensor is commonly used in smart AC's for detecting human presence? a) Temperature sensor b) PIR (Passive Infrared) sensor c) Pressure sensor d)Voltage sensor	1	K3	CO2
7.	Which type of welding uses the heat generated by the resistance to the flow of electric current? a) Arc welding b) Resistance welding c) Gas welding d) Laser welding	1	K1	CO3
8.	What is the main principle behind induction heating? a) Electrical resistance b) Magnetic hysteresis c) eddy currents d) Dielectric	1	K2	CO3
9.	Which type of electric heating is used in microwave ovens? a) Resistance heating b) Induction heating c) Dielectric heating d) Arc heating	1	K3	CO3

10.	Which motor is commonly used in electric traction?		1	K1	CO4
	a) Stepper motor	b) Traction motor			
	c) Servo motor	d) Universal motor			
11.	The amount of energy consumed by the various parts of the train per ton per kilometre is termed as _____		1	K2	CO4
	a) Specific energy consumption	b) Energy utilization			
	c) Power consumption	d) Power utilization			
12.	What is regenerative braking?		1	K3	CO4
	a) uses friction to slow down a vehicle	b) uses the engine to slow down a vehicle			
	c) uses the vehicle's momentum to generate electricity	d) uses hydraulic pressure to slow down a vehicle			
13.	What is the purpose of waste heat recovery systems in power generation?		1	K1	CO5
	a) To increase energy consumption	b) To reduce energy losses			
	c) To increase carbon emissions	d) To decrease the efficiency of the power system			
14.	What is the purpose of waste heat recovery systems in power generation?		1	K2	CO5
	a) To increase energy consumption	b) To reduce energy losses			
	c) To increase carbon emissions	d) To decrease the efficiency of the power system			
15.	Which of the following appliances is not covered under the Standards and Labelling Program in India?		1	K3	CO5
	a) Water heaters	b) Microwave ovens			
	c) Televisions	d) Clothes dryers			
16.	The primary purpose of an energy audit is to		1	K3	CO5
	a) Increase power generation	b) Identify energy wastage			
	c) Reduce voltage level	d) Improve wiring color			

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

17.	A hockey ground needs lighting with excellent color rendering for TV broadcast. Apply your understanding of lamp properties to suggest the most suitable lamp type and justify with reasons.	3	K3	CO1
18.	Point out the various factors for designing the lightning scheme.	3	K3	CO1
19.	List the properties of energy efficient motors to explain how they reduce power consumption in industrial applications.	3	K4	CO2
20.	Illustrate the coolant used in air conditioning unit.	3	K3	CO2
21.	Demonstrate the basic principle of induction heating and also its applications.	3	K3	CO3
22.	Compare dc and ac systems of railway electrification from the point of main line and suburban line railway service.	3	K4	CO4
23.	Examine how the regenerative braking applied in traction.	3	K4	CO4
24.	Identify the power quality problems due to domestic loads.	3	K3	CO5

PART - B (Descriptive Answer Questions)
(5 × 12 = 60 Marks)
Answer ALL Questions

25.	a)	Sketch and describe the operation of following lamps (i)Incandescent lamp (ii) Sodium Vapour lamp	12	K3	CO1

OR

	b)	Apply both laws of illumination to derive the expression for illumination on a horizontal surface due to a point source at height 'h'.	*12*	*K3*	*CO1*
26.	a)	Analyze the vapour compression refrigeration principle to explain the working of a domestic refrigerator with a neat diagram.	*12*	*K4*	*CO2*
		OR			
	b)	A factory uses a 40 kW standard motor with efficiency of 80%. It is replaced by an energy efficient motor with efficiency of 96%. Data: Operating hours = 7000 hours/year Electricity cost = ₹9 per kWh Additional cost of efficient motor = ₹40,000 Tasks: Calculate annual energy consumption for both motors. Determine annual energy cost savings. Analyze the payback period.	*12*	*K4*	*CO2*
27.	a)	With the help of neat sketches, apply the working principles to explain different types of electric arc welding processes**.**	*12*	*K3*	*CO3*
		OR			
	b)	A steel manufacturing plant requires high temperature melting of scrap steel. Apply your knowledge of arc furnaces to select a suitable type and explain its operation.	*12*	*K3*	*CO3*
28.	a)	Examine the speed – time curve of a traction system. Also explain various periods and the action using maximum speed derivation.	*12*	*K4*	*CO4*
		OR			
	b)	Analyze the specific energy consumption and discus the factors which affect the specific energy consumptions of trains operating at a given scheduled speed.	*12*	*K4*	*CO4*
29.	a)	Apply the energy conservation techniques with one case study in generation, transmission and distribution systems.	*12*	*K3*	*CO5*
		OR			
	b)	Sketch and describe the different types of the house wiring.	*12*	*K3*	*CO5*