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BRAINWARE UNIVERSITY

Term End Examination 2024-2025
Programme – B.Tech.(EE)]-2021
Course Name – Utilization of Electric Power
Course Code - PC-EE801
(Semester VIII)

Full Marks : 60 **Time : 2:30 Hours**

[The figure in the margin indicates full marks. Candidates are required to give their answers in their own words as far as practicable.]

Group-A

(Multiple Choice Type Question) 1 x 15=15

1. *Choose the correct alternative from the following :*

(i) Identify the characteristics of an ideal traction system.
a) High efficiency and low cost
b) Low maintenance cost
c) Lightweight and compact design
d) All of these

(ii) Classify traction motors based on their operation in electric trains.
a) Series and Shunt motors
b) Single-phase and three-phase motors
c) AC and DC motors
d) All of the above

(iii) Calculate the total tractive effort required to move a train on a gradient of 2% with a weight of 200 tons and a resistance factor of 5 kg/ton.
a) 15,000 kg
b) 12,000 kg
c) 10,000 kg
d) 18,000 kg

(iv) Luminous intensity could be expressed as
a) Light power
b) Light per area
c) Light per steradian
d) Light per second

(v) Select the factors on which LED is advantageous than LCD displays
a) Power consumption
b) Size
c) Brightness
d) All of the above

(vi) Cite the occupancy sensors that help to reduce __________.
a) Voltage
b) Current
c) Energy consumption
d) Resistance

(vii) Calculate the illumination if luminous intensity is 500 cd at 5 meters.
a) 20 lux
b) 25 lux
c) 50 lux
d) 100 lux

(viii) Identify the function of a thermostat control circuit.
a) Measure current
b) Measure voltage
c) Control temperature
d) Control power

(ix) Select the advantages of electric heating

a) Low cost
b) High efficiency
c) Difficult control
d) High pollution

(x) Calculate resistance of a heating element if voltage is 220 V and current is 10 A.

a) 11 ohms
b) 22 ohms
c) 33 ohms
d) 44 ohms

(xi) Determine the application of hydrogen arc welding.

a) Aluminum welding
b) Copper welding
c) Stainless steel welding
d) Mild steel welding

(xii) Identify from the following that the process of joining metals using heat from an electric arc is ________.

a) Resistance welding
b) Arc welding
c) Gas welding
d) Soldering

(xiii) Select the advantages of using coated electrodes.

a) Minimal impact
b) Direct impact
c) No impact
d) Indirect impact

(xiv) Identify a factor affecting electro-deposition.

a) Temperature
b) Current density
c) Electrolyte concentration
d) All of the above

(xv) Calculate mass deposited if current is 10 A, time is 1 hour, and electrochemical equivalent is 0.001 g/C.

a) 36 g
b) 360 g
c) 3600 g
d) 3.6 g

Group-B

(Short Answer Type Questions) 3 x 5=15

2. Define direct resistance heating. (3)
3. List the advantages of electric traction over diesel traction. (3)
4. Distinguish electrolytic processes. (3)
5. Discuss the impact of lamp selection on energy efficiency. (3)
6. A train is climbing a gradient of 1 in 100 (1% gradient). The train's mass is 400 tonnes. Calculate the tractive effort required to overcome the gradient. (3)

OR

Analyze the effect of gradient on energy consumption in electric traction. (3)

Group-C

(Long Answer Type Questions) 5 x 6=30

7. Determine the resistance of a heating element needed to produce 1800 watts of heat when connected to a 240-volt supply. (5)
8. Analyze the impact of varying welding speeds on the heat-affected zone (HAZ) in a TIG welding process, given a constant welding current and voltage. Explain how you would estimate the resulting changes in the material's microstructure. (5)
9. Evaluate the effectiveness of using a zinc coating versus a chromium coating for corrosion protection on steel components in a marine environment. Justify your selection based on the specific properties of each coating and the environmental conditions. (5)
10. Identify and describe three distinct types of welding defects that can occur during an arc welding process, and explain their potential impact on the structural integrity of the welded joint. (5)
11. Assess the advantages and disadvantages of using AC series motors in electric traction. (5)
12. Assess the suitability of microwave heating for domestic and industrial applications. (5)

OR

Evaluate the suitability of plasma arc welding for precision welding applications. (5)

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