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Invigilator's Signature :	

CS/B.Tech (EEE)/SEM-7/EEE-704C/2009-10 2009

UTILISATION OF ELECTRIC POWER

Time Allotted: 3 Hours Full Marks: 70

The figures in the margin indicate full marks.

Candidates are required to give their answers in their own words as far as practicable.

GROUP - A (Multiple Choice Type Questions)

- 1. Choose the correct alternatives for any ten of the following: $10 \times 1 = 10$
 - i) In *a.c.* traction, the supply voltage is
 - a) 3-phase
 - b) single phase
 - c) two phase.
 - ii) In traction lines having long gradients exceeding $0.6\ per\ cent,$ the braking used is
 - a) plugging
 - b) rheostatic
 - c) regenerative
 - d) none of these.

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- iii) The motor used in traction is
 - a) d.c. series motor
 - b) d.c. shunt motor
 - c) a.c. synchronous motor
 - d) a.c. squirrel cage induction motor
 - e) none of these.
- iv) Which of the following methods of heating is not dependent on the frequency of supply?
 - a) Induction heating
- b) Dielectric heating
- c) Resistance heating
- d) None of these.
- v) The temperature inside a furnace is usually measured by
 - a) optical pyrometer
- b) mercury thermometer
- c) alcohol thermometer
- d) none of these.
- vi) In resistance heating highest working temperature is obtained from heating elements made of
 - a) nickel copper
- b) nichrome
- c) silicon carbide
- d) silver.
- vii) In arc welding major personal hazards are
 - a) flying sparks
 - b) weld spatter
 - c) harmful ultraviolet and infrarad rays from the arc
 - d) none of these.
- viii) Aluminium is difficult to weld, because it
 - a) has an oxide coating
 - b) conducts away heat rapidly
 - c) both (a) & (b)
 - d) none of these.



- ix) Spot welding is used for
 - a) thin metal sheets
 - b) rough and irregular surfaces
 - c) casting
 - d) thick sections.
- x) Filament lamps operate normally at a power factor of
 - a) 0.5 lag

b) 0.8 lag

c) unity

- d) 0.8 lead.
- xi) A solid angle is expressed in terms of
 - a) radians/m
- b) radians
- c) stradians
- d) degree.

GROUP – B (Short Answer Type Questions)

Answer any *three* of the following.

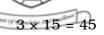
 $3 \times 5 = 15$

- 2. What are the steps in electroplating process? Give factors governing deposition of metal.
- 3. State the Faraday's laws of electrolysis. If 96000 c deposit gram equivalent weight of metal, what weight of nickel and silver respectively will be deposited by 15A in 1 hour?

(CE-nickel = 29.3, CE-silver = 108)

- 4. Discuss in brief the three types of radiation welding.
- 5. Describe briefly the method of dielectric heating with necessary diagrams. Derive the expression for power and voltage required for dielectric heating.
- 6. Give advantages and disadvantages of induction heating.

GROUP – C(**Long Answer Type Questions**) Answer any *three* of the following.



- 7. a) What are the general principles that are usually employed in the design of streetlighting? Explain.
 - b) An illumination of 25 lux is to be produced on the floor of a room 12 m \times 9 m. Eighteen lamps are required to produce this illumination if 50% of the emitted light falls on the floor. What is the power of the lamp in candela? Assume maintenance factor as unity. 8+7
- 8. a) What are the different systems of track electrification?
 - b) Write short notes on the following:
 - i) Trolley collector
 - ii) Third rail system
 - iii) Conductor rail system.

$$6 + (3 \times 3)$$

- 9. What is electro-deposition? Explain in detail various factors which have effect on the appearance and quality of the deposited surface.
- 10. Draw and explain speed-time curve of a suburban train.

 Derive the quadratic expressions for quadrilateral speed-time curves and trapezoidal speed-time curves.
- 11. What is specific energy consumption? Derive expressions for energy of acceleration, energy to overcome gradient, energy to overcome train resistance.

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