



Name :

Roll No. :

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 × 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.



- 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 infrared 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.

3 × 15 = 45

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 × 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 × 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.

=====