*Name* : ....................................................................

*Roll No.* : ...............................................................

*Invigilator's Signature* : ............................................

**CS/B.TECH (EEE)/SEM-7/EEE-704C/2012-13**

# 2012

# UTILIZATION 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 the following : $10 \times 1 = 10$

　　i)　The load power factor using welding transformer depends on

　　　　a)　arc length

　　　　b)　material to be welded

　　　　c)　type of electrode to be used

　　　　d)　all of these.

　　ii)　Which of the following is not resistance welding ?

　　　　a)　Projection welding　　b)　MIG welding

　　　　c)　Seam welding　　d)　Spot welding.

　　iii)　In induction heating

　　　　a)　heat is produced due to currents induced in the charge by electromagnetic action

　　　　b)　the resistance of the charge must be low

　　　　c)　magnetic materials can be easily treated in comparison to non-magnetic material

　　　　d)　all of these.

iv) The specific energy consumption of an electric traction drive decreases with

   a) higher acceleration

   b) lower acceleration

   c) higher acceleration & retardation

   d) lower acceleration & retardation.

v) Low frequency operation of *ac* series motor for traction drive improves

     I. power factor

     II. line reactance

     III. commutation properties

     IV. starting torque.

Which of the following is true ?

   a) (I) and (II)          b) (II) and (III)

   c) (I) and (III)         d) (II) and (IV).

vi) In case of urban series where two consecutive stops are less than 1 km, which of the following is absent ?

   a) Braking period

   b) Coasting period

   c) Speed curve running period

   d) Free running period.

vii) Series parallel control for traction drives is used for

   a) DC series motor

   b) DC shunt motor

   c) AC series motor

   d) 3-phase induction motor.

viii) Dielectric heating is used in

   a) plywood industry       b) tobacco industry

   c) both (a) and (b)       d) none of these.

ix) Suburban Railways use

   a) 1500 V *dc*           b) 400 V, 3-ph *ac*

   c) 3300 V, 3-ph *ac*     d) 25 kV, 1-ph *ac*.

x) In underground traction, the supply system is

   a) 500 V to 1000 V *dc*

   b) 25 kV, 50 Hz *ac*

   c) 25 kV, 25 Hz *ac.*

## GROUP – B

### ( Short Answer Type Questions )

Answer any *three* of the following     3 × 5 = 15

2. Explain the process of induction heating. What are its advantages & disadvantages ?

3. Explain the process of electro-deposition. State the factors which affect the quality of the deposited surface.

4. Define radiation welding. State and explain the types of radiation welding.

5. What is solid angle ? Define and explain space-height ratio and depreciation factor.

6. Explain the factors affecting the specific energy consumption of an electric traction drive.

## GROUP – C

### ( Long Answer Type Questions )

Answer any *three* of the following.     3 × 15 = 45

7. a) Draw the speed time curve and explain free running, coasting and breaking for suburban lines.

   b) An electronic train has quadrilateral speed time curve as follows :

     i) uniform acceleration from rest of 2 kmphps far.

     ii) coasting for 50 seconds.

   The train moving a uniform gradient of 1%. Tractive resistance is 40 newton per ton rotational inertia effect 10% of dead weight, duration of station stop 15 seconds and overall efficiency of transmission gear and motor as 75%. Calculate for value of its schedule speed and specific energy conservation of run.     7 + 8

8. a) What factors are required to be considered while designing the lighting scheme.

   b) An illumination on the working plane of 75 lux is required in a room 72 m × 15 m in size. The lamps are required to be hung 4 m above the work bench. Assuming a suitable space-height ratio, a utilization factor of 0·5, a lamp efficiency of 14 lumens per watt and a candle power depreciation of 20%, estimate the number, rating and disposition of lamps.       7 + 8

9. a) Explain how a dielectric heating system works.

   b) How you will choose the voltage and frequency of dielectric heating ?

   c) A plywood board 0·5 × 0·25 × 0·02 meter is to be heated from 25°C to 125°C in 10 minutes by dielectric heating employing a frequency of 20 MHz the power required in this heating process. Assume specific heat of wood 1500 J/kg/°C, weight of wood 600 kg/m$^3$ and efficiency of process 50%.       3 + 5 + 7

10. a) What are the requirements of good street lighting ?

    b) A minimum illumination 80 lumens/m$^2$ is required in the factory shed 50 m × 12 m. Calculate the number, the location and wattage of units to be used. Assume that the depreciation factor is 0·8, coefficient of utilization = 0·4, efficiency of lamp unit = 14 lumens / watt.

11. Write short notes on any *three* of the following :       3 × 5

    a) Symmetrical lamp fitting

    b) *ac* arc welding

    c) train resistance

    d) electro-cleaning

    e) fluorescent lamp and its connections.

=============