	<u>Uneah</u>
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CS/B.TECH (EE) (Separate Supple)/SEM-7/EE-703/2011

2011 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 any *ten* of the following:

 $10 \times 1 = 10$

- i) Quadrilateral Speed Time curve is the close approximation for
 - a) Urban service
 - b) Suburban service
 - c) Urban / Suburban service
 - d) Main line service.
- ii) The Train resistance (friction) is given by
 - a) a (constant)
- b) b v

c) $c v^2$

- d) $a + bv + cv^2$.
- iii) The normal value of coefficient of adhesion is
 - a) 0.25

b) 0.35

c) 0 · 50

- d) 1.50
- iv) Specific energy consumption is affected by
 - a) acceleration & retardation values
 - b) the crest speed and nature of route
 - c) distance between stops
 - d) All of the above.

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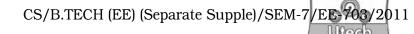


- v) The initial stage of braking in main line service should be
 - a) Regenerative braking b) Dynamic braking
 - c) Mechanical braking d) All of these.
- vi) The most common traction system in India is
 - a) D.C. Traction (600v) b) D.C. Traction (750v)
 - c) A.C. Traction (25 kv) d) A.C. Traction (1500v).
- vii) Hysteresis and Eddy current heating are used in
 - a) Resistance heating
 - b) Dielectric heating
 - c) Induction heating of steel
 - d) Induction heating of brass.
- viii) Brightness of a surface
 - a) is same in all directions
 - b) follows cosine law
 - c) follows Lambert's law
 - d) all the above.
- ix) The welding transformer should have
 - a) Rising V-I characteristic
 - b) Horizontal V-I characteristic
 - c) Drooping V-I characteristic
 - d) None of these.
- x) The coefficient of utilization increases with
 - a) Direct lighting
 - b) Mounting height of lamp
 - c) Floor area
 - d) All of these.
- xi) The solid angle subtended at the centre of a spherical surface is
 - a) 360

b) 4π

c) 2π

d) 0.



GROUP - B

(Short Answer Type Questions)

Answer any three of the following.

 $3 \times 5 = 15$

- 2. Derive an expression for the tractive effort to overcome gravitational force and tractive effort to overcome train resistance.
- 3. Explain the coefficient of adhesion and its importance in traction. Explain how adequate adhesion is ensured.
- 4. Discuss the limitations on the choice of very high frequency in Dielectric heating.
- 5. a) Briefly explain what are the different methods of light control.
 - b) What is glare? How glare is avoided?
- 6. Explain with necessary equations how the length and diameter of the heating element of a furnace are estimated?

GROUP - C

(Long Answer Type Questions)

Answer any *three* of the following.

 $3 \times 15 = 45$

- 7. a) Derive the relationship between acceleration, braking, retardation, maximum speed, speed at the end of the coasting time and distance of run in case of a train having quadrilateral speed-torque curve.
 - b) Briefly explain what are the factors affecting specific energy consumption?

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- a) Briefly explain the principle of induction heating at high frequency and highlight few applications of eddy current heating.
 - b) The depth of penetration, in the case hardening of a steel work-piece required is 1.5 mm. The relative permeability is unity and specific resistance of steel is $6\times10^{\circ}-7$ ohm m. Determine the frequency required (Take u = 1).
- 9. a) Derive the expression for heat produced in Dielectric heating.
 - b) Dielectric heating is to be employed to heat a slab of insulating material 1 cm thick and 150 sq cm in area.
 The power required is 400 Watts. And a frequency of 30 MHZ is to be used. The material has a rel. permitivity of 5 and a power factor of 0.05. Determine the voltage necessary and current that will flow through the slab.
- 10. Write short notes on (any three):
 - a) Regenerative Braking
 - b) Linear induction motor
 - c) Resistance welding
 - d) Compact fluorescent lamp
 - e) Colour rendition
 - f) Current collection in Traction
 - g) Induction heating.

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