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Seat No.	
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**T.E. (Electrical) (Semester – II) Examination, 2014**  
**UTILIZATION OF ELECTRICAL ENERGY**  
**(2008 Course)**

Time : 3 Hours

Max. Marks : 100

- Instructions :** 1) Answers to the **two** Sections should be written in **separate** answer books.
- 2) Answer **any three** questions from **each** Section.
- 3) **Neat** diagrams must be drawn **wherever** necessary.
- 4) Figures to the **right** side indicate **full** marks.
- 5) **Use** of Calculator is **allowed**.
- 6) Assume **suitable** data if **necessary**.

## SECTION – I

1. a) With a neat diagram describe the working of coreless type induction furnace. 8
- b) Determine the diameter and length of Nichrome wire to be used as heating element in a 20 KW, 220 V single phase resistance furnace. The temperature of wire should not exceed 1170°C and the temperature of the charge is to be 500°C. Assume radiating efficiency as 0.57 and emissivity of the element as 0.95. The Resistivity of Nichrome is  $1.03 \times 10^{-6}$  ohm-m. 8
- OR
2. a) Explain laser welding with suitable diagram. 8
- b) An insulating slab of 2 cm thick and 150 cm<sup>2</sup> in area is to be heated by dielectric heating. the power required is 300 watts at a frequency of 30 MHz. The material has relative permittivity of 5 and power factor of 0.05. Determine the voltage necessary for heating and the current flowing through the material. What will be the value of frequency to obtain the same heating, if the voltage is limited to 600 volt ? 8
3. a) With a suitable diagram explain electric circuit used in window type Air Conditioner. 8
- b) Write a short note on Electroplating. 8
- OR
4. a) With a suitable diagram explain electric circuit used in Refrigerator. 8
- b) Explain in detail the factors affecting quality of Electro-Deposition. 8

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5. a) Define following terms and state its unit.  
 i) Illumination  
 ii) Luminous Intensity  
 iii) Solid Angle. 6
- b) Explain construction and working of halogen lamp with a suitable diagram. 6
- c) A hall of 20 m × 50 m is to be illuminated by suitable lamps to give an average illumination of 45 lux. The lamp mounting height from the working plane is 3 m. The utilization factor and depreciation factor is 0.65 and 1.3 respectively. The lamps are to be chosen from the following groups. 6

<b>Rating in watts</b>	75	100	150	200
<b>Total lumens</b>	800	1200	2000	2800

Calculate the number of lamps of each type.

OR

6. a) Draw and explain Polar curve for horizontal and vertical plane. Explain Rouseau construction for obtaining mean spherical candle power. 6
- b) Explain laws of illumination. 6
- c) Two lamp posts are 10 meter apart and fitted with 100 CP lamp each at a height of 5 meter above ground. Calculate illumination 6  
 i) Under each lamp  
 ii) Midway between the lamps.

SECTION – II

7. a) With suitable diagrams explain different types of conductor rail system for traction power supply. 6
- b) Draw block diagram of an electric locomotive and give description of various equipments and accessories. 6
- c) State advantages of electric traction 6

OR

8. a) With suitable diagrams explain construction and working of pantograph. 6
- b) Describe any two systems of electric power supply for traction. 6
- c) State the advantages of 25 kV AC system over DC system of supply for electric traction. 6



9. a) What is meant by coefficient of adhesion ? State the factors affecting coefficient of adhesion. **8**
- b) A train has schedule speed of 30 kmph over a level track between stations 1 km apart. Station stopping time is 20 sec. Assuming braking retardation 3 kmphs and maximum speed 25% greater than average speed calculate the acceleration. **8**
- OR
10. a) Elaborate the parts of total tractive effort with usual notations. **8**
- b) Define following terms-Average speed, Schedule speed. State the factors affecting schedule speed. **8**
11. a) Elaborate how AC series motor is suitable for traction work. **6**
- b) Write a short note on – Anti collision system for railway. **4**
- c) With suitable diagrams explain series-parallel transition. Why it is called short circuit transition ? **6**
- OR
12. a) Explain French method for regenerative braking of DC series motor. **6**
- b) Draw and explain electric circuit used for detecting track occupancy of train. **4**
- c) State the desired properties of traction motor. **6**

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