

Utilization of Electric Energy

P. Pages : 2

Time : Three Hours



TKN/KS/16/7422

Max. Marks : 80

- Notes :
1. All questions carry marks as indicated.
 2. Solve Question 1 OR Questions No. 2.
 3. Solve Question 3 OR Questions No. 4.
 4. Solve Question 5 OR Questions No. 6.
 5. Solve Question 7 OR Questions No. 8.
 6. Solve Question 9 OR Questions No. 10.
 7. Solve Question 11 OR Questions No. 12.
 8. Due credit will be given to neatness and adequate dimensions.
 9. Assume suitable data whenever necessary.
 10. Illustrate your answers whenever necessary with the help of neat sketches.
 11. Use of non programmable calculator is permitted.

1. a) Write the advantages and disadvantages of electric heating over conventional heating methods. **6**
- b) A 20 KW, 230V, single phase resistance over employs nickel-chrome wire for its heating elements. If the wire temperature is not to exceed 1200°C and the temperature of the charge is to be 600°C, Calculate the diameter and length of the wire. Assume radiating efficiency as 0.6 and emissivity as 0.9. Specific resistance of nickel-chrome is 1.016 micro-ohm-m. **7**

OR

2. a) With a neat sketch, describe the working of a coreless type induction furnace. **6**
- b) A slab of insulating material 150 cm² in area and 1cm thick is to be heated by dielectric heating. The power required is 400W at 30 MHz. Material has a relative permittivity of 5 and Pf 0.05. Absolute permittivity = 8.854×10^{12} f/m Determine the necessary voltage. **7**
3. a) Describe in brief various methods of electric welding. **7**
- b) Compare between AC are welding and DC are welding. **7**

OR

4. a) Explain with a neat sketch how spot welding is carried out by spot welding machine. **7**
- b) Explain electron beam welding. **7**
5. a) Define and explain the following terms. **6**
- i) Illumination
 - ii) Utilization factor
 - iii) Solid angle

- b) A lamp of 500 watts housing M.S.C.P. of 1000 is suspended 2.7 meters above the working plane. Calculate. **8**
- i) Illumination directly below the lamp at the working plane.
 - ii) Lamp efficiency
 - iii) Illumination at a point 2.5 meters away on the horizontal plane from vertically below the lamp.

OR

6. a) Explain law of inverse squares for illumination. **6**
- b) Estimate the number and wattage of lamps which would be required to illuminate a workspace 50 x 60 meters by means of lamps mounted 5m above the working plane. The average illumination required is about 110 Lux coefficient of utilization = 0.4, luminous efficiency is 16 lumens/w. Assume space-height ratio of unity and depreciation factor 20%. **8**
7. a) What are different types of refrigeration systems. Explain vapour compression refrigeration cycle. **7**
- b) What do you understand by primary and secondary refrigerants? Give examples for both types. **6**

OR

8. a) Define air-conditioning. Explain various factors involved in air-conditioning. **7**
- b) Explain in brief about the functioning of a drinking water cooler. **6**
9. a) Explain different types of fans along with proper sketches. **7**
- b) What are the various air flow control strategies of fans? **6**

OR

10. a) Explain with a neat sketch principle and working of a centrifugal pump. **7**
- b) Explain in brief various factors affecting pump performance. **6**
11. a) What is a compressors? Give classification of compressors. **7**
- b) Explain in brief about compressor air system components. **6**

OR

12. a) Explain the 'DG set system' with a block diagram. **7**
- b) Describe the factors affecting energy performance assessment of DG sets. **6**
