QUESTION BANK

UNIT- I

1. Define Electrical drive?
2. Draw the speed torque characteristics of an ideal traction system drives.
3. Three phase systems could not become popular for traction purpose.Why?
4. Define specific energy consumption and discuss the factors which effect the specific energy consumption.
5. Illustrate the recent trends in electric traction?
6. List the advantages and disadvantages of electric traction.
7. Deduce the expression for total tractive effort.
8. Analysis the features of electric traction?
9. Define tractive effort.
10. Explain type of motor is used for electric traction? Why?
11. Summerize the factors affecting scheduled speed of a train.
12. Sketch the speed-time curve for a sub-urban railway systems
13. Discuss the requirements of an ideal traction system.
14. Discuss the use of speed time curve?
15. Define gear ratio.
16. Define dead weight and adhesive weight as applied to a locomotive.
17. List four advantages of a.c series motor used as traction motor.
18. With respect to traction system, explain the term “free running”.

19. Deduce the factor affecting schedule speed.

20. Generalize four advantages of D.C series motor used as traction motor.

1. (i)Describe the series- parallel control of electric traction motor. Also specify the advantages of the above control.(8)

(ii)A train runs with an average speed of 50 kmph.Distance between stations is 4.5 km. Values of acceleration and retardation are 1.5 kmphs and 1.8 kmphps respectively. Calculate the maximum speed of the train assuming a trapezoidal speed time curve.(8)

2. (i)Explain the recent trends in electric traction systems(8)

(ii).A sub urban electric train has a maximum speed of 65kmph.The schedule speed including a station stop of 30seconds is 43.5kmph.If the acceleration is 1.3kmphps; Identify the value of retardation when the distance between stops is 3km.(8)

3. (i)Explain about the types of supply system used in traction system.(8)

(ii) A 250 tonnes train with 10% rotational inertia effect is started with uniform acceleration and reaches a speed of 50 kmphps in 265 seconds on level road. Calculate the specific energy consumption if the journey is to be made according to trapezoidal speed- time curve. Acceration = 2 kmphps; Tracking retardation = 3 kmphps ; Distance between the stations = 2.4 km ; efficiency = 0.9; Track resistance = 5 kg/tones.(8)

4. (i)With the aid of transmission of tractive effort, describe the mechanism of train movement.(8)

(iiDescribe clearly regenerative braking when used for Dc series traction motors. Also discuss the requirements for ideal traction.(8)

5. (i)A sub urban electric train has a maximum speed of 65kmph.The schedule speed including a station stop of 30seconds is 43.5kmph.If the acceleration is 1.3kmphps; Calculate the value of retardation when the distance between stops is 3km. (8)

(ii)Discuss short notes on Trolley bus.(8)

6. (i) Draw the speed – Time curve of a traction system. Also explain various periods and the action.(8)

(ii) A train has a scheduled speed of 50 kmph over a level track, distance between stations being 1.8 kms. Station stopping time is 30 seconds. Assuming braking retardation of 3 kmphps and maximum speed 50% greater than average speed. Estimate acceleration to run the service.(8)

7. (i) Describe the mechanism of train movement.(8)

(ii) Write a short notes on supply system in electric traction.(8)

8. (i) Explain the recent trends in electric traction.(8)

(ii) Explain any two methods of advanced traction motor control.(8)

9. A train weighing 203 tonnes accelerates uniforms from the rest to a speed of 45kmph up a gradient of 1 in 500, the time taken being 30 seconds. The power is then cut off the coasts down as uniform gradient of 1 in 1000 for a period of 40 seconds when brakes are applied for period of 15 seconds so as to bring the train uniformly to the rest on this gradient. Estimate

(i)The maximum power output from the driving axle. (ii)The energy taken from the conductor rails in Kwh. Assume efficiency is 60%, traction effort is 44 Newton/Tonne at all speed, rotational inertia is 10%. (16)

10. (i) Describe the principle and operation of a modern ac locomotive.(6)

(ii) What are the various types of electric braking used in traction? Discuss in detail.(10)

11. (i)List the requirement of electric traction system.(8) (ii)Explain DC series traction motor control.(8)

12. Describe the different methods of traction motor control and explain.(16)

13. The distance between two stations is 1 km and the average speed of the train is 30 kmph. Station stopping time is 20 sec.Assume braking retardation 3 kmph.ps and maximum speed 1.25 times average speed .Calculate acceleration required to run the service if the speed time curve is approximated by a trapezoidal curve. (16)

14. (i)Explain and compare the various arrangements of

current collection in traction.

(ii) The maximum torque of a400v, three phase four pole 60c/s IM is 100NM at a slip of 0.1.If the motor works at

50c/s 400v supply.Evaluate the maximum torque, slip

and the speed at which it occurs. Neglect stator

impedance.(10)

UNIT- II

Q.No	Questions
1.	If the total lumens required are 7200 and coefficient of utilization is 0.3, calculate lamp lumens required.
2.	Generalize the types of lighting system.
3.	Define luminous efficiency.
4.	Examine illumination law
5.	Define luminous flux

6. Define the term lux.
7. Define lumen.
8. What are the properties of heating materials.
9. State the different types of electrical lamps used for illumination?
10. Why tungsten is selected as the filament material?
11. Point out the requirements of good lighting
12. Suggest suitable lamps for sports gound lighting application.
13. Specify any four energy efficient lamps.
14. Explain the importance of street lighting system
15. Describe the term MSCP and lamp efficiency.
16. Define solid angle
17. Generalize plane angle
18. Distinguish between direct lighting and indirect lighting.
19. Deduce why sodium vapour lamps are not preferred for indoor lighting.
20. Discuss Stephan's law of radiation.

1. (i)Discuss laws of illumination and its limitations in actual practice(8)

(ii)A workshop dimension 30 metre * 20 metre is illuminated by 30 Nos. of 400 Watts Metal Halide lamps. The luminous efficacy of metal Halide lamp is 90 lumens/Watt. The depreciation factor is 1.2 and utilization factor is 0.6. Calculate the illumination level of the working plane.(8)

2. (i)Explain the operation of fluorescent lamp in details.(8)

(ii)A classroom dimension 10 metre * 7.5 metre with a ceiling height of 4 metre is to be provided with general illumination of 300 lux. Considering a co-efficient of utilization is 0.5 and depreciation factor of 1.2. Calculate the number of 36 watts fluorescent lamps required. The luminous efficacy of 36 watts fluorescent lamp is 84 lumens per watt.(8)

3. (i)List the properties of good lighting.(8)

(ii)With a neat diagram explain the construction and working of sodium vapour lamp.(8)

4. A hall 30m long and 12m wide is to be illuminated and the illumination required is 50 lumens/m^2.Deduce the number of fitting required, taking depreciation factor of

1.3 and utilization factor of 0.5.Given that the outputs of different types of lamp are given below:

Watts	100	200	300	500	1000
Lumens	1625	3650	4720	9970	21520 (16)

5. (i)Explain the construction and working of mercury vapour lamp.(8)

(ii)A lamp of 500 c.p. is placed at the centre of a room 20*10*5 m. Calculate the illumination in each cornoer of the room.(8)

6. (i)Describe and prove laws of illumination (8)

(ii)Design a street lighting of a road of 300metres long which is required to be illuminated by providing 40W fluorescent lamp. The width of the road is 4 m. Illumination is 0.6 lux. Assume efficiency of lamp as70Lumen/watt.(8)

7. Two street lamps are 20m apart and are fitted with a 500 C.P. lamp at a height of 8m above the ground each. Calculate the illumination at a point

(a) Under the lamps each.

(b) Midway between the lamps (16)

8. (i)List the various types of lamps commercially available. Also specify the energy efficient lamps for domestic and industrial lighting applications.(8)

(ii)Discuss the various steps followed in calculation of illumination for designing the residential lighting(8)

9. (i)Explain the various steps involved in designing of lighting system for a workplace.(8)

(ii)Discuss about Diffusion principle of street lighting(8)

10. Explain the various steps followed in calculation of illumination for designing the flood lighting in sports ground.(16)

11. (i)Explain the factors affecting the design of lighting system.(8)

(ii)Discuss the principle of street lighting.Explain different types of lighting with neat Sketches(8).

12. Pointout the various factors to be taken into account for designing street lighting and flood lighting(16)

13. (i) Discuss the various steps followed in calculation of illumination for designing the residential lighting(8)

(ii) Describe flood lighting with necessary definitions(8)

14. A drawing hall 30*15*5 m is to be provided with a general illumination of 120Lux.Taking coefficient of utilization as 0.5, depreciation factor as 1.4, Design the number of fluorescent tubes required, their spacing height, mounting height and total wattage. Take luminous efficiency of fluorescent tubes as 40 Lumen/Watt for 80watts tube.(16)

UNIT- III

Q.No **Questions**

1. List the factors which limit the choice of frequency in induction and dielectric heating.
2. Describe arc welding, also list its types?
3. State the requirements of a good heating material.
4. Discuss by electric arc welding?

5. Summarize types of electrode used in electric arc welding applicability?
6. Define resistance arc welding?
7. List few applications of dielectric heating.
8. Prepare the properties of heating element materials?
9. Point out advantages of electric heating.
10. Compare DC welding and AC welding.
11. Classify the methods of electric heating.
12. Show Stefan's law of heat radiation.
13. Summarize basic principle of induction heating
14. Define LASER welding
15. Classify the modern welding techniques
16. Differentiate between core type and coreless type induction furnace.
17. Describe indirect resistance heating
18. Evaluate causes of failure of heating element.
19. Generalize on infra red heating.
20. Discuss any four advantage of coreless induction Furnace.

1. (i).Draw a neat sketch of induction furnace and generalize its working.(8)

   (ii).An insulating material 2cm thick and 150sq.cm. in area is to be heated by dielectric heating. The material has permittivity of 4 and p.f. as 0.04.Power requires is 400watts and frequency of 40MHz.Measure the voltage and current that will flow through the material. If the voltage were limited to 700 volts, what will the frequency to get the same loss?(8)

2. (i).Discuss the principle of arc welding and the difference between carbon and metal arc welding and their relative merits and demerits. (8)

   (ii).Generalize the characteristics of a welding transformer.(8)

3. Discuss in details about any two types of resistance welding(16)
4. Calculate the efficiency of a high frequency induction furnace which takes 12 minutes to melt 1.3Kg of Aluminium. The input to the furnace being 4.5kW and the initial temperature is 15^{o}C.Take specific heat of Aluminium is 880J/Kg/^{o}C, melting point of Al is 660^{o}C and latent heat of fusion of Al is 32KJ/Kg.(16)

5. Examine the induction heating?what are the characteristics of induction heating? Explain Ajex-wyatt furnace.(16)

6. Analyze the efficiency of a high frequency induction furnace which takes 10 minutes to melt 1.815Kg of Aluminium. The input to the furnace being 5 kW and the initial temperature is 15^{o}C.Take specific heat of Aluminium is 0.212 kcal/kg^{0}c, melting point of Al is 660^{o}C and latent heat of fusion of Al is 76.8 Kcal/Kg.(16)

7. (i) Classify the various types of resistance heating.(8)

(ii) An insulating material 2cm thick and 150 sq.cm in area is to be heated by dielectric heating. The material has permittivity of 4 and p.f as 0.04.power required is 200watts and frequency of 300MHz.point out the voltage and the current that flows through the material. If the voltage were limited to 600v.what will be the frequency to get the same loss.(8)

8. With neat diagram describe the different type of arc welding.(16)

9. (i)Discuss in detail design of heating element.(8)

(ii) Summarize technical note on welding transformer.(8)

10. (i)What are the types of ARC furnace? Describe the operation of them.

(ii) Describe the construction and working principle of dielectric heating.

11. (i) Explain the working of coreless induction furnace and list its merits. (8)

(ii) Calculate the time taken to melt 3 metric tones of steel in a three phase arc furnace having the following data: Current=5000 A; Arc voltage=60 V; Resistance of transformer=0.003

ohms; Reactance of transformer=0.005 ohms;Melting point of steel=1370^{o}C; Initial temperature of steel=18^{o}C;Assume overall efficiency as 60%.(8)

12. (i) Explain the various types of electric arc welding. (8)

(ii) Explain the principle and working of welding transformer.(8)

13. (i) A 15kW, 220V, single phase resistance over employs circular nickel-chromium wire for its heating element. The wire temperature is not to exceed 1230ºC and the temperature of the charge to be 500ºC. Calculate the size and gth of the wire. Assume radiating efficiency=0.6, Emis y-0.9, Specific resistance of nickel-chrome wire=101.6x1010 Ωcm.(8)

(ii) With the neat sketches, explain the functioning of carbon arc welding and shielded metal arc welding.(8)

14. (i) A furnace consuming 5kW takes 15 minutes to just melt 2.5Kg of Aluminium, the initial temperature being 15ºC. Find the efficiency of the furnace when the specific heat of Aluminium is 0.212cal/gm/ºC, Melting point is 658ºC and latent heat of fusion is 320J/gm.(8)

(ii) What are the differences of AC welding and DC welding?(8)

UNIT- IV

Q.No	Questions
1.	List various energy resources
2.	Summarize significance of renewable energy
3.	Identify the problem associated with tapping solar energy
4.	Summarize the factor influencing solar power extraction
5.	Identify the limitation of solar power
6.	Explain solar concentrators
7.	List the advantage of solar concentrators.
8.	Specify the parameters characterising solar concentrators
9.	Define Collector efficiency
10	Differentiate flat plate collectors and concentrating collectors
11	What is solar cell
12	What are the types of collectrors used in solar power generation
13	Examine the important factors govering the selection of site for conventional sources.
14	Classify the components of flat plate collectors.

15 Show the two advantages of non-conventional energy source

16 Mention the various types of solar PV cells

17 Pointout the various semiconductors used for photovoltaic conversion

18 List the solar PV application

19 What is solar time and why it is different from standard circuit time of the country?

20 At what wavelength the radiation emitted from the sun and that reflected from the earth are centred.

1. Explain the power extraction aspects of solar PV system.(16)

2. Explain the working principle of various types of concentrating solar collectors with neat sketch.(16)

3. Describe the operation and control stratergy of solar power conversion system(16)

4. (i) Schematically describe the residential cooling and heating with solar energy(8)

   (ii) Describe flat plate collector(8)

5. Draw the neat block diagram of a standalone solar PV generation system.Also explain the role of individual blocks.(16)

6. (i) What are the basic components of solar PV system(8)

   (ii) Explain the basic solar PV system used for power generation with neat diagram.(8)

7. Describe briefly the grid interactive solar PV system.(16)

8. Explain how a solar used for industrial heating system(16)

9. Describe briefly the various solar PV application(16)

10. Describe the classification of solar cell.(16)

11. (i) What is the important of MPPT in a solar PV system?(8)

    (ii) Explain various strategies used for operation of an MPPT?(8)

12. Explain the IV characteristics of a solar cell and also explain an equivalent ckt of a particular solar PV cell?(16)

13. Describe briefly the classification of solar PV system.(16)

14. (i) Define solar constant and collector efficiency. Also explain the solar radiation geometry at earth surface.(8)

(ii) Estimate the average solar radiation(8)

UNIT- V

Q.No	Questions
1.	What range of wind speed is considered favourable for wind power generation?
2.	Give the factors led to the accelerated development of wind power.

3. List the factors responsible for distribution of wind energy on the surface of earth.
4. Define gust.
5. Quote the principles may be used for measurement of wind speed.
6. Illustrate the standard height for measurement of wind speed.
7. Tell the advantages of presenting the wind data in the form of a wind rose.
8. List the most favourable sites for installing of wind turbines.
9. Explain the major applications of wind power.
10. Give the relative features of drag and lift type machines.
11. Arrange the effects of solidity on the performance of s wind turbine.
12. Show the various types of drive schemes used in wind turbines.
13. Generalise the environmental impacts of wind energy.
14. Discuss the power versus wind speed characteristics of a wind turbine.
15. What do you understand by teetering of rotor? In what cases is it required?
16. Describe an expression for energy available in the wind.
17. Compare the relative features of HAWT and VAWT.
18. Explain the variation of power output of a wind turbine with tip speed of the rotor.
19. Demonstrate the mechanism of production of local winds.
20. What is the objective of load control in wind energy systems?How load control is achieved in small stand alone wind turbine.

1. Sketch the diagram of a HAWT, and explain the functions of its main components. (16)
2. Discuss the relative performance of a pitch regulated and stall regulated wind turbine. (16)
3. Evaluate the suitability of various types of generators for wind power generation. (16)
4. Explain the main features of wind-Diesel hybrid generating systems. Also point out various types of operational scheduling for diesel unit. (16)
5. Explain various designs of blades of HAWTs and their relative features. (16)
6. Describe the expression for maximum axial thrust experienced by a wind turbine and also find the condition for such operation. (16)

7. Using Betz model of a wind turbine, describe the expression for power extracted from wind. What is the maximum theoretical power that can be extracted and under what condition? (16)

8. With the help of block diagram, describe the functions of various blocks of a WECS. (16)

9. Sketch the diagram of a VAWT, and describe the functions of its main components. (16)

10. With the help of a diagram, describe the terms free and relative wind velocities, drag and lift forces, solidity, pitch angle and chord. (16)

11. What do you understand by attached and separated flow? With the help of diagram, show attached and stalled flow. What are the main features of stalled flow?How is the stalled performance improved? .(16)

12. With the help of a diagram, explain the nature of variation of wind speed with height from the ground. Explain the terms:wind shear, gradient height, free atmosphere, planetary boundary, surface layer and Edman layer. (16)

13. With the help of a diagram, illustrate the circulation of global winds. What are the forces responsible for determining the speed and direction of global winds? .(16)

14. Demonstrate the upwind and downwind machines, yaw active and yaw fixed machines.(16)