Reg. No. : | | | | | | | | | | | |

D 4175

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2008.

Eighth Semester

(Regulations 2004)

Electrical and Electronics Engineering

EE 1451 — ELECTRIC ENERGY GENERATION UTILIZATION AND CONSERVATION

(Common to B.E. (Part-Time) Seventh Semester Regulation 2005)

Time : Three hours

Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Give four sources of non-conventional energy.

2. Name the various semi conductors used for photovoltaic conversion.

3. Define load factor.

4. What are the causes of low power factor?

5. Define the term Lux.

6. List the four merits of electrically produced heat.

7. Define tractive effort.

8. What is meant by specific energy consumption?

9. What are the advantages of individual drive?

10. What type of electrical drive is used in (a) Cranes (b) Blowers?

PART B — (5 × 16 = 80 marks)

11. (a) (i) What are the basic components of solar PV system? (8)

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

Or

(b) Give a brief review of generation of electrical power by any two conventional methods. (8 + 8)

12. (a) The maximum demand of power plant is 40 MW. The capacity factor is 0.5 and the utilisation factor is 0.8. Find

(i) Load factor

(ii) Plant capacity factor

(iii) Reserve capacity. (6 + 6 + 4)

Or

(b) Discuss the following types of tariffs :

(i) Two part tariff

(ii) Three part tariff

(iii) Flat demand tariff

(iv) Straight meter rate tariff. (4 × 4 = 16)

13. (a) A 30 KW, three phase, 400 V over is to employ nickel-chrome strip 0.254 mm thick for the three star-connected heating elements. If the wire temperature is to be 1100°C and that of charge to be 700°C. Estimate a suitable width for the strip. Assume conductivity of 0.9 and radiating efficiency to be 0.5. What would be the temperature of the wire if the charge were cold? (16)

Or

(b) (i) Explain the working of low pressure mercury vapour lamp with necessary circuit diagram. (8)

(ii) Two street lamps are 20 m apart and fitted with a 500 C.P. lamp at a height of 8 m above the ground. Find the illumination at a point under the lamp post and midway between the lamps. (8)

14. (a) A train runs at an average speed of 45 km per hour between stations 2.5 km apart. The train accelerated at 2 kmphps and retards at 3 kmphps. Find its crest speed assuming trapezoidal speed time curve. Calculate also the distance travelled before the brakes were applied. (16)

Or

(b) (i) What are the merits of electric braking? (6)

(ii) Describe briefly about regenerative braking and how this can be applied to D.C. series traction motors. (10)

15. (a) Explain the different factors to be considered for selection of electric drives for a specific application. (16)

Or

(b) A 200 V, 875 rpm, 150 A d.c. motor has an armature resistance of 0.06 Ω. It is fed from a single phase fully controlled rectifier with an A.C. source voltage of 220 V, 50 HZ. Calculate the firing angle for rated motor torque at 750 r.p.m. (16)

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V 4172

B.E./B.Tech. DEGREE EXAMINATION, APRIL/MAY 2008.

Eighth Semester

(Regulations 2004)

Electrical and Electronics Engineering

EE 1451 — ELECTRIC ENERGY GENERATION UTILIZATION AND CONSERVATION

(Common to B.E. (Part-Time) Seventh Semester Regulation 2005)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Give any two reasons to go for non conventional sources for power generation.

2. Draw a typical daily load curve.

3. What is meant by geothermal energy?

4. State the advantages of power factor improvement.

5. What are the properties of heating materials?

6. State the laws of illumination.

7. Explain the terms dead weight and adhesive weight as applied to a locomotive.

8. What is scheduled speed of a train?

9. What is load equalization?

10. Distinguish between individual drive and group drive.

PART B — (5 × 16 = 80 marks)

11. (a) Explain in detail about the electric energy generation by tidal power and wind power. (16)

Or

(b) Write about the concept of distributed generation and its effect on system operation. (16)

12. (a) (i) Write a short note on the need for energy conservation. (8)

(ii) Discuss briefly about energy auditing. (8)

Or

(b) (i) Discuss the various methods to improve power-factor. (8)

(ii) Define power quality and explain related terms. (8)

13. (a) (i) With a neat diagram explain the working of High pressure sodium vapour lamp. (8)

(ii) A lamp of 500 c.p. is placed at the centre of a room $(20 \times 10 \times 5)$ m^3. Calculate illumination in each corner of the room. (8)

Or

(b) (i) Derive the expressions for distance 'd' and length 'l' of a heating element. (8)

(ii) Explain construction and operating principle of welding transformer and its characteristics. (8)

14. (a) (i) Explain different methods of traction motor control. (10)

(ii) Write in detail about mechanics of train movement. (6)

Or

(b) Describe in detail the recent trends available in electric traction system. (16)

15. (a) Mention the criteria to be considered while selecting a motor for a specific application. Explain with example. (16)

Or

(b) Discuss various methods of speed control of industrial drives. Write typical examples for each drives. (16)

B 1254

B.E./B.Tech. DEGREE EXAMINATION, MAY/JUNE 2006.

Eighth Semester

Electrical and Electronics Engineering

EE 041 — ELECTRIC ENERGY UTILISATION AND CONSERVATION

Time : Three hours

Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Write any two reasons for the failure of heating element.

2. Briefly explain the role of reactors in Electric arc furnace.

3. State the law of illumination that helps us to find intensity of illumination at a point on the ground due to street lamps.

4. What are the factors that influence the degree of illumination necessary to view the object?

5. Draw the speed–time curves of urban and sub–urban Electric Train services.

6. State the reason why single phase series motor is not preferred for suburban services.

7. Find the thickness of copper deposited on a plate area of 0.00025 m^2 during electrolysis if a current of one amp is passed for 100 min. Density of copper is 8900 kg/m^3 and ece of copper = 32.95×10^{-8} kg/C.

8. Define Polarisation.

9. What are the different types of tariffs?

10. What is the need for depreciation reserve?

PART B — (5 × 16 = 80 marks)

11. (i) Briefly explain the different types of supply systems used for Electric Traction. (8)

(ii) An Electric train having an average speed of 42 km/hr on a level track between stops of 1.4 km apart. It is accelerated at 1.7 km/hr/sec and is braked at 3.3 km/hr/sec. Draw the speed–time curve and estimate the specific energy consumption. Tractive resistance is 50 N/tonne rotational inertia 10%. Overall efficiency of transmission and motor 75% (P183, NVS/UofEP) (8)

12. (a) (i) Explain the working of core type induction furnace with neat sketches. (8)

(ii) A 5 kW, 440 V, 3 phase resistance oven is to have a 3 star connected nichrome strip of .3 mm thick heating element. If the wire temp. is to be 1500°C and that of the charge 1000°C, estimate the suitable width of the strip. The resistivity of nichrome alloy is 1.016×10^{-6}. Assume the radiating efficiency and emissivity of the element as 0.6 and 0.91 respectively. (P 84, NVS/UofEP). (8)

Or

(b) (i) State the advantages of coated Electrodes used in Arc welding. (8)

(ii) With the help of neat diagrams explain in detail the various methods of resistance welding. (8)

13. (a) (i) Explain the working of low pressure mercury vapour lamp with necessary circuit diagram. (8)

(ii) Two street lamps are 20 m apart and are fitted with a 500 c.p. lamp at a height of 8 m above the ground. Find illumination at a point (1) under the lamp post and (2) midway between the lamps. (4 + 4)

Or

(b) (i) Define glare. Suggest suitable ways to avoid it. (8)

(ii) Design a lighting scheme for a drawing office of size 12 m × 6 m × 4 m with white coloured ceiling and light cream coloured wall to provide an illumination of 400 lux. Co–efficient of utilization is 0.6. Assume suitable maintenance factor. Calculate the number of lamps if 80 W twin tube fittings are to be used. Draw the layout of the placement of fittings with space to height ratio not more than 1.5. (8)

14. (a) (i) Define the laws of electrolysis. What are the various operations involved in electroplating. (4 + 4)

(ii) Briefly describe about the equipments used for electroplating. (8)

Or

(b) (i) Nickel coating of 1 mm thickness is to be built on a cylindrical surface 15 cm dia. and 20 cm long in $1\frac{1}{2}$ hours. Calculate the electrical energy needed if E.C.E. of nickel is .3043 mgm/coulomb, specific gravity 8.9 and voltage used in electroplating is 10 volts. (8)

(ii) Explain Electro–extraction of Aluminium metal. (8)

15. (a) (i) Explain various schemes of determining depreciation and compare them in reference to the burden imposed on the electric utilities. (8)

(ii) Briefly discuss about the factors considered in energy costing. (8)

Or

(b) (i) Explain about (1) energy auditing and its types (2) energy conservation measures. (8)

(ii) A large industry has a maximum demand of 50 MW at a load factor of 0.5. It has the option of getting supply from a electric utility or installing its own plant. The costs on different heads are as follows : (p47, BRG/GofEE).

Public utility tariff = Rs. 600 per kW of MD per year + Rs. 2.50 per kWh.

Private plant :

Reserve capacity – 20 MW

Capital investment Rs. 30,000 per kW

Interest and depreciation – 15%

Fuel consumption – 0.6 kg/kWh

Fuel cost – Rs. 1,400 per 1000 kg

Wages, repair and other operating expenses – Rs. 0.80 per kWh

Determine the cost of power for both options and suggest the cheaper one. (8)

R 8273

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2006.

Eighth Semester

Electrical and Electronics Engineering

EE041 : ELECTRIC ENERGY UTILISATION AND CONSERVATION

Time : Three hours

Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. What are the factors that influence the welding time in Resistance welding?

2. List the specific advantages and applications of dielectric heating.

3. State the Lambert's cosine law of illumination.

4. What factors are considered in the design of indoor illumination?

5. Draw the speed-time curve of Main line Electric Train services and define different regions.

6. State the disadvantages of using three phase motor for suburban services.

7. What is electrorefining?

8. What is Polarisation? Mention ways to reduce it.

9. State the type of tariff used for industrial consumers of electricity. Why?

10. State the need for risk analysis in power generation.

PART B — (5 × 16 = 80 marks)

11. (a) (i) Explain the working of high pressure sodium vapour lamp with necessary circuit diagram.

(ii) Determine the effective illumination of a drawing room of size 12 m × 15 m illuminated by 15 lamps of 200 watts each. The luminous efficiency of each lamp is 12 lumens/watt. Given, co-efficient of utilisation – 0.6, depreciation factor – 0.8. Assume any other relevant data appropriately.

Or

(b) (i) Explain the principle of street lighting? State the factors influencing street lighting.

(ii) A lamp giving 400 candle power in all directions below the horizontal, is suspended 3 m above the centre of a square table of 1.5 m side. Calculate the maximum and minimum illumination on the table.

12. (a) (i) Explain the working of High frequency core-less Induction furnace with neat sketch.

(ii) A wooden board 30 cms × 15 cms × 2 cms is to be heated from 20° C to 180° C in 10 minutes by dielectric heating using 40 MHz supply. Specific heat of wood is 0.35 and density 0.55 gm/cc and $\varepsilon_r = 5$. Estimate the voltage across the specimen. Assume loss of energy as 10%.

Or

(b) (i) State how the drooping characteristics is obtained in Arc welding power supply.

(ii) Discuss with neat diagram different types of Arc welding methods.

13. (a) (i) Derive an expression for Tractive effort required to run an electric locomotive.

(ii) Distance between two stations is 1 km and the schedule speed is 30 kmph. Station stopping time is 20 s. Braking retardation is 3 kmphps and max. speed 1.25 times the average speed. Determine the acceleration assuming trapezoidal speed-time curve.

Or

(b) (i) List the factors favouring DC series motor for traction application.

(ii) An electric train has an average speed of 42 kmph on level track between stops 1400 m apart. It is accelerated at 1.7 kmphps and is braked at 3.3 kmphps. Estimate the energy consumption at the axles of the rain per tonne km. Tractive resistance is 50 N/tonne and rotational inertia at 10%.

14. (a) (i) A rectangular plate 20 × 10 cm is to be coated with nickel with a layer of 0.2 mm thickness. Determine the quantity of electricity in ampere hour and time taken for the process. Current density is 190 amp/m^2 and current efficiency is 90% and specific gravity of nickel is 8.9

(ii) Discuss in detail the various steps involved in electro – plating.

Or

(b) (i) State the factors that influence the quality of electro-deposition.

(ii) Discuss about different methods of charging batteries.

15. (a) (i) Briefly discuss about sinking fund method depreciation. State its relative merits and demerits.

(ii) Bring out the importance of energy conservation measures in electric energy consuming Industry.

Or

(b) (i) Explain about Energy auditing and different methods in use.

(ii) A generating station has got maximum demand of 80 kW. Calculate the cost per kWh delivered from the following data :

Capital Investment Rs. 16×10^6

Rate of interest and depreciation-12%

Fuel cost- Rs. 14×10^5

Wages, repair and other operating expenses-Rs. 9×10^5

Annual load factor is 60%