Sample Question Paper

Program Name	: **Electrical Engineering Program Group**
Program Code	: **EE/EP/EU**
Semester	: **Sixth**
Course Title	: **Utilization of Electrical Energy**
Max. Marks	: **70**

22626

Time: 3 Hrs.

Instructions:
(1) All questions are compulsory.
(2) Illustrate your answers with neat sketches wherever necessary.
(3) Figures to the right indicate full marks.
(4) Sub-questions in a main question carry equal marks.
(5) Assume suitable data if necessary.
(6) Preferably, write the answers in sequential order.

Q.1 Attempt any Five of the following. **(10 Marks)**
    a) Define the following terms with reference to illumination
            i) MSCP   ii) Coefficient of Utilization
    b) State Lambert's cosine law of illumination.
    c) Write the classification of resistance welding.
    d) Define group drive and individual drive.
    e) List any four requirements of an ideal traction system.
    f) Explain any four desirable characteristics of tariff.
    g) List any four causes of low power factor.

Q.2 Attempt any Three of the following. **(12 Marks)**
    a) Draw a neat labeled diagram of the conventional fluorescent tube light. State the function of choke and starter in it.
    b) Draw V-I characteristics of an electric arc. Describe how arc length affects the arc stability.
    c) Define mechanical power transmission system of electric drive. List out its types.
    d) Describe any four advantages of 25 kV A.C. traction system.

Q.3) Attempt any Three of the following. **(12 Marks)**
    a) Describe the main features and areas of applications for
      i) Semi-direct and ii) Indirect lighting schemes.
    b) Explain with a neat labeled schematic diagram the working of the Ajax Wyatt furnace.
    c) Explain with necessary circuit diagram, plugging applied to D.C. series motor.
    d) Describe a tariff mainly used to prepare bill for i) L.T. Residential consumer ii) H.T. Industrial consumer.

Q.4) Attempt any Three of the following. **(12 Marks)**
    a) List any four equipment's used in arc furnace with their application.
    b) Draw the curve and estimate suitable H.P. of motor having following duty cycle:
        1) Rising load from 200 to 400 H. P. - 4 minute
        2) Uniform load of 300 H.P. - 2 minute
        3) Regenerative braking from 50 to zero H.P. - 1 minute
        4) Idle for - 1 minute

c) Define i) Average speed and ii) Schedule speed in traction system. Write any two factors affecting the schedule speed.

d) Compare electric locomotive over diesel locomotive on the basis of:
   (i) Centre of gravity,
   (ii) Running / maintenance cost,
   (iii) Starting time and
   (iv) Regenerative braking.

e) A 400 V, 50 Hz, 3-phase line delivers 200 kW at 0.7 p.f. lagging. It is desired to improve the line power factor to unity by using shunt capacitors. Calculate value of capacitance of each unit if they are connected in delta.

Q.5) Attempt any Two of the following. **(12 Marks)**

a) A 40 kW, 3-phase, 400 V resistance oven uses nickel-chromium strip of 0.3 mm thickness. The heating elements are star connected. The wire temperature is to be 1127°C and that of charge is to be 727°C, estimate the width and length of the wire required.

Given: radiation efficiency = 0.6, specific resistance of Ni-Cr = 1.03×10^{-6} ohm-m, emissivity = 0.9.

b) i) Explain the factors on which shape and size of the elevator car depends.
   ii) List any four safety and protective devices used in elevator.

c) A trapezoidal time curve of train consists of :
   i) Uniform acceleration of 6 kmphps for 25 seconds
   ii) Free running for 10 minutes
   iii) Uniform deceleration of 6 kmphps to stop the train
   iv) A stop time of 5 minutes.
   Find the distance between the stations, average and scheduled speed.

Q.6) Attempt any Two of the following. **(12 Marks)**

a) Compare A.C. welding with D.C. welding on the basis of:
   1) Equipment,
   2) Operating efficiency,
   3) Cost,
   4) No-load voltage,
   5) Heating and
   6) Arc stability

b) State the need of load equalization in motors. Describe the method to achieve it.

c) "DC series motor is used for traction purpose". Justify.

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Progressive Test– I Sample Question Paper

Program Name : **Electrical Engineering Program Group**
Program Code : **EE/EP/EU**
Semester : **Sixth**
Course Title : **Utilization of Electrical Energy**
Max. Marks : **20**   **Time: 1 Hour**

22626

Instructions:
(1) All questions are compulsory.
(2) Illustrate your answers with neat sketches wherever necessary.
(3) Figures to the right indicate full marks.
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(5) Assume suitable data if necessary.
(6) Preferably, write the answers in sequential order.

Q.1 Attempt any FOUR. **(08 Marks)**

   a. Define the following related to illumination i) Luminous intensity ii) Waste light factor.
   b. List any two application of i) LED lamp ii) Metal halide lamps.
   c. Draw a neat labelled diagram of direct arc furnace.
   d. List any two applications of each i) spot welding ii) seam welding.
   e. Suggest a suitable electric drive for each of the following application:
      1) Paper mills, 2) Electric traction.
   f. State the function of bearing. State any two advantages of ball or roller bearing.

Q.2 Attempt any THREE. **(12 Marks)**

   a. Describe with neat labeled diagram, working of High Pressure Mercury Vapor lamp.

   b. 'Only DC Supply is used for Carbon arc welding'. Justify.

   c. Give any four advantages of coated electrodes.

   d. Describe any two methods of temperature control of resistance furnace.

   e. Draw and explain the load cycle for the following type of load:

        i) Intermittent loading

        ii) Continuous operation with short time loading.

Program Name	: Electrical Engineering Program Group
Program Code	: EE/EP/EU
Semester	: Sixth
Course Title	: Utilization of Electrical Energy
Max. Marks	: 20

22626

Time: 1 Hour

Instructions:

(1) All questions are compulsory.
(2) Illustrate your answers with neat sketches wherever necessary.
(3) Figures to the right indicate full marks.
(4) Sub-questions in a main question carry equal marks.
(5) Assume suitable data if necessary.
(6) Preferably, write the answers in sequential order.

Q.1 Attempt any FOUR. **(08 Marks)**

    a. Give the types of elevator based on: i) Speed and ii) Capacity.
    b. Write any two conditions for regenerative braking.
    c. State any two special features of Metro Railway.
    d. Compare urban, suburban and mainline services on the following points: i) Distance between substation ii) Value of acceleration.
    e. State any two disadvantages of low power factor.
    f. State various types of track electrification system.

Q.2 Attempt any THREE. **(12 Marks)**

    a. Describe Rheostatic braking applied to 3-phase induction motor.
    b. Draw a neat labeled block diagram of A.C electric locomotive.
    c. Describe the working of Faiveley type pantograph with a neat sketch.
    d. A train has schedule speed of 60 kmph between stops which are 6 km apart. Determine the crest speed over the run assuming:

     i) Duration of stops as 60 sec
     ii) Acceleration as 2 kmphps
     iii) Retardation as 3 kmphps
     The speed time curve is trapezoidal.

    e. A factory has a maximum demand of 300 kVA with a load factor of 0.6. The following tariffs are offered:

      a) Two part tariff - Rs 125/kVA of M.D./year + Rs 5.50 per kWh.
      b) A flat rate of Rs 6.90 /kWh.

    Calculate tariff in both cases and recommend one of them with justification.