

**FACULTY OF ENGINEERING****B.E. 4/4 (EEE) II – Semester (New) (Main) Examination, April / May 2014****Subject: Utilization****Time: 3 Hours****Max.Marks: 75****Note: Answer all questions from Part A. Answer any five questions from Part B.****PART – A (25 Marks)**

- 1 What is the purpose of using reaction in electric arc furnace? 2
- 2 What are the specific advantages of dielectric heating? 3
- 3 How is a synchronous motor started? 2
- 4 Explain the two ways of how glare is produced and how it can be avoided. 3
- 5 A 0.4 metre diameter diffusing sphere of opal glass (20% absorption) encloses an incandescent lamp with a luminous flux of 4,850 lumens, calculate the average luminance of sphere. 3
- 6 Define 'crest speed' and 'scheduled speed' and explain the factors which affect the scheduled speed of the train. 2
- 7 State the merits and demerits of the induction motor for traction duties. 3
- 8 What are the different systems of track electrification? 2
- 9 What is the scope of application of battery drive? 2
- 10 Explain the unsuitability of shunt motor for traction duties. 3

**PART – B (50 Marks)**

- 11 List the various types of furnaces in use with their applications. Describe with neat diagram the working principle of
  - i) Vertical core type furnace
  - ii) Coreless induction furnace
 10
- 12 (a) Explain the applications of (a) limit switch (b) pressure switch (c) plugging switch and (d) transfer switch. 5  
 (b) Explain the jogging operation of 3-phase induction motor with neat schematic diagram. 5
- 13 (a) What is meant by stroboscopic effect? How this effect is eliminated in fluorescent tube lighting? 4  
 (b) A lamp having a uniform CP of 200 in all directions is provided with reflector which direct 60% of total light uniformly onto a circular area of 10 M diameter. The lamp is hung 6 M above the area. Calculate the illumination (i) at centre and (ii) at the edge of the surface with and without the reflector. Determine also the average illumination over the area with out the reflector. 6
- 14 (a) What are the advantages of electric drive and state the limitations to its use? 3  
 (b) A 200 tonne motor coach having 4 motors, each developing 6000 NM torque during accelerator, starts from rest. If up gradient is 30 in 1000, gear ratio 4, great transmission efficiency 90%, wheel radius 45 cm, train resistance 50 N/tonne, addition of rotational inertia 10%, calculate the time taken to attain speed of 50 kmph. If the line voltage is 3000 V, d.c and efficiency of motors 85%, find the current taken during the notching period. 7
- 15 (a) Explain the suitability of series motor for traction duties. 5  
 (b) What are main transition connections from series to parallel operation if traction motors and what are their relative merits? 5
- 16 (a) What is skin effect and on what factors does it depend? 3  
 (b) A laminated wooden board 30 cm x 16 cm x 25 cm thick is to be heated from 20°C to 170°C in 10 minutes by dielectric heating using 30 MC PS supply. Sp heat of wood is 0.35 and density 0.55 gm/cc, relative permittivity 5, power factor 0.05. Determine the voltage across the work piece and current during heating; assume loss of energy by conduction, convection and radiation as 15%. 3
- 17 Write short notes on the following:
  - a) Traction systems in India.
  - b) D.C. versus A.C. traction
 5 + 5

**FACULTY OF ENGINEERING**

B.E. 4/4 (EEE) II - Semester (Old) Examination, April / May 2014

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Time : 3 Hours

Max. Marks: 75

**Note: Answer all questions of Part - A and answer any five questions from Part-B.****PART – A (25 Marks)**

- 1 Write the Stefan's law of heat radiation and mention all constants. (3)
- 2 Compare ac and dc welding. (2)
- 3 What do you understand by push button control stations? (3)
- 4 Differentiate ordinary switch and limit switch. (2)
- 5 What is relation between lux and lumens / m<sup>2</sup>? (2)
- 6 Define luminance and reduction factor. (3)
- 7 Discuss merits and demerits of the dc and single phase AC systems of traction. (3)
- 8 What is the value of voltage used in overhead supply for trains in India? (2)
- 9 Define specific energy consumption. (2)
- 10 Write short notes on mechanics of train movement? (3)

**PART – B (50 Marks)**

- 11 (a) Describe with neat sketches the various methods of electric resistance welding. (5)  
(b) Describe the construction and operation of an electric arc furnace. (5)
- 12 (a) A 60 Cp, 250V metal filament lamp has a measured candle power of 71 Cp at 260V and 50Cp at 240V.  
(i) Find the constant for the lamp in the expression  $C = \sigma V^b$  whose C = Candle Power and V = Voltage.  
(ii) Calculate the change of candle power per volt at 250V, Determine the percentage variation of candle power due to a voltage variation of  $\pm 4\%$  from the normal value. (10)
- 13 (a) Explain interlocking methods for reversing control of 3 - phase induction motor. (5)  
(b) Explain two supply sources of 3 - phase induction motor with that control circuit. (5)
- 14 An electric train is to have acceleration and braking retardation of 0.8 kmphps and 3kmphps respectively. If the ratio of maximum to average speed is 1.3 and time for stops 26 seconds, find scheduled speed for a run of 1.5 km. Assume simplified trapezoidal speed time curve. (10)
- 15 (a) Explain various characteristics that an ideal traction motor should possess. (5)  
(b) Write short notes on charging and rating of battering. (5)
- 16 Explain the following in brief: (10)  
(a) Sodium Vapour Lamp (b) Welding transformer and its rating.
- 17 Write short notes on any the following: (10)  
(a) Over load relays (b) Coefficient of adhesion  
(c) Advantage of Electric heating

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