

Total No. of Questions : 8]

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SEAT No. :
[Total No. of Pages : 3

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T.E. (Electrical)

UTILIZATION OF ELECTRICAL ENERGY

(2015 Pattern) (Semester - II)

Time : 2½ Hours]

[Max. Marks : 70

Instructions to the candidates:

- 1) Neat diagrams must be drawn wherever necessary.
- 2) Assume suitable data, if necessary.
- 3) Use of logarithmic tables, slide rule, Mollier charts, electronics pocket calculator is and steam table is allowed.
- 4) Figures to the right indicate full marks.

Q1) a) The following data relate to 3 phase electric arc furnace, current drawn = 4000 A, arc voltage 60 V, resistance of transformer referred to secondary = 0.0025 ohm, reactance of transformer referred to secondary = 0.0050 ohm, calculate [8]

- i) Power factor and KW drawn from supply
 - ii) If the overall efficiency of the furnace is 70 % find the time required to melt 2.5 tonne of steel if latent heat of steel = 37.2 KJ/Kg, specific heat of steel = 0.5 KJ/Kg K, melting point of steel = 1370° C and initial temperature of steel = 15° C
- b) Explain factors affecting on Electrodeposition [6]
c) Explain Faradays law of Illumination [6]

OR

- Q2) a) Explain modes of heat transfer with their mathematical expression. [6]
b) With neat diagram explain electric circuit used in refrigerator. [6]
c) Two similar lamps having uniform intensity 500 CP in all direction below the horizontal area mounted at a height of 4 mtr. What must be the maximum spacing between the lamps so that illumination on the ground midway between the lamps shall be at least one half the illumination directly under the lamp. [8]

P.T.O.

Q3) a) Explain disadvantages of steam engine drive. [8]

b) Explain function of following traction equipment [8]

- i) Circuit Breaker
- ii) Interrupter

OR

Q4) a) Explain 3 phase low frequency AC system of track electrification. [8]

b) Explain four advantages and four disadvantages of Diesel electric drive. [8]

Q5) a) Define: [8]

- i) Average Speed
- ii) Schedule Speed
- iii) Crest Speed
- iv) Coefficient of Adhesion

b) A train is required to run between two stations 3 km apart at an average speed of 50 kmph. The run is to be made to a simplified quadrilateral speed time curve. If the maximum speed is to be limited to 70 kmph, acceleration to 2 kmphs, coasting to 0.16 kmphs, breaking retardation to 3.2 kmphs respectively. Determine the duration of acceleration, coasting t and breaking period. [8]

OR

Q6) a) Draw a simplified speed time curve and explain its each part in detail. [8]

b) An electric train has quadrilateral speed time curve having uniform acceleration from rest at 2 kmphs for 25 sec, coasting for 60 sec, breaking period of 30 sec. The train is moving up gradient of 1 %, tractive resistance is 50 N/ tonne, rotational inertia effect 10 % of dead weight, duration of station stop is 10 sec and overall efficiency of transmission gear and motor as 80%. Calculate schedule speed and specific energy consumption of run. [8]

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Q7) a) Explain suitable characteristic of following motors for traction purpose [6]

- i) DC series motor
- iii) Linear Induction Motor
- b) Explain Series parallel control method. [6]
- c) A 300 tonne train on a down gradient of 1 in 75 has its speed reduced from 60 kmph to 40 kmph. Calculate energy returned to the line in a distance of 1000 mtr by adopting regenerative braking. Assume overall efficiency of 85 %, track resistance as 5 kg/tonne and allow 10 % for rotational inertia. [6]

OR

Q8) a) write a note on Anticollision system. [6]

- b) A train weighing 500 tonne is going down a gradient of 20 in 1000. It is desired to maintain train speed at 40 kmph by regenerative braking. Calculate the power fed into the line, tractive resistance is 40 N/tonne and allow 10 % for rotational inertia and efficiency of conversion as 75 % [6]

c) Explain following Transition method [6]

- i) Open Transition
- ii) Shunt Transition