Date:29/04/2017

**Total Marks: 70** 

# **GUJARAT TECHNOLOGICAL UNIVERSITY**

BE - SEMESTER-VIII (OLD) - EXAMINATION - SUMMER 2017

Subject Code:180902

**Subject Name: Electrical Power Utilization** 

Time:10:30 AM to 01:00 PM

energy consumption

### Instructions:

- 1. Attempt all questions.
- 2. Make suitable assumptions wherever necessary.
- 3. Figures to the right indicate full marks.
- Q.1 (a) Deduce the expression for the total tractive effort for propulsion of train 07 considering acceleration, up and down the gradient, to overcome resistance.
  - (b) 220 volt D.C. shunt motors has armature resistance of 0.2 ohm, shunt field resistance of 110 ohms, takes no load current of 4 Amp and runs at 900 r.p.m. Find the new speed of the motor when full load current is 50 Amp considering that the flux of motor is reduced by 5% due to effect of armature reaction.
- Q.2 (a) Draw typical speed-time curve for train movement and explain (a) acceleration (b) 07 free running (c) coasting (d) retardation.
  - (b) A 500 tonnes goods train is to be hauled by a locomotive up a gradient of 1 in 40 07 with an acceleration of 1.5 kmphps. Determine the weight of locomotive & number of axles, if axel loads not to exceed 24 tonnes. Coefficient of adhesion is 0.31, track resistance is 45 N/tonne & effective rotating masses 10% of dead weight.

#### OR

- (b) Suggest suitable A.C. and D.C. drives for following applications. Give reasons for the same. (i) Pump (ii) Blower (iii) Hoist (iv) Excavator
- **Q.3** (a) A 30 KW, 400 volts resistance oven is to employ nickel chrome strip 0.025 cm thick for 3- $\emptyset$  star connected heating elements. If wire temperature is 1100<sup>o</sup> C and that of charge is 700°C. Assume emissivity ( $\varepsilon$ ) = 0.9, radiating efficiency ( $\eta$ ) = 0.6, Specific resistance of nickel chrome alloy is 1.03 X 10-6  $\Omega$ -m. Estimate suitable width for strip.
  - (b) Explain principle of electric arc welding. Write its types. Explain any two. 07

#### OR

- Q.3 (a) Explain principle and working of vertical core type induction furnace with 07 diagram.
  - (b) What are the advantages of electrically produced heat?05Explain principle of dielectric heating.02
- Q.4 (a) Discuss track electrification methods in detail.
  (b) Explain following term (1) co-efficient of adhesion (2) schedule speed (3) specific

## OR

- Q.4 (a) Write a short note on eddy current heating.
   (b) What is electroplating? Explain factors governing electroplating. Write three 07 applications of electroplating.
   Q.5 (a) Explain design procedure of heating element with necessary expressions.
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- Q.5 (a) Explain design procedure of heating element with necessary expressions.(b) State and explain laws of illumination.

#### OR

Q.5 (a) Explain lighting scheme for factory. Discuss steps for conservation in lighting.
 (b) Explain different factors to be considered while designing lighting scheme.
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