Reg. No.									

MANIPAL INSTITUTE OF TECHNOLOGY

MANIPAL

A Constituent Institution of Manipal University

VII SEMESTER B.TECH (ELECTRICAL & ELECTRONICS ENGINEERING)

MAKEUP EXAMINATIONS, DEC 2016 - JAN 2017

SUBJECT: UTILISATION OF ELECTRICAL ENERGY [ELE 435]

REVISED CREDIT SYSTEM

Time: 3 Hours **Date: 02 January 2017** **Max. Marks: 50**

Instructions to Candidates:

- Answer **ANY FIVE FULL** questions.
- Missing data may be suitably assumed.

1A.	Mention the requirement of ideal traction system. Explain the DC system of track electrification.	**04**
1B.	Explain the factors affecting on scheduled speed in the traction.	**03**
1C.	Derive an expression for total distance travelled in km of traction using quadrilateral speed time curve with the help of figure.	**03**
2A.	An electric train is to have acceleration and braking retardation of 0.9 km /hr/sec and 3.5 km/hr/sec respectively. If the ratio of maximum to average speed is 1.4 and time for stops 28 secs, find schedule speed for a run of 1.6 km. assume trapezoidal speed time curve.	**03**
2B.	Define coefficient of adhesion. Derive an expression for tractive effort transferred to the driving wheel with a neat figure.	**03**
2C.	An electric train weighing 250 tonne has 8 motors geared to driving wheels, each wheel is 100 cm diameter. Determine the torque developed by each motor to accelerate the train to a speed of 50 kmph in 30 seconds up to a gradient of 1 in 250. The tractive resistance is of 60 newtons per tonne, the effect of rotational inertia is 10% of the train weight, the gear ratio is 5 to 1 and gearing efficiency is 85%.	**04**
3A.	500 tonne goods train is to be hauled by a locomotive up a gradient of 3 % with acceleration of 1.5 km/hr/sec. Coefficient of adhesion is 30% , track resistance 50 N/tonne and effective rotating masses 10% of the dead weight . Find the weight of the locomotive and number of axles if the axle load is not to increase beyond 24 tonne.	**03**
3B.	Describe how DC motors are suitable for traction with the help of its characteristics.	**03**
3C.	Explain the different types of transition methods in traction systems with a neat figures.	**04**
4A.	Explain the different methods of starting & speed control of 3Φ Induction motors	**04**
4B.	Explain regenerative braking system in traction. List out its advantages and disadvantages.	**03**
4C.	Describe the booster transformer using return feeder to overcome the communication interference in the railway with a neat figure.	**03**
5A.	Explain the different methods of Electric heating. Mention the properties of a good heating element.	**04**

5B.	With a neat diagram, explain the working of Coreless type or high frequency induction furnace.	**03**
5C.	A slab of insulating material 140 cm2 in area and 2 cm thick is to be heated by dielectric heating. The power required is 400 w at 40 MHz. Material has a relative permittivity of 5 and power factor of 0.05. Absolute permittivity is 8.854×10^{-12} F/m. Determine the necessary voltage.	**03**
6A.	Describe the process of projection welding with a neat figure.	**03**
6B.	Describe the Faraday's laws of electrolysis	**03**
6C.	Explain the factors on which quality of electro deposition depends	**04**