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Manipal Institute of Technology, Manipal

(A Constituent Institute of Manipal University)



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VII SEMESTER B.TECH (ELECTRICAL ENGINEERING) MAKE UP EXAMINATIONS, DEC 2015 / JAN 2016

SUBJECT: UTILIZATION OF ELECTRICAL ENERGY [ELE 435]

REVISED CREDIT SYSTEM

Time: 3 Hours

09 January 2016

MAX. MARKS: 50

Instructions to Candidates:

- ✤ Answer ANY FIVE FULL questions.
- ✤ Missing data may be suitably assumed.
- **1A.** Describe the following: i. tramwaysii. Trolley buses**04**
- **1B.** List the advantages and disadvantages of Electric drive.
- **1C.** Define the following
 - i. Crest speed
 - ii. Average speed
 - iii. Scheduled speed
- 2A. Derive an expression for maximum speed of the train. Assume a trapezoidal speed time curve.03
- 2B. An electric train has an average speed of 45 km /hr on a level track between stops 1500 m apart. It is accelerated at 1.8 km /hr/sec & is braked at 3.5 km/hr/sec. Draw the speed- time curve for the run.
- **2C.** A suburban electric train has a maximum speed of 80 km /hr. The scheduled speed including a station stop of 32 seconds is 46 km/hr. If the acceleration is 1.6 km./hr./sec, find the value of retardation when the average distance between stops is 5 km.
- 3A. A train weighing 120 tonne is to be driven up an incline of 2 % at a speed of 36 km/hr. If the train resistance at this speed is 2 kg per tonne, find the current required at 1500 V dc. If the η of the motors & gearing is 88%. . If the current were cut off, how long would the train take to come to rest? (w_e=1.1 w)
- 3B. Calculate the specific energy consumption of an electric train, if a maximum speed of 12.30 m/s & for a given run of 1530 meters, an acceleration of 0.37 m/s² are desired. Train resistance during accelerations is 52.5 Newton/1000 kg & during coasting is 6.2 Newton/1000 kg, 10% being allowable for rotational inertia. The η of the equipment during the acceleration period is 60%. Assume a quadrilateral speed time curve.

3C. Define the following

i. Dead weight

	ii. Accelerating weight	03
	iii. Adhesive weight.	05
4A.	With a neat diagram explain the starting & speed control of DC series motor using series –parallel control method.	04
4B.	Explain shunt transition method of changing over the connection from one grouping to another with neat figures.	03
4C.	With a neat diagram explain the cascade control method of starting & speed control of 3Φ Induction motor.	03
5A.	Explain with a neat diagram, the working of rail connected booster transformer.	04
5B.	Explain the faraday's laws of Electrolysis.	03
5C.	Calculate the thickness of copper deposited on a plate area of 2.3 cm ² during electrolysis if a current of 1 A is passed for 90 minutes. E.C.E of copper is 32.95×10^{-8} kg/C & density of copper is 8900 kg/m^3 .	03
6A.	Explain the different modes of heat transfer.	03
6B.	With a neat diagram, explain the principle of dielectric heating.	03
6C.	Explain the working of atomic hydrogen welding with a neat diagram. Mention its applications and advantages.	04