VIT

Vellore Institute of Technology

School of Mechanical Engineering

Continuous Assessment Test – I, August 2019, Fall Semester 2019-20

B.Tech Mechanical with spl in Automotive Engineering

Course Code	: MEE1035	Duration	: 90 minutes
Course Name	: Automotive Electricals	Max. Marks	: 50
Slot/Batch	: B1+TB1	Faculty	: Prof. T.Vijayakumar

- **Avoid irrelevant answers**
- **Make your sketches neatly with pencil**
- **Answer all the questions**

Part A (5x10=50)

1. a. A copper wire and an aluminum wire are connected in parallel. Their respective specific resistances are in the ratio *50:20*. The former carries *70* percent more current than the latter and the latter is *53* percent longer than the former. Determine the ratio of the diameters of the wires. **(5)**

   b. Calculate the ideal copper cable size required for a fuel pump circuit. The pump draws *8 A* from a *12 V* battery. The maximum allowable volt drop is *0.5 V*. The length of the cable is limited to *1.2 m*. Take the resistivity of copper as *0.017 μΩ-cm* **(5)**

2. The filament of an automotive head lamp, operated at *12.6 V*, is to be constructed from a wire having a diameter of *0.02 mm* and a resistivity at *20 °C* of *2.89 x 10^{-8} Ω-cm*. If *α = 0.005 / °C*, what length of filament is necessary if the lamp is to dissipate *80 W* at a filament temperature of *2420 °C*.

3. The coil of a relay takes a current of *0.12 A* when it is at the room temperature of *15 °C* and connected across a *12.6 V*. If the minimum operating current of the relay is *0.15 A*, calculate the temperature above which the relay will fail to operate when connected to the same supply. Resistance temperature coefficient of the coil material is *0.0043 per °C at 6 °C*

4. Gassing is one of the major problems that are faced by the conventional lead acid batteries. Explain the conditions under which the gassing can happen inside the battery and how it is taken care of in conventional batteries. Also explain in detail the recent advancements that are made in the lead acid battery technology to avoid these gassing problems. Make suitable sketches and use appropriate chemical equations to explain your answers.

5. Technician A states that "Ignition cables in a gasoline powered automotive vehicle are normally made of Copper alloy". Technician B states that "The grid structure of a plate, in a typical cell does not affect the current output of a cell". Are the statements of the technicians are correct? Justify your answers with relevant theory