



Answer the following questions:

I. Electrical Networks:

(Mark 6.25)

- 1.a. Define: i. Step voltage ii. Touching voltage
- 1.b. Prove that, $\rho = 2\pi LR$ for the measurement of the earth resistivity using four electrode method.
- 1.c. Explain the standard cable tests which are required for checkup during the service time.

II. Electrical Machines:

(Mark 6.25)

- 2.a. Explain the rotor resistance control method to control the speed of the 3-phase, slip ring I.M. in the laboratory, illustrating the torque/slip curves and the connection diagram.
- 2.b. What are the differences between induction regulator and tapping transformer as a voltage regulator.
- 2.c. Discuss the following sentence: "the results obtained in the laboratory show that the efficiency of universal motor is low when supplied from AC source".

III. High Voltage:

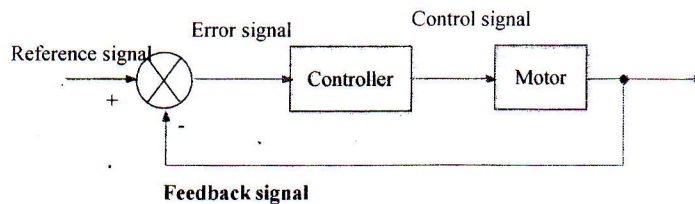
(Mark 6.25)

- 3.a. Demonstrate the equivalent circuit of the insulator and the corresponding current components when this insulator is subjected to a step DC voltage. Then, deduce the shape of measured insulator resistance.
- 3.b. Show experimentally, how can you study the impact of applied AC voltage on the corresponding leakage current for single insulator with clean and all levels of pollution of the surface.

IV. Control:

(Mark 6.25)

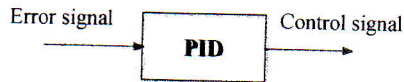
- 4.a. In your opinion, what is the difference between the current based and the voltage based control systems?
- 4.b. The following diagram shows a simple analog closed loop control system on a dc motor that controls the position of the shaft.



- i. Show how getting the feedback signal representing the shaft position?
- ii. If the used controller is proportional, what is the effect of its gain value on the response?
- iii. Show how limiting the overshoot without using any other type of controllers?

4.c. What is the difference between the NTC and PTC thermistor transducers?

4.d. In analog control systems, how constructing the following controller type?



NOTE: Draw the complete electrical circuit to get the control signal from the error signal.

With best wishes

This exam measures the following ILOs												
Question no.	Q1-a	Q2-b	Q3-a	Q4-a	Q1-c	Q2-c	Q4-b	Q4-c	Q1-b	Q2-a	Q3-b	Q4-d
Skills	A2	A17	A11	A4	B2	B7	B4	B4	C1	C9	C13	C9
	Knowledge & Understanding Skills				Intellectual Skills				Professional Skills			