TED (10)–3004

(REVISION—2010)

Reg.No. 11031218

Signature

SECOND SEMESTER DIPLOMA EXAMINATION IN ELECTRICAL AND ELECTRONICS ENGINEERING—MARCH, 2011

BASIC ELECTRICAL ENGINEERING

[*Time* : 3 hours

(Maximum marks : 100)

PART—A

Marks

(Answer the following questions in one or two sentences. Each question carries 2 marks.)

I 1. The two devices having different power rating connected in series, which device will have higher voltage ?

2. The area of the plate of a capacitor increases, what would be the effect on capacitance ?

3. Distinguish between statically and dynamically induced emf.

4. What is the power factor of a circuit haying 45% reactive power ?

5. An alternating current given by $i1 = 10 \sin (\omega t + \pi/3)$ What is the RMS value and phase ? (5×2=10)

PART—B

(Answer any *five* of the following. Each question carries 6 marks.)

II 1. Show the various steps involved in converting a network into a Norton equivalent circuit with suitable examples.

2. Explain the charging and discharging phenomenon of a capacitor through a resistor.

3. The equation of an alternating current is $i = 42.2 \sin 628t$. Determine its :
   (i) Maximum value
   (ii) Frequency
   (iii) RMS value
   (iv) Average value
   (v) Form factor.

4. Deduce the impedance and power factor angle of RL series circuit with phasor diagram and waveform.

5. Plot and analyze the variation of magnetic flux density with magnetizing force in a soft iron piece.

6. Distinguish between apparent power, active power and reactive power in AC circuits and also specify which elements contributing these powers.

7. Analyze the voltage distribution in a series circuit while using it as potential divider with the relation of applied voltage, current and resistances. (5×6=30)

Marks

PART—C

(Answer *one* full question from each unit. Each question carries 15 marks.)

UNIT—I

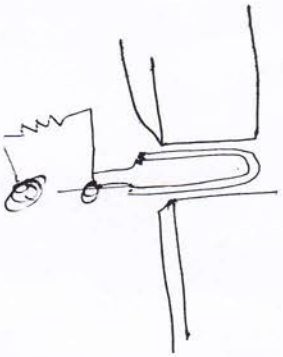
III 1. Show the method of applying Thevenins theorem to a given circuit with necessary circuit diagram. 5

2. Two batteries A and B are connected in parallel and a load of 10 ohm is connected across their terminals. A has an EMF of 12 V and internal resistance of 2 ohms, B has an EMF of 8 V and internal resistance of 1 ohm. Use Kirchhoffs law to determine the values and the direction of current flowing in each of batteries and in the external resistance. Also determine PD across the external resistance. 10

OR

IV 1. Analyze the variation of resistance with temperature and show the various factors affecting temperature coefficient of resistance. 5

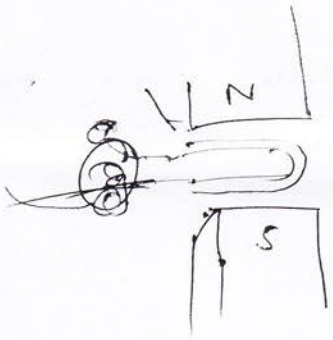
2. A 60 W, 240 V incandescent filament lamp is switched on at 20°C. The operating temperature of the filament is 2000°C. Determine the current taken by the lamp at the instant of switching on. The temperature coefficient of resistance of filament material is 0.0045/K.



UNIT—II

V 1. State the factors affecting energy stored in a capacitor and derive an expression.

2. Two capacitors A and B are connected in series across 100 V supply and it is observed that the pd across them are 60 V and 40 V respectively. A capacitor of 2 μf capacitance is now connected in parallel with A and pd across B rises to 90 V. Determine the capacitance of A and B.



OR

VI 1. State the factors affecting force on a current carrying conductor.

2. A rectangular shaped core is made of mild steel plate 15 mm × 20 mm cross-section. The mean length of the magnetic path is 18 cm. The exciting coil has 300 turns and current 0.7 A. Calculate.

(i) Magnetizing force (iii) Reluctance

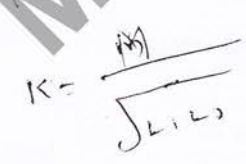
(ii) Flux density (iv) Flux of magnetic circuit.

Assume the relative permeability of mild steel as 940

UNIT—III

VII 1. State the factors affecting coefficient of coupling and derive an expression.

2. Describe the generation of sinusoidal alternating voltage in a generator and obtain an equation representing the waveform.



OR

VIII 1. Analyze the significance of self inductance in a circuit and derive the energy stored in an inductor.

2. The field winding of DC electromagnet is wound with 960 turns and has resistance of 50 ohm when the exciting voltage is 230 V, the magnetic flux linking the coil is 0.005 wb. Calculate the self inductance of the coil and energy stored in the magnetic field.

Marks

Unit—IV

IX 1. Show the variation in current and power factor when the circuit elements changes in an RLC circuit with phasor diagram. 5

2. An emf represented by $e = 100 \sin (100 \pi t)$ is impressed across a circuit consisting of 40 ohm resistor in series with a 40 μf capacitor and a 0.25 H inductor. Determine :

   (i) The RMS value of current

   (ii) The power supplied

   (iii) The power factor. 10

Or

X 1. An impedance $Z_1 = (8-j5)$ ohm is in parallel with an impedance $Z_2 = (3+j7)$ ohm, if 100 V are impressed on parallel combination, find branch currents I_1, I_2 and the resultant current. Draw the corresponding phasor diagram. Calculate also the equivalent resistance, reactance and impedance of the whole circuit. 10

2. State the utility of resonance in RLC series circuit and derive an expression for resonant frequency. 5
