TED (10)–3004

Reg. No. .....

(REVISION—2010)

Signature .....

SECOND SEMESTER DIPLOMA EXAMINATION IN ELECTRICAL AND ELECTRONICS ENGINEERING—OCTOBER, 2013

BASIC ELECTRICAL ENGINEERING

[*Time* : 3 hours

(Maximum marks : 100)

PART—A

Marks

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

1. Define voltage source.
2. What is meant by permeance of a magnetic circuit ?
3. What is permittivity of free space ?
4. What is indicated by negative sign before induced emf equation ?
5. What is meant by resonant frequency ? (5×2=10)

PART—B

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

1. What is an energy source ?
2. What is meant by dielectric strength of a medium ?
3. State the laws of electrostatics.
4. What is difference between dynamically induced emf and statically induced emf ?
5. What is meant by coefficient of coupling between the coils ?
6. Does an inductor draw instantaneous power as well as average power ?
7. Why do we never discuss apparent power, active power and reactive power in dc circuit ? (5×6=30)

PART—C

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

UNIT—I

III (a) How does increase in temperature affect the resistance of :
(i) conductors ; and (ii) insulators 6

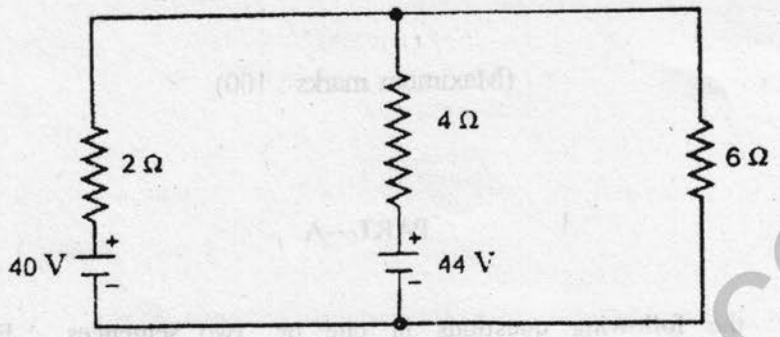
(b) The filament of a 60W, 230 V lamp has normal working temperature 2000° C. Take the temperature coefficient (say at room temperature of 20° C) to be 0.005. Find the approximate current which flows at instant of switching to the cold lamp. 9

OR

Marks

IV (a) What is maximum power transfer theorem ? 6

(b) Figure shows two batteries connected in parallel each represented by an emf along with its internal resistance. A load resistance 6Ω is connected across the ends of the batteries. Calculate the current through each battery and the load.



9

UNIT—II

V (a) Explain the idea of fixed capacitors and variable capacitors. 6

(b) The capacitance of a capacitor formed by two parallel metal plates each 200 cm^2 in area separated by a dielectric 4 mm thick is 0.0004 μF. A potential difference of 20 kV is applied. Calculate :

(i) the total charge on the plates

(ii) potential gradient in the dielectric

(iii) flux density

9

OR

VI (a) Derive the relation between flux density and magnetizing force. 6

(b) A cast steel electromagnet has an air gap length of 3 mm and iron path length 40 cm. Find the number of ampere turns necessary to produce a flux density of 0.7 Wb/m^2 in the gap. Neglect leakage and fringing. Assume ampere turns required for air gap to be 70% of the total ampere turns. 9

UNIT—III

VII (a) On what factors does the experienced by a current carrying conductor placed in a magnetic field depend ? 6

(b) Two coils having 100 and 50 turns respectively are wound on a core with $\mu = 4000\mu_o$. Effective core length = 60 cm and core area = 9 cm^2. Find mutual inductance between the coils. 9

OR

VIII (a) Differentiate between form factor and peak factor. 6

(b) The equation of an alternating current i = 42.42 sin 628t. Determine :

(i) its maximum value

(ii) frequency

(iii) rms value

(iv) average value

(v) form factor

9

Marks

UNIT—IV

IX (a) What are active and reactive powers ? Draw the power triangle. 6

(b) A series R-C circuit takes a power of 7,000 W when connected to 200 V, 50 Hz supply. The voltage across the resistor is 130 V. Calculate :

(i) the resistance (R)
(ii) current (I)
(iii) power factor (cosϕ)
(iv) capacitance (c)
(v) impedance (Z) 9

OR

X (a) What is series resonance ? Why it is called the voltage resonance ? 6

(b) A pure resistance of 50 ohms is in series with a pure capacitance of 100 μF. The series combination is connected across 100 V, 50 Hz supply. Find :

(i) the impedance (Z)
(ii) current (I)
(iii) power factor (cosϕ)
(iv) phase angle (ϕ) 9